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Linn Street Exchange RAD Conversion Renovations

Solicitation No. 2025-3018

CMHA

Cincinnati Metropolitan Housing Authority

1627 Western Avenue
Cincinnati, OH 45214

Revised 8/04/ 2025
Addendum 01

PROJECT MANUAL

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

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1. BID DOCUMENTS

CMHA Linn Street Exchange - Solicitation No. 2025-3018

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INVITATION FOR BIDS
SCHEDULE AND INSTRUCTIONS

CINCINNATI METROPOLITAN HOUSING AUTHORITY

SOLICITATION 2025-3018: Linn St. Exchange RAD Conversion Renovations

PROJECT MANUAL

DATE ISSUED	July 21, 2025
OPTIONAL SITE VISIT/WALK THROUGH	**July 29, 2025 @ 10:30** **1505 Jones St., Cincinnati, OH** It is suggested that the attendees have read the Scope of Work
LAST DATE FOR QUESTIONS	**August 11, 2025 5:00 pm** Questions shall be submitted in writing to michael.koch@cintimha.com. Responses to questions will be posted as an addendum to the website along with the other solicitation documents.
PROPOSAL SUBMITTAL DEADLINE & PUBLIC OPENING	**Bid due date: August 19, 2025 @ 10:00a.m** **Sealed Hard Copy Bids** must be delivered to: Cincinnati Metropolitan Housing Authority 1627 Western Ave. Cincinnati OH 45214
WHAT TO SUBMIT	Bid Package MUST include the following documents: 1. Bid Form 2. Bid Bond 3. Non-Collusive Affidavit 4. Disclosure of Lobbying Activities, 5. Form HUD-2530, 6. Form HUD-5369A
NOTICE OF INTENT TO SUBMIT	It is suggested that interested companies submit a Notice of Intent to submit a proposal to procurement@cintimha.com. By indicating your intent to submit a proposal you will receive notice of any addenda posted.
CONSTRUCTION TIME	**420** Calendar days from the date stated in the "Notice to Proceed"

CMHA Reserves the right to modify this schedule at its discretion.

1. In 2012, CMHA established its Gold Performance Standards which consist of the principles and values by which the Agency performs and how our partners, vendors, contractors and consultants are measured.

   The Gold Performance Standards are: Respect, Timely, Exceptional, Initiative, Excellent, Quality, Accurate, Integrity, Value, Creativity, Accountability and Professionalism.

   It is CMHA's intent to procure Contractors that share these standards and can clearly demonstrate the services they can provide CMHA that no other contractor can offer. It's very imperative that our partners, vendors, contractors and consultants abide by these standards that have been established.

2. The Contractor shall hold the offer for 330 days after Bid Due Date

3. Notification of changes in the form of Addendums will be made available to all interested parties via an email and/or by posting on CMHA's website.

4. Only the documents stated on the Solicitation as required will be evaluated. DO NOT include additional documents like, but not limited to: references, licenses, curriculum vitae, previous job pictures. Submitting additional documents may cause the proposal to be unresponsive.

5. This project is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended. Preference may be given in accordance with 24 CFR 135 and the CMHA procurement policy.

6. The Prevailing Wages shall be paid for a legal day's work to laborers, workmen or mechanics engaged in work under this Contract, at the site of the Project, in the trade or occupation listed.

7. The Authority reserves the right to reject and not consider any proposal that does not meet the requirements of this Solicitation, including but not necessarily limited to incomplete proposals and/or proposals offering alternate or non-requested services, proposals deemed non-responsive, respondents deemed not responsible, and conditional proposals.

8. The responsibility for submitting a response to this request at the designated office of the Cincinnati Metropolitan Housing Authority on or before the stated time and date will be solely and strictly of the Proposer. The Authority will in no way be responsible for the delays caused by the delivery manner chosen by the respondent or caused by any other occurrence.

END OF CONDITIONS

INVITATION FOR BIDS
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SOLICITATION No. 2025-3018 - PROPOSAL

TO THE CINCINNATI METROPOLITAN HOUSING AUTHORITY (CMHA)

In submitting this proposal,_____understands that the right is reserved by the Cincinnati Metropolitan Housing Authority to reject any and all Proposals. If written notice of the acceptance of this proposal is mailed, telegraphed or delivered to the undersigned within 250 days after the opening thereof, or at any time thereafter before this proposal is withdrawn, the undersigned agrees to execute and deliver a contract in the prescribed form and furnish the required bond and insurance certifications no later than 10 days after the "Notice of Intent".

1. Total Proposal Amount (TPA)

The base proposal to include all work indicated, administrative costs and Addendums, is

_____
Figure

_____Dollars.
Words

Note: The Total Proposal Amount shall be shown in both words and figures; in case of discrepancy, the amount in words shall govern. To be valid proposal, the Fee Submission Form must be filled out in its entirety with all certifications and affidavits. It must be submitted with and is part of the Proposal Packet.

Attached hereto is an affidavit in proof that the undersigned has not entered into any collusion with any person in respect to this proposal or any other proposal or the submitting of Proposals for the contract for which this proposal is submitted. Also attached is a completed Form HUD-5369-A, Representations, Certifications, and Other Statements of Bidders.

Work under this Contract will begin immediately upon the successful Contractor's receipt of a "Notice to Proceed" from CMHA. The "Notice to Proceed" will follow the completion of an executed contract.

2. Alternate Bid

An Alternate Bid or Alternate is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted. Any alternates accepted by the owner shall be accepted in the order in which they are listed in the form of Bid.

DEDUCT D01: Remove Linn Street building lighting. Remove work from A500 Sheet Elevations and Electrical drawings. $_____

DEDUCT D02: Remove Masonry Cleaning. Remove work shown on A500 Sheets and in Specifications. $_____

DEDUCT D03: Sitework: Remove fence repair. Remove all stone work and metal work associated with parking lot boundary fence and mechanical yard fences and gates. Remove work shown on G401 and Work Shown in A500 sheets. $_____

DEDUCT D04: Sitework: remove parking lot repair and stripping (excluding lighting). Remove work shown on Sheet G401 & C100. $_____

DEDUCT D05: Remove new solid surface countertop and replace with plastic laminate countertop. Refer to material schedule. $_____

DEDUCT D06: Remove "Provide vanity cabinet, counter with integral sink and facet" (note W02) with revised note to say "Provide counter with integral sink and facet, UNO" the existing vanity cabinet to remain. Provide price per unit to replace the vanity cabinet. See Material Schedule basis of design for reference. $_____

3. Unit Costs

Unit costs shall be inclusive of materials, labor, overhead and profit. The unit prices offered will be used to increase or decrease the Total Contract Amount based on the existing conditions determined by the Owner at the time of construction of any given building. No unit prices may be used without the written permission of the Owner. CMHA has the right to reject any proposal which indicates an unbalanced proposal or prices.

1. Repair sub floor: $/sf _____
2. Subfloor seal: $/ sf _____
3. Roof substrate repair: $/sf _____
4. Replace wet or removed insulation: $/sf _____
5. Repair damaged joist: $/lf _____
6. Replace countertops: $/lf _____
7. Roof repair: $/sf _____
8. Price per unit vanity cabinet. $/ unit _____

4. Bid Bond

A Bid Bond of 10% of the Total Proposal Amount is included in the Proposal

_____
Figure

_____Dollars.
Words

All bid bonds be a shall be issued by Surety Companies licensed to issue bonds in the State of Ohio and listed in Federal Register Circular #570. The current power of attorney for the person who signs for any surety company shall be attached to the bid bond.

The CMHA will have the right to retain the bid security of bidders to whom an award is being considered until either (a) the contract has been executed and bonds, if required, have been executed, (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

5. Acknowledgment's

I acknowledge receipt and acceptance of the following:

- Scope of Work
- General Contract Conditions (HUD-5370)
- MBE/WBE Participation Report
- S3 Residents and Business Concerns
- Prevailing Wages Clause
- Wage Determination Rates
- Addendum No. Dated:
- Addendum No. Dated:
- Addendum No. Dated:

6. Basis of Contract Award

CMHA intends to award this contract to the Lowest Responsive Bidder complying with these Public Bid Specifications, Drawings and Addenda, if any, provided the Contractor's proposal is reasonable and in the best interest of CMHA to accept it.

7. Contract Time

The contract performance period from the "Notice to Proceed" until Substantial Completion, will be

420 Calendar Days.

8. Assurance of Compliance

The successful Bidder shall furnish an assurance of completion prior to the execution of any contract under this solicitation in the form of a performance and payment bond in a penal sum of 100 percent of the contract price.

9. Minority Business Enterprise (MBE) & Women Business Enterprise(WBE)

The contractor agrees to make its best effort to expend at least 20% of the total dollar amount of the

Contract on Minority Business Enterprises (MBE), an entity with at least 51% ownership interest by a minority in business), and at least 5% of the Contract to a Women Business Enterprises (WBE), an entity with a least 51% ownership interest by a woman in business.

Prior to award of Contract, the Contractor will submit documents in support of its best efforts to achieve the above stated MBE/WBE participation. Best efforts may be established by documenting that the Contractor:

- Has made efforts to identify appropriate MBE/WBE contractors through community contacts or MBE and WBE associations.
- Has contacted CMHA's Economic Inclusion Coordinator to help identify potential
- MBE/WBE companies appropriate for the project.
- Has contacted and solicited proposals/Proposals from selected MBE/WBE companies.

Contractors agrees to promptly complete and return all required reports confirming MBE/WBE participation, including Proposed, Amended, and Final MBE/WBE Participation Forms. If requested by CMHA, the Contractor agrees to submit proof of payment made to each MBE/WBE subcontractor listed on the MBE/WBE Participation Report.

Request for complete or partial waiver of the contractor's MBE/WBE participation goals must be made in writing, stating all details in the request, the circumstances, and all relevant information. The request must be accompanied by a record of all efforts taken by the Bidder/Bidder to locate MBE/WBEs, solicit MBE/WBEs, seek assistance from CMHA's Economic Inclusion Coordinator, or seek help from other community/business resources or technical assistance agencies. CMHA will respond in writing to the Waiver Request within five (5) business days upon receipt.

10. Section 3 Certification of Preference

Please note that a contract with the Cincinnati Metropolitan Housing Authority is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended and to the Section 3 Action Plan submitted with the proposal for this project.

Type of Business (circle all that apply)

ϒ Corporation	ϒ Partnership	ϒ Sole Proprietorship	ϒ Joint Venture
ϒ LLC	ϒ MBE	ϒ WBE	ϒ

You self-certify that your business has documented within the last six months a Section 3 Business Concern based on one of the eligibility criteria below. (Check the one that qualifies your business):

- ϒ **Category 1:** 51 percent or more owned and controlled by low- or very low-income people (based on household income under HUD-income limits)
- ϒ **Category 2:** 75 percent or more of the business labor hours to perform the business are performed by low-very low-income people.
- ϒ **Category 3:** 51 percent owned and controlled by current residents of public housing or Section 8-assisted housing.
- ϒ My business does not meet the Section 3 eligibility criteria and wishes to forgo Section 3

  preferences in the awarding of this contract but understand that we are still responsible for meeting Section 3 compliance.

11. Section 3 – Action Plan

Please check any and all efforts from the below mentioned categories that your company will utilize to:

- ϒ Recruit, solicit, encourage, facilitate and hire Section 3 Workers when new hiring/training opportunities are generated through the awarding of the contract.
- ϒ Recruit, solicit, encourage, facilitate and Subcontract with Section 3 Business Concerns when new subcontracting opportunities are generated through the awarding of the contract.

Your acknowledgment is still needed, so please check accordingly. The Section 3 Action Plan is subject to audit at any time during the awarding of the contract through the duration of the contract by the Section 3 Compliance Coordinator

You are required to the provide opportunities to "the greatest extent feasible" in order to comply with the requirements of Section 3. In the event that you are not able to hire/train and/or contract with Section 3 Residents and/or Section 3 Business Concerns, you will be required to document why you were unable to meet the numerical goals.

a. Opportunities Strategies - Hiring / Training

- **Mandatory** Commit that the company and/or subcontractors as a result of the contract, 25% of the labors hours will be Section 3 Workers.
- **Mandatory** Contact the CMHA Section 3 Compliance Coordinator regarding
- employment and training opportunities.
- **Mandatory** Provide the CMHA Section 3 Compliance Coordinator with a monthly report listing all employment and training opportunities.
- **Mandatory** Post notice (placards) at the worksite where the work is being done,
- indicating any employment and training opportunities
- Facilitate or co-facilitate Hiring Halls within close proximity to where the work is being done for Section 3 Workers and Tags.
- Contact/Meet with Resident Associations informing them of new training and
- employment opportunities.
- Advertise new training and employment opportunities in community and diversity newspapers/websites.
- Sponsor or participate in job informational meetings or job fairs in the neighborhood or
- service area of the Section 3 covered project.
- Establish an internal training program (pre-apprenticeship) that is consistent with Dept. of Labor requirements to provide Section 3 Workers with the opportunity to learn skills and job requirements.
- Distribute flyers to CMHA owned sites indicating the number and types of jobs that will be offered with contact information.
- Maintain a file of eligible qualified Section 3 Workers and Targeted Section 3 Workers
- for future employment opportunities.

- Incorporate into contract (after selection of Bidders but prior to the execution of contracts), a negotiated provision for a specific number of Section 3 Workers to be trained and/or employed during the contract.
- Other:

_____

_____

b. Opportunities Strategies - Subcontracting

- **Mandatory** Contact the CMHA Section 3 Compliance Coordinator regarding all new subcontracting opportunities.
- **Mandatory** Provide the CMHA Section 3 Compliance Coordinator with a monthly report
- listing all subcontracting opportunities.
- Advertise new contracting opportunities in community and diversity newspapers/websites.
- Maintain a file of eligible qualified Section 3 Business Concerns for future contracting opportunities.
- Incorporate into contract (after selection of Bidders but prior to the execution of contracts), a negotiated provision for a specific amount of work to be contracted with Section 3 Business Concern(s) during the contract.
- Sponsor or participate in minority, women, small business expositions and or conferences in the Cincinnati, Ohio area to network and promote contracting opportunities with Section 3 Business Concern
- Outreach to business assistance agencies, minority contracting associations, community organizations, to network and promote contracting opportunities with Section 3 Business Concerns.
- Contact/Meet with Resident Associations informing them of new contracting opportunities.
- Outreach to trade/labor organizations to network and promote contracting opportunities
- with Section 3 Business Concerns.
- Host/Facilitate workshops geared to Section 3 Business concerns on contracting procedures and opportunities.
- Become an active mentor to Section 3 Business Concerns.
- Other:

_____

_____

INVITATION FOR BIDS
BID BOND SAMPLE

The undersigned is familiar with the local conditions, regulations and codes affecting the cost of the work, and with the Drawings and Specifications, issued and Addenda, if any thereto.

The penalty for making false statements in any offer is prescribed in 19 U.S.C. 1001.
FILL WITH LEGIBLE BLOCK LETTERS

Amount:_____

Legal Business Name: _____

DBA Name (If Applicable): _____

Business Address: _____

City, State, Zip: _____

Fed. Tax ID: _____

Business SAM.gov Unique Entity ID: _____

Email / Phone No.: _____

Signature:_____

Name:_____

Title: _____

Direct to Section3@cintimha.com any questions regarding CMHA's:

- MBE/WBE Program
- Section 3 Business Concerns

KNOWN ALL MEN BY THESE PRESENTS, that we:

_____

(Insert full name and address or legal title of Contractor) as

Principal, hereinafter called the principle, and:

(Insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of:

_____as Surety, hereinafter called the Surety,

are held and firmly bound unto:

(Insert full name and address or legal title of Owner) hereinafter called

the Obligee, in the sum of (10% of Bid):

_____DOLLARS
(In Words)

$_____

for payment of which sum, well and truly to be made, we hereby jointly bind ourselves, our heirs, executors, administrators, successors and assigns. The CONDITION OF THIS OBLIGATION IS SUCH, that whereas, the Principal has submitted the accompanying bid, dated:

_____20_____for _____

_____

NOW, THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee 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 Obligee the difference between the amount specified in said Bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bond, then this obligation shall be null and void, otherwise to remain in full force andeffect.

SIGNED SEALED ANDDATED THIS_____DAY OF_____, 20_____

WITNESS PRINCIPAL

BY_____

SURETY

BY_____

Note: In lieu of such bond, the Bidder shall include with his proposal, a Certified Check, Bank Draft, or U.S. Government Bond at par value, payable to the Obligee.

Certified Check for_____

DOLLARS - ON_____BANK OF _____

_____DEPOSITED HEREWITH

BIDDER

BY_____

_____
TITLE

TO THE CINCINNATI METROPOLITAN HOUSING AUTHORITY (CMHA)

State of _____

County of _____

_____, being first sworn, deposes:

and says that he is □ sole owner, □ partner, □ other_____of

(Firm Name) _____

the party making the foregoing proposal or bid, that such proposal or bid is genuine and not collusive or sham; that aspired, connived or agreed, directly or indirectly, with any bidder or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly, or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or of any other bidder, or to fix any overhead, profit or cost element of said bid price, to secure any advantage against the Cincinnati Metropolitan Housing Authority or any person interested in the proposed contract; and that all statements in said proposal or bid are true.

_____

Signature of Bidder: (If Individual)

_____

Signature of Bidder: (If Partnership)

_____

Signature of Bidder: (If Corporation)

Subscribed and sworn to before me this_____day of_____, 20_____

_____ My commission expires_____, 20____Notary Public

FOR CONTRACTS, GRANTS, LOANS AND COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Fill with legible block letters

Signature:_____

Name:_____

Title:_____

Date: _____

Covered Action: _____

Type and identify program, project or activity

Previous Participation Certification

OMB Approval No. 2502-0118
(Exp. 05/31/2019)

US Department of Housing and Urban Development
Office of Housing/Federal Housing Commissioner

US Department of Agriculture
Farmers Home Administration

Part I to be completed by Principals of Multifamily Projects *(See instructions)* Reason for submission:		**For HUD HQ/FmHA use only**	
1. Agency name and City where the application is filed		**2**. Project Name, Project Number, City and Zip Code	
3. Loan or Contract amount $	**4**. Number of Units or Beds	**5**. Section of Act	**6**. Type of Project (check one) ☐ Existing ☐ Rehabilitation ☐ Proposed (New)

7. List all proposed Principals and attach organization chart for all organizations

Name and address of Principals and Affiliates (Name: Last, First, Middle Initial) proposing to participate	**8 Role of Each Principal in Project**	**9. SSN or IRS Employer Number**

Certifications: The principal(s) listed above hereby apply to HUD or USDA FmHA, as the case maybe, for approval to participate as principal(s) in the role(s) and project listed above. The principal(s) each certify that all the statements made on this form are true, complete and correct to the best of their knowledge and belief and are made in good faith, including any Exhibits attached to this form. **Warning:** HUD will prosecute false claims and statements. Conviction may result in criminal and/or civil penalties. The principal(s) further certify that to the best of their knowledge and belief:

1. Schedule A contains a listing, for the last ten years, of every project assisted or insured by HUD, USDA FmHA and/or State and local government housing finance agencies in which the principal(s) have participated or are now participating.
2. For the period beginning 10 years prior to the date of this certification, and except as shown on the certification:

a. No mortgage on a project listed has ever been in default, assigned to the Government or foreclosed, nor has it received mortgage relief from the mortgagee;
b. The principals have no defaults or noncompliance under any Conventional Contract or Turnkey Contract of Sale in connection with a public housing project;
c. There are no known unresolved findings as a result of HUD audits, management reviews or other Governmental investigations concerning the principals or their projects;
d. There has not been a suspension or termination of payments under any HUD assistance contract due to the principal's fault or negligence;
e. The principals have not been convicted of a felony and are not presently the subject of a complaint or indictment charging a felony. (A felony is defined as any offense punishable by imprisonment for a term exceeding one year, but does not include any offense classified as a misdemeanor under the laws of a State and punishable by imprisonment of two years or less);
f. The principals have not been suspended, debarred or otherwise restricted by any Department or Agency of the Federal Government or of a State Government from doing business with such Department or Agency;
g. The principals have not defaulted on an obligation covered by a surety or performance bond and have not been the subject of a claim under an employee fidelity bond;

3. All the names of the principals who propose to participate in this project are listed above.
4. None of the principals is a HUD/FmHA employee or a member of a HUD/FmHA employee's immediate household as defined in Standards of Ethical Conduct for Employees of the Executive Branch in 5 C.F.R. Part 2635 (57 FR 35006) and HUD's Standard of Conduct in 24 C.F.R. Part 0 and USDA's Standard of Conduct in 7 C.F.R. Part 0 Subpart B.
5. None of the principals is a participant in an assisted or insured project as of this date on which construction has stopped for a period in excess of 20 days or which has been substantially completed for more than 90 days and documents for closing, including final cost certification, have not been filed with HUD or FmHA.
6. None of the principals have been found by HUD or FmHA to be in noncompliance with any applicable fair housing and civil rights requirements in 24 CFR 5.105(a). (If any principals or affiliates have been found to be in noncompliance with any requirements, attach a signed statement explaining the relevant facts, circumstances, and resolution, if any).
7. None of the principals is a Member of Congress or a Resident Commissioner nor otherwise prohibited or limited by law from contracting with the Government of the United States of America.
8. Statements above (if any) to which the principal(s) cannot certify have been deleted by striking through the words with a pen, and the relevant principal(s) have initialed each deletion (if any) and have attached a true and accurate signed statement (if applicable) to explain the facts and circumstances.

Name of Principal	**Signature of Principal**	**Certification Date(mm/dd/yyyy**	**Area Code and Tel. No.**
This form prepared by (print name)		**Area Code and Tel. No.**	

IFB Project Manual Rev. 1 (10/24)

Previous editions are obsolete **ref Handbook 4065.1 Form HUD-2530 (2/2013)**

Schedule A: List of Previous Projects and Section 8 Contracts. Below is a complete list of the principals' previous participation projects and participation history in multifamily Housing programs of HUD/FmHA, State and local Housing Finance Agencies. **Note:** Read and follow the instruction sheet carefully. Make full disclosure. Add extra sheets if you need more space. Double check for accuracy. If no previous projects, write by your name, "**No previous participation, First Experience"**.

1. Principals Name (Last, First)	2. List of previous projects (Project name, project ID and, Govt. agency involved)	3.List Principals' Role(s) (indicate dates participated, and if fee or identity of interest participant)	4. Status of loan (current, defaulted, assigned, foreclosed)	5.Was the Project ever in default during your participation **Yes**	**No**	**If yes, explain**	6. Last MOR rating and Physical Insp. Score and date

Part II- For HUD Internal Processing Only

Received and checked by me for accuracy and completeness; recommend approval or refer to Headquarters after checking appropriate box.

Date (mm/dd/yyyy)	Tel No. and area code	☐A. No adverse information; form HUD-2530 approval recommended.	C. Disclosure or Certification problem
Staff	Processing and Control	☐B. Name match in system	D. Other (attach memorandum)

Supervisor	Director of Housing/Director, Multifamily Division	Approved ☐ Yes ☐ No	Date (mm/dd/yyyy)

Instructions for Completing the Previous Participation Certificate, form HUD-2530

Carefully read these instructions and the applicable regulations. A copy of those regulations published at 24 C.F.R. 200.210 to 200.245 can be obtained from the Multifamily Housing Representative at any HUD Office. Type or print neatly in ink when filling out this form. Mark answers in all blocks of the form. If the form is not filled completely, it will delay approval of your application.

Attach extra sheets as you need them. Be sure to indicate "Continued on Attachments" wherever appropriate. Sign each additional page that you attach if it refers to you or your record.

Carefully read the certification before you sign it. Any questions regarding the form or how to complete it can be answered by your HUD Office Multifamily Housing Representative.

Purpose: This form provides HUD with a certified report of all previous participation in HUD multifamily housing projects by those parties making application. The information requested in this form is used by HUD to determine if you meet the standards established to ensure that all principal participants in HUD projects will honor their legal, financial and contractual obligations and are acceptable risks from the underwriting standpoint of an insurer, lender or governmental agency. HUD requires that you certify your record of previous participation in HUD/USDA-FmHA, State and Local Housing Finance Agency projects by completing and signing this form, before your project application or participation can be approved.

HUD approval of your certification is a necessary precondition for your participation in the project and in the capacity that you propose. If you do not file this certification, do not furnish the information requested accurately, or do not meet established standards, HUD will not approve your certification.

Note that approval of your certification does not obligate HUD to approve your project application, and it does not satisfy all other HUD program requirements relative to your qualifications.

Who Must Sign and File Form HUD-2530:

Form HUD-2530 must be completed and signed by all principals applying to participate in HUD multifamily housing projects, including those who have no previous participation. The form must be signed and filed by all principals and their affiliates who propose participating in the HUD project. Use a separate form for each role in the project unless there is an identity of interest.

Principals include all individuals, joint ventures, partnerships, corporations, trusts, non-profit organizations, any other public or private entity that will participate in the proposed project as a sponsor, owner, prime contractor, turnkey developer, managing agent, nursing home administrator or operator, packager, or consultant. Architects and attorneys who have any interest in the project other than an arm's length fee arrangement for professional services are also considered principals by HUD.

In the case of partnerships, all general partners regardless of their percentage interest and limited partners having a 25 percent or more interest in the partnership are considered principals. In the case of public or private corporations or governmental entities, principals include the president, vice president, secretary, treasurer and all other executive officers who are directly responsible to the board of directors, or any equivalent governing body, as well as all directors and each stockholder having a 10 percent or more interest in the corporation.

Affiliates are defined as any person or business concern that directly or indirectly controls the policy of a principal or has the power to do so. A holding or parent corporation would be an example of an affiliate if one of its subsidiaries is a principal.

Exception for Corporations – All principals and affiliates must personally sign the certificate except in the following situation. When a corporation is a principal, all of its officers, directors, trustees and stockholders with 10 percent or more of the common (voting) stock need not sign personally if they all have the same record to report. The officer who is authorized to sign for the corporation or agency will list the names and title of those who elect not to sign. However, any person who has a record of participation in HUD projects that is separate from that of his or her organization must report that activity on this form and sign his or her name. The objective is **full** disclosure.

Exemptions – The names of the following parties do not need to be listed on form HUD-2530: Public Housing Agencies, tenants, owners of less than five condominium or cooperative units and all others whose interests were acquired by inheritance or court order.

Where and When Form HUD-2530 Must Be Filed: The original of this form must be submitted to the HUD Office where your project application will be processed at the same time you file your initial project application. This form must be filed with applications for projects, or when otherwise required in the situations listed below:

- Projects to be financed with mortgages insured under the National Housing Act (FHA).
- Projects to be financed according to Section 202 of the Housing Act of 1959 (Elderly and Handicapped).
- Projects in which 20 percent or more of the units are to receive a subsidy as described in 24 C.F.R. 200.213.
- Purchase of a project subject to a mortgage insured or held by the Secretary of HUD.
- Purchase of a Secretary-owned project.
- Proposed substitution or addition of a principal or principal participation in a different capacity from that previously approved for the same project.
- Proposed acquisition by an existing limited partner of an additional interest in a project resulting in a total interest of 25 percent or more or proposed acquisition by a corporate stockholder of an additional interest in a project resulting in a total interest of 10 percent or more.
- Projects with U.S.D.A., Farmers Home Administration, or with state or local government housing finance agencies that include rental assistance under Section 8 of the Housing Act of 1937. For projects of this type, form HUD-2530 should be filed with the appropriate applications directly to those agencies.

Review of Adverse Determination: If approval of your participation in a HUD project is denied, withheld, or conditionally granted on the basis of your record of previous participation, you will be notified by the HUD Office. You may request reconsideration by the HUD Review Committee. Alternatively, you may request a hearing before a Hearing Officer. Either request must be made in writing within 30 days from your receipt of the notice of determination.

If you do request reconsideration by the Review Committee and the reconsideration results in an adverse determination, you may then request a hearing before a Hearing Officer. The Hearing Officer will issue a report to the Review Committee. You will be notified of the final ruling by certified mail.

Specific Line Instructions:

Reason for submitting this Certification: e.g., refinance, change in ownership, change in management agent, transfer of physical assets, etc.

Block 1: Fill in the name of the agency to which you are applying. For example: HUD Office, Farmers Home Administration District office, or the name of a State or local housing finance agency. Below that, fill in the name of the city where the office is located.

Block 2: Fill in the name of the project, such as "Greenwood Apts." If the name has not yet been selected, write "Name unknown." Below that, enter the HUD contract or project identification number, the Farmers Home Administration project number, or the State or local housing finance agency project or contract number. Include **all** project or contract identification numbers that are relevant to the project. Also enter the name of the city in which the project is located, and the ZIP Code.

Block 3: Fill in the dollar amount requested in the proposed mortgage, or the annual amount of rental assistance requested.

Block 4: Fill in the number of apartment units proposed, such as "40 units." For hospital projects or nursing homes, fill in the number of beds proposed, such as "100 beds."

Block 5: Fill in the section of the Housing Act under which the application is filed.

Block 7: Definitions of all those who are considered principals and affiliates are given above in the section titled "Who Must Sign and File "

Block 8: Beside the name of each principal, fill in the appropriate role. The following are examples of possible roles that the principals may assume: Owner/Mortgagor, Managing Agent, Sponsor, Developer, General Con-tractor, Packager, Consultant, Nursing Home Administrator etc.

Block 9 : Fill in the Social Security Number or IRS employer number of every principal listed, including affiliates.

Instructions for Completing Schedule A:

Be sure that Schedule A is filled-in completely, accurately and the certification i s properly dated and signed, because it will serve as a legal record of your previous experience. All Multifamily Housing projects involving HUD/ FmHA, and State and local Housing Finance Agencies in which you have previously participated **must be** listed. Applicants a r e reminded that previous participation pertains to the individual principal within an entity as well as the entity itself. A newly formed company may not have previous participation, but the principals within the company may have had extensive participation and disclosure of that activity is required.

Column 2. ***All previous projects must be listed or your certification cannot be processed.*** Include the name of all projects, project number, city where it is located and the governmental agency (HUD, USDA-FmHA or state or local housing finance agency) that was involved.

Column 3. List the role(s) as a principal, dates participated and if fee or identity of interest (IOI) with owners.

Column 4. Indicate the current status of the loan. Except for current loan, the date associated with the status is required. Loans under a workout arrangement are considered assigned. For all noncurrent loans, an explanation of the status is required.

Column 5. Explain any project defaults during your participation.

Column 6. Provide the latest Management Review (MOR) rating and Physical Inspection score.

Certification: After you have completed all other parts of form HUD-2530, including schedule A, read the Certification carefully. In the box below the statement of the certification, fill in the names of all principals and affiliates as listed in block 7. Each principal should sign the certification with the exception in some cases of individuals associated with a corporation (see "Exception for Corporations" in the section of the instructions titled "Who Must Sign and File Form HUD-2530). Principal who is signing on behalf of the entity should attach signature authority document. Each principal who signs the form should fill in the date of the signature and a telephone number. By providing a telephone number, HUD can reach you in the event of any questions.

If you cannot certify and sign the certification as it is printed because some statements do not correctly describe your record, use a pen to strike through those parts that differ with your record, and then sign and certify.

Attach a signed statement of explanation of the items you have struck out on the certification. Item 2e. relates to felony convictions within the past 10 years. If you are convicted of a felony within the past 10 years, strike out 2e. and attach statement of explanation. A felony conviction will not necessarily cause your participation to be disapproved unless there is a criminal record or other evidence that your previous conduct or method of doing business has been such that your participation in the project would make it an unacceptable risk from the underwriting stand point of an insurer, lender or governmental agency.

The Department of Housing and Urban Development (HUD) is authorized to collect this information by law (42 U.S.C. 3535(d) and 24 C.F.R. 200.217) and by regulation at 24 CFR 200.210. This information is needed so that principals applying to participate in multifamily programs can become HUD-approved participants. The information you provide will enable HUD to evaluate your record with respect to established standards of performance, responsibility and eligibility. Without prior approval, a principal may not participate in a proposed or existing multifamily project. HUD uses this information to evaluate whether or not principals pose an unsatisfactory underwriting risk. The information is used to evaluate the potential principals and approve only individuals and organizations that will honor their legal, financial and contractual obligations.

Privacy Act Statement: The Housing and Community Development Act of 1987, 42 U.S.C. 3543 requires persons applying for a Federally-insured or guaranteed loan to furnish his/her Social Security Number (SSN). HUD must have your SSN for identification of your records. HUD may use your SSN for automated processing of your records and to make requests for information about you and your previous records with other public agencies and private sector sources. HUD may disclose certain information to Federal, State and local agencies when relevant to civil, criminal, or regulatory investigations and prosecutions. It will not be otherwise disclosed or released outside of HUD, except as required and permitted by law. You must provide all of the information requested in this application, including your SSN.

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. This agency may not collect this information, and you are not required to complete this form, unless it displays a currently valid OMB control number.

A response is mandatory. Failure to provide any of the information will result in your disapproval of participation in this HUD program.

U.S. Department of Housing and Urban Development

Office of Public and Indian Housing

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

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1. Certificate of Independent Price Determination

(a) The bidder certifies that--

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory--

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(l) through (a)(3) above.

_____ [insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

[x] [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding $50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [ ] is, [ ] is not included with the bid.

2. Contingent Fee Representation and Agreement

(a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [ ] has, [ ] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [ ] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding $100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The bidder, by signing its bid, hereby certifies to the best of his or her knowledge and belief as of December 23, 1989 that:

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of a contract resulting from this solicitation;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the bidder shall complete and submit, with its bid, OMB standard form LLL, "Disclosure of Lobbying Activities;" and

(3) He or she will include the language of this certification in all subcontracts at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(d) Indian tribes (except those chartered by States) and Indian organizations as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) are exempt from the requirements of this provision.

4. Organizational Conflicts of Interest Certification

The bidder certifies that to the best of its knowledge and belief and except as otherwise disclosed, he or she does not have any organizational conflict of interest which is defined as a situation in which the nature of work to be performed under this proposed contract and the bidder's organizational, financial, contractual, or other interests may, without some restriction on future activities:

(a) Result in an unfair competitive advantage to the bidder; or,

(b) Impair the bidder's objectivity in performing the contract work.

[ ] In the absence of any actual or apparent conflict, I hereby certify that to the best of my knowledge and belief, no actual or apparent conflict of interest exists with regard to my possible performance of this procurement.

5. Bidder's Certification of Eligibility

(a) By the submission of this bid, the bidder certifies that to the best of its knowledge and belief, neither it, nor any person or firm which has an interest in the bidder's firm, nor any of the bidder's subcontractors, is ineligible to:

(1) Be awarded contracts by any agency of the United States Government, HUD, or the State in which this contract is to be performed; or,

(2) Participate in HUD programs pursuant to 24 CFR Part 24.

(b) The certification in paragraph (a) above is a material representation of fact upon which reliance was placed when making award. If it is later determined that the bidder knowingly rendered an erroneous certification, the contract may be terminated for default, and the bidder may be debarred or suspended from participation in HUD programs and other Federal contract programs.

6. Minimum Bid Acceptance Period

(a) "Acceptance period," as used in this provision, means the number of calendar days available to the PHA/IHA for awarding a contract from the date specified in this solicitation for receipt of bids.

(b) This provision supersedes any language pertaining to the acceptance period that may appear elsewhere in this solicitation.

(c) The PHA/IHA requires a minimum acceptance period of [Contracting Officer insert time period] calendar days.

(d) In the space provided immediately below, bidders may specify a longer acceptance period than the PHA's/IHA's minimum requirement. The bidder allows the following acceptance period: calendar days.

(e) A bid allowing less than the PHA's/IHA's minimum acceptance period will be rejected.

(f) The bidder agrees to execute all that it has undertaken to do, in compliance with its bid, if that bid is accepted in writing within (1) the acceptance period stated in paragraph (c) above or (2) any longer acceptance period stated in paragraph (d) above.

7. Small, Minority, Women-Owned Business Concern Representation

The bidder represents and certifies as part of its bid/ offer that it --

(a) [ ] is, [ ] is not a small business concern. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) [ ] is, [ ] is not a women-owned business enterprise. "Women-owned business enterprise," as used in this provision, means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

(c) [ ] is, [ ] is not a minority business enterprise. "Minority business enterprise," as used in this provision, means a business which is at least 51 percent owned or controlled by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of its voting stock is owned by one or more minority group members, and whose management and daily opera- tions are controlled by one or more such individuals. For the purpose of this definition, minority group members are:

(Check the block applicable to you)

[ ] Black Americans	[ ] Asian Pacific Americans
[ ] Hispanic Americans	[ ] Asian Indian Americans
[ ] Native Americans	[ ] Hasidic Jewish Americans

8. Indian-Owned Economic Enterprise and Indian Organization Representation (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

The bidder represents and certifies that it:

(a) [ ] is, [ ] is not an Indian-owned economic enterprise. "Economic enterprise," as used in this provision, means any com- mercial, industrial, or business activity established or organized for the purpose of profit, which is at least 51 percent Indian owned. "Indian," as used in this provision, means any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act.

(b) [ ] is, [ ] is not an Indian organization. "Indian organization," as used in this provision, means the governing body of any Indian tribe or entity established or recognized by such governing body. Indian "tribe" means any Indian tribe, band, group, pueblo, or

community including Native villages and Native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

9. Certification of Eligibility Under the Davis-Bacon Act (applicable to construction contracts exceeding $2,000)

(a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

10. Certification of Nonsegregated Facilities (applicable to contracts exceeding $10,000)

(a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.

(b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that 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.

(c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.

(d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed $10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:

(1) Obtain identical certifications from the proposed subcontractors;

(2) Retain the certifications in its files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

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

11. Clean Air and Water Certification (applicable to contracts exceeding $100,000)

The bidder certifies that:

(a) Any facility to be used in the performance of this contract [ ] is, [ ] is not listed on the Environmental Protection Agency List of Violating Facilities:

(b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,

(c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

12. Previous Participation Certificate (applicable to construction and equipment contracts exceeding $50,000)

(a) The bidder shall complete and submit with his/her bid the Form HUD-2530, "Previous Participation Certificate." If the successful bidder does not submit the certificate with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the certificate by that date may render the bid nonresponsive. No contract award will be made without a properly executed certificate.

(b) A fully executed "Previous Participation Certificate"

[ ] is, [ ] is not included with the bid.

13. Bidder's Signature

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

(Signature and Date)

(Typed or Printed Name)

(Title)

(Company Name)

(Company Address)

U.S. Department of Housing and Urban Development
Office of Public and Indian Housing

Instructions to Bidders for Contracts Public and Indian Housing Programs

Instructions to Bidders for Contracts

Public and Indian Housing Programs

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1. Bid Preparation and Submission

(a) Bidders are expected to examine the specifications, drawings, all instructions, and, if applicable, the construction site (see also the contract clause entitled **Site Investigation and Conditions Affecting the Work** of the *General Conditions of the Contract for Construction*). Failure to do so will be at the bidders' risk.

(b) All bids must be submitted on the forms provided by the Public Housing Agency/Indian Housing Authority (PHA/IHA). Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidder's name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of that agent's authority. (Bidders should retain a copy of their bid for their records.)

(c) Bidders must submit as part of their bid a completed form HUD-5369-A, "Representations, Certifications, and Other Statements of Bidders."

(d) All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.

(e) If this solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "No Bid" in the space provided for any item on which no price is submitted.

(f) Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.

(g) Unless expressly authorized elsewhere in this solicitation, bids submitted by telegraph or facsimile (fax) machines will not be considered.

(h) If the proposed contract is for a Mutual Help project (as described in 24 CFR Part 905, Subpart E) that involves Mutual Help contributions of work, material, or equipment, supplemental information regarding the bid advertisement is provided as an attachment to this solicitation.

2. Explanations and Interpretations to Prospective Bidders

(a) Any prospective bidder desiring an explanation or interpretation of the solicitation, specifications, drawings, etc., must request it at least 7 days before the scheduled time for bid opening. Requests may be oral or written. Oral requests must be confirmed in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided. Any information given a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written amendment to the solicitation, if that information is necessary in submitting bids, or if the lack of it would be prejudicial to other prospective bidders.

(b) Any information obtained by, or provided to, a bidder other than by formal amendment to the solicitation shall not constitute a change to the solicitation.

3. Amendments to Invitations for Bids

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date on the bid form, or (3) by letter, telegram, or facsimile, if those methods are authorized in the solicitation. The PHA/IHA must receive acknowledgement by the time and at the place specified for receipt of bids. Bids which fail to acknowledge the bidder's receipt of any amendment will result in the rejection of the bid if the amendment(s) contained information which substantively changed the PHA's/IHA's requirements.

(c) Amendments will be on file in the offices of the PHA/IHA and the Architect at least 7 days before bid opening.

4. Responsibility of Prospective Contractor

(a) The PHA/IHA will award contracts only to responsible prospective contractors who have the ability to perform successfully under the terms and conditions of the proposed contract. In determining the responsibility of a bidder, the PHA/IHA will consider such matters as the bidder's:

(1) Integrity;

(2) Compliance with public policy;

(3) Record of past performance; and

(4) Financial and technical resources (including construction and technical equipment).

(b) Before a bid is considered for award, the bidder may be requested by the PHA/IHA to submit a statement or other documentation regarding any of the items in paragraph (a) above. Failure by the bidder to provide such additional information shall render the bidder nonresponsible and ineligible for award.

5. Late Submissions, Modifications, and Withdrawal of Bids

(a) Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and it:

(1) Was sent by registered or certified mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by the 20th of the month must have been mailed by the 15th);

(2) Was sent by mail, or if authorized by the solicitation, was sent by telegram or via facsimile, and it is determined by the PHA/IHA that the late receipt was due solely to mishandling by the PHA/IHA after receipt at the PHA/IHA; or

(3) Was sent by U.S. Postal Service Express Mail Next Day Service - Post Office to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of proposals. The term "working days" excludes weekends and observed holidays.

(b) Any modification or withdrawal of a bid is subject to the same conditions as in paragraph (a) of this provision.

(c) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. or Canadian Postal Service postmark both on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date or the bid, modification, or withdrawal shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, bidders should request the postal clerk to place a hand cancellation bull's-eye postmark on both the receipt and the envelope or wrapper.

(d) The only acceptable evidence to establish the time of receipt at the PHA/IHA is the time/date stamp of PHA/IHA on the proposal wrapper or other documentary evidence of receipt maintained by the PHA/IHA.

(e) The only acceptable evidence to establish the date of mailing of a late bid, modification, or withdrawal sent by Express Mail Next Day Service-Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service-Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph (c) of this provision, excluding postmarks of the Canadian Postal Service. Therefore, bidders should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and Failure by a bidder to acknowledge receipt of the envelope or wrapper.

(f) Notwithstanding paragraph (a) of this provision, a late modification of an otherwise successful bid that makes its terms more favorable to the PHA/IHA will be considered at any time it is received and may be accepted.

(g) Bids may be withdrawn by written notice, or if authorized by this solicitation, by telegram (including mailgram) or facsimile machine transmission received at any time before the exact time set for opening of bids; provided that written confirmation of telegraphic or facsimile withdrawals over the signature of the bidder is mailed and postmarked prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

6. Bid Opening

All bids received by the date and time of receipt specified in the solicitation will be publicly opened and read. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

7. Service of Protest

(a) Definitions. As used in this provision:

"Interested party" means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

"Protest" means a written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

(b) Protests shall be served on the Contracting Officer by obtaining written and dated acknowledgement from —

[Contracting Officer designate the official or location where a protest may be served on the Contracting Officer]

(c) All protests shall be resolved in accordance with the PHA's/IHA's protest policy and procedures, copies of which are maintained at the PHA/IHA.

8. Contract Award

(a) The PHA/IHA will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the PHA/IHA considering only price and any price-related factors specified in the solicitation.

(b) If the apparent low bid received in response to this solicitation exceeds the PHA's/IHA's available funding for the proposed contract work, the PHA/IHA may either accept separately priced items (see 8(e) below) or use the following procedure to determine contract award. The PHA/IHA shall apply in turn to each bid (proceeding in order from the apparent low bid to the high bid) each of the separately priced bid deductible items, if any, in their priority order set forth in this solicitation. If upon the application of the first deductible item to all initial bids, a new low bid is within the PHA's/IHA's available funding, then award shall be made to that bidder. If no bid is within the available funding amount, then the PHA/IHA shall apply the second deductible item. The PHA/IHA shall continue this process until an evaluated low bid, if any, is within the PHA's/IHA's available funding. If upon the application of all deductibles, no bid is within the PHA's/IHA's available funding, or if the solicitation does not request separately priced deductibles, the PHA/IHA shall follow its written policy and procedures in making any award under this solicitation.

(c) In the case of tie low bids, award shall be made in accordance with the PHA's/IHA's written policy and procedures.

(d) The PHA/IHA may reject any and all bids, accept other than the lowest bid (e.g., the apparent low bid is unreasonably low), and waive informalities or minor irregularities in bids received, in accordance with the PHA's/IHA's written policy and procedures.

(e) Unless precluded elsewhere in the solicitation, the PHA/IHA may accept any item or combination of items bid.

(f) The PHA/IHA may reject any bid as nonresponsive if it is materially unbalanced as to the prices for the various items of work to be performed. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.

(g) A written award shall be furnished to the successful bidder within the period for acceptance specified in the bid and shall result in a binding contract without further action by either party.

9. Bid Guarantee (applicable to construction and equipment contracts exceeding $25,000)

All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. In the case where the work under the contract will be performed on an Indian reservation area, the bid guarantee may also be an irrevocable Letter of Credit (see provision 10, Assurance of Completion, below). Certified checks and bank drafts must be made payable to the order of the PHA/IHA. The bid guarantee shall insure the execution of the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in the rejection of the bid. Bid guarantees submitted by unsuccessful bidders will be returned as soon as practicable after bid opening.

10. Assurance of Completion

(a) Unless otherwise provided in State law, the successful bidder shall furnish an assurance of completion prior to the execution of any contract under this solicitation. This assurance may be [Contracting Officer check applicable items] —

[ ] (1) a performance and payment bond in a penal sum of 100 percent of the contract price; or, as may be required or permitted by State law;

[ ] (2) separate performance and payment bonds, each for 50 percent or more of the contract price;

[ ] (3) a 20 percent cash escrow;

[ ] (4) a 25 percent irrevocable letter of credit; or,

[ ] (5) an irrevocable letter of credit for 10 percent of the total contract price with a monitoring and disbursements agreement with the IHA (applicable only to contracts awarded by an IHA under the Indian Housing Program).

(b) Bonds must be obtained from guarantee or surety companies acceptable to the U.S. Government and authorized to do business in the state where the work is to be performed. Individual sureties will not be considered. U.S. Treasury Circular Number 570, published annually in the Federal Register, lists companies approved to act as sureties on bonds securing Government contracts, the maximum underwriting limits on each contract bonded, and the States in which the company is licensed to do business. Use of companies listed in this circular is mandatory. Copies of the circular may be downloaded on the U.S. Department of Treasury website **http://www.fms.treas.gov/c570/index.html**, or ordered for a minimum fee by contacting the Government Printing Office at (202) 512-2168.

(c) Each bond shall clearly state the rate of premium and the total amount of premium charged. The current power of attorney for the person who signs for the surety company must be attached to the bond. The effective date of the power of attorney shall not precede the date of the bond. The effective date of the bond shall be on or after the execution date of the contract.

(d) Failure by the successful bidder to obtain the required assurance of completion within the time specified, or within such extended period as the PHA/IHA may grant based upon reasons determined adequate by the PHA/IHA, shall render the bidder ineligible for award. The PHA/IHA may then either award the contract to the next lowest responsible bidder or solicit new bids. The PHA/IHA may retain the ineligible bidder's bid guarantee.

11. Preconstruction Conference (applicable to construction contracts)

After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the PHA/IHA and its architect/engineer, and other interested parties convened by the PHA/IHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract (e.g., Equal Employment Opportunity, Labor Standards). The PHA/IHA will provide the successful bidder with the date, time, and place of the conference.

12. Indian Preference Requirements (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

(a) HUD has determined that the contract awarded under this solicitation is subject to the requirements of section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e(b)). Section 7(b) requires that any contract or subcontract entered into for the benefit of Indians shall require that, to the greatest extent feasible

(1) Preferences and opportunities for training and employment (other than core crew positions; see paragraph (h) below) in connection with the administration of such contracts or subcontracts be given to qualified "Indians." The Act defines "Indians" to mean persons who are members of an Indian tribe and defines "Indian tribe" to mean any Indian tribe, band, nation, or other organized group or community, including any Alaska Native village or regional or village corporation as defined in or established pursuant to the Alaska Native Claims Settlement Act, which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians; and,

(2) Preference in the award of contracts or subcontracts in connection with the administration of contracts be given to Indian organizations and to Indian-owned economic enterprises, as defined in section 3 of the Indian Financing Act of 1974 (25 U.S.C. 1452). That Act defines "economic enterprise" to mean any Indian-owned commercial, industrial, or business activity established or organized for the purpose of profit, except that the Indian ownership must constitute not less than 51 percent of the enterprise; "Indian organization" to mean the governing body of any Indian tribe or entity established or recognized by such governing body; "Indian" to mean any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act; and Indian "tribe" to mean any Indian tribe, band, group, pueblo, or community including Native villages and Native groups (including

corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

(b) (1) The successful Contractor under this solicitation shall comply with the requirements of this provision in awarding all subcontracts under the contract and in providing training and employment opportunities.

(2) A finding by the IHA that the contractor, either (i) awarded a subcontract without using the procedure required by the IHA, (ii) falsely represented that subcontracts would be awarded to Indian enterprises or organizations; or, (iii) failed to comply with the contractor's employment and training preference bid statement shall be grounds for termination of the contract or for the assessment of penalties or other remedies.

(c) If specified elsewhere in this solicitation, the IHA may restrict the solicitation to qualified Indian-owned enterprises and Indian organizations. If two or more (or a greater number as specified elsewhere in the solicitation) qualified Indian-owned enterprises or organizations submit responsive bids, award shall be made to the qualified enterprise or organization with the lowest responsive bid. If fewer than the minimum required number of qualified Indian-owned enterprises or organizations submit responsive bids, the IHA shall reject all bids and readvertise the solicitation in accordance with paragraph (d) below.

(d) If the IHA prefers not to restrict the solicitation as described in paragraph (c) above, or if after having restricted a solicitation an insufficient number of qualified Indian enterprises or organizations submit bids, the IHA may advertise for bids from non-Indian as well as Indian-owned enterprises and Indian organizations. Award shall be made to the qualified Indian enterprise or organization with the lowest responsive bid if that bid is -

(1) Within the maximum HUD-approved budget amount established for the specific project or activity for which bids are being solicited; and

(2) No more than the percentage specified in 24 CFR 905.175(c) higher than the total bid price of the lowest responsive bid from any qualified bidder. If no responsive bid by a qualified Indian-owned economic enterprise or organization is within the stated range of the total bid price of the lowest responsive bid from any qualified enterprise, award shall be made to the bidder with the lowest bid.

(e) Bidders seeking to qualify for preference in contracting or subcontracting shall submit proof of Indian ownership with their bids. Proof of Indian ownership shall include but not be limited to:

(1) Certification by a tribe or other evidence that the bidder is an Indian. The IHA shall accept the certification of a tribe that an individual is a member.

(2) Evidence such as stock ownership, structure, management, control, financing and salary or profit sharing arrangements of the enterprise.

(f) (1) All bidders must submit with their bids a statement describing how they will provide Indian preference in the award of subcontracts. The specific requirements of that statement and the factors to used by the IHA in determining the statement's adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement shall be rejected as nonresponsive. The IHA may require that comparable statements be provided by subcontractors to the successful Contractor, and may require the Contractor to reject any bid or proposal by a subcontractor that fails to include the statement.

(2) Bidders and prospective subcontractors shall submit a certification (supported by credible evidence) to the IHA in any instance where the bidder or subcontractor believes it is infeasible to provide Indian preference in subcontracting. The acceptance or rejection by the IHA of the certification shall be final. Rejection shall disqualify the bid from further consideration.

(g) All bidders must submit with their bids a statement detailing their employment and training opportunities and their plans to provide preference to Indians in implementing the contract; and the number or percentage of Indians anticipated to be employed and trained. Comparable statements from all proposed subcontractors must be submitted. The criteria to be used by the IHA in determining the statement(s)'s adequacy are included as an attachment to this solicitation. Any bid that fails to include the required statement(s), or that includes a statement that does not meet minimum standards required by the IHA shall be rejected as nonresponsive.

(h) Core crew employees. A core crew employee is an individual who is a bona fide employee of the contractor at the time the bid is submitted; or an individual who was not employed by the bidder at the time the bid was submitted, but who is regularly employed by the bidder in a supervisory or other key skilled position when work is available. Bidders shall submit with their bids a list of all core crew employees.

(i) Preference in contracting, subcontracting, employment, and training shall apply not only on-site, on the reservation, or within the IHA's jurisdiction, but also to contracts with firms that operate outside these areas (e.g., employment in modular or manufactured housing construction facilities).

(j) Bidders should contact the IHA to determine if any additional local preference requirements are applicable to this solicitation.

(k) The IHA [ ] does [ ] does not [Contracting Officer check applicable box] maintain lists of Indian-owned economic enterprises and Indian organizations by specialty (e.g., plumbing, electrical, foundations), which are available to bidders to assist them in meeting their responsibility to provide preference in connection with the administration of contracts and subcontracts.

These conditions are a supplement to the HUD 5369 Instructions to Bidders and provide information to help clarify articles of that document. Any articles or paragraphs not specifically mentioned shall remain as printed in HUD 5369 without change.

1. Add to Paragraph 1, subparagraph b:

   i. The bid documents required for the complete bid package shall consist of the following (all shall be signed originals):

      1. Bid Form
      2. Bid Bond
      3. Non-Collusive Affidavit
      4. Disclosure of Lobbying Activities
      5. Form HUD-2530
      6. Form HUD-5369A

2. Add to paragraph 2 subparagraph a

   a. All questions are to be received in writing. Oral questions will not be accepted. Oral clarifications will not be provided.
   b. Responses to all written questions will be posted as addendum on the CMHA website at www.cintimha.com.

3. Add to paragraph 4 subparagraph b.1.

   b.1 Bidders shall indicate receipt of addendum on Bid Form. No other acknowledgement is required.

4. Add to paragraph 4, subparagraph a:

   a. Ability to demonstrate a minimum of 7 years of experience as a general contractor, performing work of like scope and material, for the period immediately preceding commencement of this CMHA Project for work of the size and type of this CMHA Project.

CMHA, in its sole and absolute discretion, will consider a request for a waiver of the 7 years of experience requirement, if the contractor can establish that it has successfully undertaken and completed such a number of projects of similar scope and complexity in a lesser number of years so as to confer upon that contractor the same or more experience as other bidders have achieved in 7 or more years of experience.

5. Add to paragraph 5, subparagraph g:

g. No bid shall be withdrawn for a time period of 330 calendar days from the bid opening. The foregoing limitation upon withdrawal of bids prior to opening shall be subject to the right of withdrawal of a bid made in error as provided by Section 9.31, Ohio Revised Code, to the extent that such statutory provision is applicable.

6. Add to paragraph 10, subparagraphs a, and b:

a. All bid bonds be a shall be issued by Surety Companies licensed to issue bonds in the State of Ohio and listed in Federal Register Circular #570. The current power of attorney for the person who signs for any surety company shall be attached to such bid bond.

b. The CMHA will have the right to retain the bid security of bidders to whom an award is being considered until either (a) the contract has been executed and bonds, if required, have been executed, (b) the specified time has elapsed so that bids may be withdrawn, or (c) all bids have been rejected.

7. Add paragraph 13. Minority Business Enterprise:

It is the goal of CMHA to obtain 20 percent minority business participation on this project.

8. Add paragraph 14. Lead Based Paint:

Any contractor awarded a contract for modernization shall comply with 24 CFR (Code of Federal Regulations) Part 35 prohibiting the use of lead-based paint.

9. Add paragraph 15. Sales Tax Exemption:

The contractor shall take whatever steps required by law to relieve the owner from payment of excise tax and Ohio sales tax on materials, specialties and equipment for contractor to take any part of such action shall constitute the responsibility of the contractor to make such tax payments as within the scope of this contract. The owner is tax exempt, and upon request will provide a statement to that effect.

10. Add paragraph 16. Liquidated Damages

This project has liquidated damages, as specified in Clause 33 of HUD General Conditions in this contract, which may be charged against contractors who do not complete work on time.

11. Add paragraph 17. Pre-Bid Conference

A pre-bid conference for all prospective contractors will be held as indicated on the Invitation of Bids. Questions will not be received or answered at the pre-bid conference. All questions are to be submitted in writing and responses will beposted as addendum to the CMHA website atwww.cintimha.com.

Before presenting a bid, the contractor is advised to have visited the site and be thoroughly familiar with the scope of work and the conditions under which it will be executed. Failure to do so will not release contractor of his obligation to furnish all material and labor necessary to carry out all provisions of the contract.

Add paragraph 18. Definition

Addenda are written or graphic instruments issued by the CMHA prior to the execution of the Contract, which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

A Bid is a complete and properly signed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be in Alternate Bids.

An Alternate Bid or Alternate is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted. Any alternates accepted by the owner shall be accepted in the order in which they are listed in the form of Bid.

A Unit Price is an amount stated in the Bid as a price per unit of measure for materials, equipment or services or a portion of the Work as described in the Bidding Documents, and to be utilized at CMHA's sole discretion.

12. Add paragraph 19. Form and Style of Bids

a. Bids shall be submitted on the form included in the Bidding Documents.

b. All blanks on the Bid Form shall be filled in by typewriter or manually in ink.

c. Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the amount written in words shall govern.

d. The signer of the Bid must initial interlineations, alterations and erasures.

e. All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."

f. Each copy of the Bid shall include the legal name of the Bidder and a statement that the Bidder is a sole proprietor, partnership, corporation or other legal entity. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

END OF SECTION

CONSTRUCTION CONTRACT

CINCINNATI METROPOLITAN HOUSING AUTHORITY
AND

CONTRATOR

This Contract is made and entered into between the Cincinnati Metropolitan Housing Authority, hereinafter referred to as "Owner" and the below named, hereinafter referred to as "CONTRACTOR."

1. PURPOSE AND BACKGROUND

OWNER is the 17th largest public housing authority in the United States. OWNER's Asset Management Portfolio of properties are owned and operated by OWNER.

The purpose of this contract is for the Contractor to provide construction services at OWNER's property further described in *The Scope of Work*.

2. STATEMENT OF WORK

The Contractor shall furnish the personnel, material, and/or services and otherwise do all things necessary for or incidental to the performance of the work set forth in *the Scope of Work*

The General Terms and Conditions of the Construction Contract govern the work to be performed under this contract, the nature of the working relationship between OWNER and the Contractor, and specific obligations of both parties.

3. APPLICABLE DOCUMENTS

This contract includes all relevant terms in Solicitation 2024-3035, the Contractor's Fee Submission Form and all documents, policies, and documents incorporated by reference. All documents, sections, exhibits, clauses, terms and provisions of this Performance Based Contract shall be read so as to be consistent to all extent practicable. In the event that any document, section, clause, exhibit, term or provision of this Contract conflicts with any provision of any of the above-mentioned applicable document, the provision of the instruments listed below shall take precedence in the following order:

a) Applicable Federal and State of Ohio statutes and regulations
b) This Instrument (Performance Based Contract)
c) Solicitation
d) The Contractor's Fee
e) Other Documents incorporated by reference (if applicable)

4. PERIOD OF PERFORMANCE

Subject to other Contract provisions, the period of performance under this Contract shall be from as indicated in the Notice to Proceed, unless sooner terminated or extended as provided herein.

Upon issuance of the Notice to Proceed by Owner, the Contractor shall have two (2) weeks from the issuance of the Notice to submit applications for any required permits. Contractor shall have one (1) week to begin work after receipt of the applicable permits. Failure to meet these deadlines shall constitute a material breach of the terms of this Agreement and shall constitute good cause for the Owner to cancel this contract.

5. COMPENSATION AND PAYMENT

Billing and payment shall be accomplished in accordance with the Contract. OWNER shall pay an amount not to exceed the Fee Amount on item 9 of the *Fee Submission Form*, as breakdown in the Schedule of Values approved by the OWNER, for the performance of all things necessary for, or incidental to the performance of work as set forth in *The Scope of Work*.

Payment shall be contingent upon review and acceptance of the Contractor's Deliverables by OWNER.

OWNER will pay Contractor within 45 days of receipt of properly completed invoices or acceptance of deliverable, whichever is later. Invoices shall be submitted to the Construction Manager or designated not more often than monthly. The invoice shall reference the Contract No., describe and document to OWNER's satisfaction as description of the deliverable accepted by OWNER and the fixed price cost per deliverable. OWNER may, in its sole discretion, withhold payments claimed by Contractor for services rendered if Contractor fails to satisfactorily comply with any term or condition of this Contract. Invoices shall be sent to 1627 Western Ave., Cincinnati, OH 45214

6. WARRANTIES

Contractor warrants that its services and materials provided will be of good quality and consistent with the professional skill and care ordinarily provided by professionals performing the same or similar service and such services and materials shall be provided in accordance with generally accepted industry standards.

At all times Contractor shall comply with all applicable federal, state and local laws, rules, regulations, ordinances and codes and obtain any licenses or permits required to provide the services under this Contract.

7. EXECUTIVE REVIEW

This Contract shall be subject to the written approval of OWNER's authorized representative and shall not be binding until so approved.

IN WITNESS WHEREOF, this PROFESSIONAL SERVICES AGREEMENT has been

executed by OWNER and _____
to take effect on _____

Cincinnati Metropolitan Housing Authority	**Contractor**
Sign and Date	Sign and Date

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1. ARTICLE I CONTRACTOR'S RESPONSIBILITIES

1.1. The Contractor shall perform the Work in a workmanlike manner, consistent with the standards of skill and care exercised by entities licensed to perform (where required by Applicable Law) and regularly performing comparable work in the same or similar locality under the same or similar circumstances.

1.1.1. Furthermore, Contractor agrees to adhere to CMHA's quality standards as outlined in the Contract Documents; this includes, but is not necessary limited to, CMHA's Gold Standards of performance.

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

1.3. The Contractor shall furnish all labor, services, materials, tools, equipment, superintendence, and transportation necessary for performance of the Work.

1.3.1. Contractor shall also furnish all necessary water, heat, light, and power not made available to the Contractor by CMHA.

1.4. The Contractor shall perform on the site and with its own organization, work equivalent to at least {12%} (unless otherwise indicated) of the total amount of work to be performed under the order.

1.4.1. This percentage may reduce by a supplemental agreement to this Construction Contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be the advantage of CMHA.

1.5. At all times during performance of this Construction Contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the work site a competent superintendent whose qualifications and experience are satisfactory to CMHA and has authority to act on behalf of the Contractor.

1.6. The Contractor shall be responsible for all damages, including, but not limited to, damages to persons or property, that occur as a result of the Contractor's breach of this Construction Contract, fault or negligence.

1.6.1. The Contractor shall take proper safety and health precautions to protect the Work, the workers, the public, and the property of others.

1.6.2. The Contractor shall hold and save CMHA, including CMHA's officers, employees, consultants, and agents, free and harmless from damages, claims, demands, suits and liabilities of any nature, including but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, caused by the Contractor's breach of this Construction Contract, fault, negligence or performance of the Work.

1.6.3. The Contractor shall also be responsible for all storage, protection and cleaning of materials delivered and Work performed on the Project, until Contract Completion and acceptance of the entire Project by CMHA, except for any completed unit of Work which may have not been accepted under the Construction Contract.

1.7. The Contractor shall lay out the work from base lines and bench marks indicated in the drawings and be responsible for all lines, levels, and measurements of all work executed under the Contract Documents.

1.7.1. The Contractor shall verify the lines, bench marks, figures and dimensions indicated in the Contract Documents before laying out the work and will be held responsible for any resulting errors resulting from its failure to do so.

1.8. The Contractor shall confine all operations (including storage of materials) on CMHA's premises to areas authorized or approved by the Contracting Officer.

1.9. The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials.

1.9.1. After completing the Work and before final inspection, the Contractor shall:

- **A.** Remove from the premises all scaffolding, equipment, tools, materials (including rejected materials) that are not the property of CMHA and rubbish caused by its work;
- **B.** Leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer;
- **C.** Perform all specified tests; and
- **D.** Deliver the installation in complete and operating conditions.

1.10. The Contractor must perform the Work so as to not interfere with, disturb, hinder, or delay the services of separate consultants or the work of separate contractors.

1.10.1. The Contractor must cooperate and coordinate fully with all separate consultants and separate contractors and must freely share all of the Contractor's Project-related information with them to facilitate the timely and proper performance of the Work and of the services and work of the separate consultants and separate contractors.

1.10.2. The Contractor must afford every separate consultant and separate Contractor proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of their services and work.

1.10.3. If the Contractor damages the property or work of any separate consultant or separate Contractor caused by Contractor or by failure to perform the Work with due diligence, delays, interferes with, hinders, or disrupts the services of any separate consultant or separate Contractor who suffers additional expense and damage as a result, the Contractor is responsible for that damage, injury, or expense.

1.10.4. The intent of 1.10 is to benefit any separate consultants and separate contractors and to demonstrate that the separate consultants or separate contractors are intended third-party beneficiaries of Contractor's obligations under the Contract.

1.11. If the proper execution or result of any part of the Work depends upon work performed or services provided by CMHA, a separate consultant, or a separate Contractor, the Contractor must inspect that other work and appropriate instruments of service, and promptly report to CMHA in writing any defects or deficiencies in that other work or services that render it unavailable or unsuitable for the proper execution and results of the Work.

1.11.1. The Contractor's failure to inspect and promptly report any issues in writing will constitute an acceptance of the other work and services as fit and proper for integration with the Contractor's Work unless in the opinion of CMHA's Project Manager and/or Construction Contract Administrator the defects and deficiencies in the other work and appropriate instruments of service were not reasonably discoverable at the time of the Contractor's inspection.

1.12. The Contractor shall not delay the Work on account of any claim, dispute, or action between the Contractor and CMHA or the Contractor a Separate Consultant or Separate Contractor.

1.13. The Contractor shall complete all portions of Work in the sequence in the Construction Progress Schedule.

1.14. The Contractor shall develop and keep a Construction Progress Schedule and prepare and keep current a schedule of submittals that is coordinated with the Construction Progress Schedule for CMHA's acceptance.

1.15. The Project's regular work hours shall be between 8:00 am and 5:00 pm, or as determined and approved by CMHA.

1.15.1. The Contractor may modify the regular work hours only if Contractor receives written authorization from CMHA's Project Manager and/or Construction Contract Administrator.

1.16. The Contractor shall coordinate the Work with the activities and responsibilities of the Project's architect or engineer ("A/E"), CMHA and Contractor's surety to meet the contractual dates for Substantial Completion and Contract Completion.

1.17. The Contractor shall remove any snow and ice as may be required for reasonably safe access to the Project, including, without limitation, building entries, driveways, parking lots, and sidewalks.

1.18. The Contractor shall keep a daily log containing a record of weather, number of workers on Site for the Contractor, identification of equipment, Work accomplished, problems encountered and other similar relevant data.

1.19. The Contractor hereby represents and agrees that, prior to submitting its bid or quote to perform the Work on the Project, it has had a competent person carefully and diligently review each part of the Contract Documents, including the Divisions of the Specifications and parts of the Drawings that are not directly applicable to the Work.

1.19.1. Contractor further represents and agrees that, based upon its careful and diligent review of the Contract Documents, that it is not aware of any conflicts, inconsistencies, errors, or omissions in the Contract Documents for which it has not notified CMHA or the A/E.

1.19.2. If there are any such conflicts, inconsistencies, errors, or omissions in the Contract Documents, the Contractor will:

A. Provide the labor, equipment, or materials of the better quality or greater quantity of Work; and/or

B. Comply with the more stringent requirements.

1.19.3. The Contractor will not be entitled to any additional compensation for any conflicts, inconsistencies, errors, or omissions that would have been discovered by such careful and diligent review.

1.20. The Contractor hereby represents and agrees that the Project is a public project involving public funds.

1.20.1. The Contractor further understands that CMHA expects and requires that each Contractor adhere to the highest ethical and performance standards.

1.20.2. Accordingly, Contractor hereby pledges and agrees that:

A. It will act at all times with absolute integrity and truthfulness in its dealings with CMHA and the A/E;

B. It will use its best efforts to cooperate with CMHA and the A/E and all other contractors and consultants on the Project and at all times will act with professionalism and dignity in its dealings with CMHA, the A/E, and other contractors;

C. It will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her; and

D. It has read, understands and will comply with the terms of the Contract Documents.

1.21. Emergency

1.21.1. In the event of an emergency affecting the safety of the Project, other property, or individuals, the Contractor, without special instructions or authorization, shall act to prevent the threatened damage, injury, or loss.

1.21.2. If the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of its actions in response to any emergency, the Contractor may request a Change Order by giving written notice no later than 48-hours after the emergency.

2. ARTICLE II HOUSING AUTHORITY RIGHTS AND RESPONSIBILITIES

2.1. CMHA shall designate a Project Manager and/or Construction Contract Administrator for the Project.

2.2. CMHA shall have access to the Work and Site at all times, whether the Project is in preparation or progress.

2.3. CMHA is not responsible for construction means, methods, manners, techniques, sequences, procedures, or for safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in conformity with the Contract Documents.

2.4. Upon the date indicated in the Notice to Proceed, CMHA shall provide the Site to the Contractor in a condition to permit the Contractor to perform the Work.

2.4.1. If the Site provided by CMHA is not in a condition to permit the Contractor to perform the Work, Contractor shall notify CMHA's Project Manager and/or Construction Contract Administrator within 48 hours of the Notice to Proceed and identify the conditions which are preventing Contractor from performing the Work.

3. ARTICLE III A/E'S DUTY, RESPONSIBILITY AND AUTHORITY

3.1. The A/E for this Contract and any successor shall be designated in writing by CMHA.

3.2. The A/E's duties and responsibilities may include, but shall not be limited to:

3.2.1. Attend and conduct the Construction Progress Meetings.

3.2.2. Making periodic visits to the work site and on the basis of his/her on-site inspections, issuing written reports to CMHA which shall include all observed deficiencies.

A. The A/E shall electronically send a copy of the report to CMHA and to the Contractor's designated representative at the site.

3.2.3. Making modifications in drawings and technical specifications and assisting the Contracting Officer in the preparation of Change Orders and other Contract Modifications for issuance to the Contracting Officer.

3.2.4. The A/E may authorize minor changes or alterations in the Work that are consistent with the intent of the Contract Documents and do not involve adjustment of the Contract Sum or Contract Times, or both.

A. The A/E has no authority to authorize the Contractor to perform additional or extra Work for which the Contractor may seek adjustment of the Contract Sum or the Contract Time, or both.

3.2.5. Reviewing and making recommendations with respect to:

A. The Contractor's Construction Progress Schedules;

B. The Contractor's shop and detailed drawings; and

C. The Contractor's price breakdown and progress payment estimates.

3.2.6. Assisting in inspections, signing Certificates of Substantial Completion and Contract Completion, and making recommendations with respect to acceptance of work completed under the Contract; and

3.2.7. Approve or certify applicable forms required under the Contract Documents.

3.3. Site Visits and Observation

3.3.1. The A/E shall notify, advise, and consult with CMHA and protect CMHA against Defective Work throughout completion of the Project, which includes the Correction Period, and for such time period CMHA may extend A/E's services.

A. The A/E should designate a field representative, subject to CMHA's approval, to attend meetings, to observe and check the progress and quality of the Work, and to take action as necessary or appropriate to achieve conformity with the Contract Documents.

B. The A/E shall have its consultants attend to the Project at intervals required by its agreement or required by CMHA.

3.3.2. The A/E is authorized to disapprove or reject Defective Work. The A/E shall immediately notify CMHA any time the A/E disapproves or rejects an item of Work.

3.3.3. The A/E is not responsible for construction means, methods, manners, techniques, sequences, procedures, or for work safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in conformity with the Contract Documents.

3.4. Testing and Inspection Services

3.4.1. Unless otherwise specified in the Contract Documents, CMHA shall apply for, secure, and pay for the costs of structural testing and special inspections under the Ohio Building Code; testing including geotechnical analysis, environmental testing and analysis, concrete, masonry, structural steel, reinforcing steel, welding, bolts, steel connections, HVAC systems and controls, plumbing and piping, air, and water balancing and testing, or other testing, or approvals required by Applicable Law.

3.5. A/E Review and Approval of Work

3.5.1. Any information the Contractor submits to the A/E is for the sole purpose of determining whether the Work and information is generally consistent with the Contract's intent, and will not relieve the Contractor of its sole responsibility for the performance, preparation, completeness, and accuracy of the Work and information.

3.5.2. By reviewing information submitted by the Contractor, A/E is not taking on responsibility for construction means, methods, manners, techniques, sequences, procedures, or for work safety precautions and programs in connection with the Work.

3.6. Limitation of A/E's Authority

3.6.1. The A/E shall serve as the technical representative for CMHA with respect to architectural, engineering, and design matters related to the Work performed under the Contract.

3.6.2. Subject to the Contractor's responsibility under ARTICLE I, the A/E may provide direction on Contract performance.

3.6.3. Such direction shall be within the scope of the Contract and may not be of a nature which:

A. Institutes additional work outside of the scope of the Contract;

B. Constitutes a change;

C. Causes an increase or decrease in the cost of the Contract;

D. Alters the Construction Progress Schedule;

E. Changes any of the other express terms or conditions of the Contract;

F. Accepts any defective or non-conforming services, Work, or vendor-furnished items;

G. Makes any settlements on CMHA's behalf;

H. Assumes any responsibilities of the Contractor or Subcontractors; or

I. Binds CMHA to any authorizations under, modifications of, or amendments to the Contract Documents other than as expressly provided A/E'S DUTY, RESPONSIBILITY AND AUTHORITY.

3.7. The Contractor acknowledges and agrees that CMHA's legal counsel may from time to time provide legal services to the Project and that in doing so may communicate with the A/E, as CMHA's representative on the Project.

3.7.1. The Contractor agrees that such communications will be privileged communications and, if there is a Claim contemplated or pending, any written communications will be protected by the attorney client privilege and considered confidential work product.

4. ARTICLE IV PRECONSTRUCTION ACTIVITIES

4.1. Pre-construction Conference

4.1.1. Within ten (10) calendar days, unless otherwise indicated by CMHA, of Contract execution, and prior to the commencement of work, the Contractor shall attend a preconstruction conference with CMHA representatives; CMHA's A/E, and other interested parties convened by CMHA.

A. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the Contract.

B. CMHA will provide the Contractor with the date, time, and place of the conference.

4.2. Certificate of Insurance

4.2.1. Before commencing work, the Contractor and each Subcontractor shall furnish CMHA with certificates of insurance showing the minimum insurance coverage is in force and will insure all operations under the Contract.

4.3. Building and Trade Permits, Licenses and Codes

4.3.1. The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules, and regulations.

A. Notwithstanding the requirement of the Contractor to comply with the drawings and specifications in the Contract, all Work installed shall comply with all applicable laws, ordinances, codes, rules, and regulations, as may be amended by any waivers.

B. Before installing the Work, the Contractor shall examine all drawings and the specifications for compliance with applicable laws, ordinances, codes, rules, and regulations bearing on the work and shall immediately report, in writing, any discrepancy it may discover to the CMHA's Project Manager and/or Construction Contract Administrator and the A/E.

i. If required by any governing jurisdiction, CMHA will modify the Contract by change order so that the Work on the Project will conform to the applicable laws, ordinances, codes, rules, and regulations.

C. If the Contractor installs any Work that does not comply with all applicable laws, ordinances, codes, rules, and regulations before providing notice hereunder to CMHA and receiving direction from CMHA, Contractor shall be responsible for all costs resulting from any removal, demolishing, and disposing of any Work that must be replaced or repaired.

4.3.2. Notwithstanding the provisions below, the Contractor shall secure and pay for all permits, fees, and licenses necessary for the proper execution and completion of Work.

A. Where CMHA can arrange for the issuance of all or part of these permits, fees, and licenses, without cost to the Contractor, the Contract amount shall be reduced accordingly.

4.4. Plan Approval and Permits

4.4.1. The A/E shall facilitate the required structural, plumbing, HVAC, and electrical plan reviews during the design phase, as required by the governing jurisdiction for securing an overall building permit to start construction.

4.4.2. The Contractor shall schedule and attend all intermediate and final inspections required for any permit applicable to the Work or any governing jurisdiction.

4.4.3. The Contractor shall schedule with the State Fire Marshal or local fire authority for the life safety inspection for occupancy permits.

4.4.4. The Contractor shall give the A/E and CMHA reasonable notice of the dates and times for any inspections.

A. The Contractor shall pay for all initial inspections and re-inspections required as a result of Contractor's failure to receive approval for its Work.

4.5. Trade Permits and Licenses

4.5.1. The Contractor shall secure and pay the fees for any permit, inspection, or license applicable to the Contractor's particular trade.

4.5.2. Local Permits:

A. The Contractor shall secure and pay the fees for any permits, inspections, licenses, capacity charges, or tap fees required by local authorities having jurisdiction over the Project.

i. The Contractor shall give the A/E and CMHA reasonable notice of the date(s) arranged for inspections.

4.5.3. National Pollutant Discharge Elimination System (NPDES) Storm Water General Permit:

A. The A/E shall secure the NPDES general permit by submitting a Notice of Intent (NOI) application form to the Ohio Environmental Protection Agency at least 45 days prior to the start of construction.

i. The Contractor shall be a co-permitee, if required under Applicable Law.

B. The A/E shall prepare and certify the storm water pollution prevention plan to provide sedimentation and erosion controls at the Project. The A/E shall prepare and process the required Notice of Termination (NOT) prior to Contract Completion.

5. ARTICLE V CONSTRUCTION REQUIREMENTS

5.1. Commencement of Work on Site

5.1.1. Unless CMHA agrees otherwise in writing, the Construction Stage will commence with CMHA issuing the Notice to Proceed and will terminate upon CMHA issuing a Certificate of Contract Completion to the Contractor. The Certificate of Contract Completion will be issued in accordance with the requirements of the Contract Documents and will not occur until after CMHA issues a Certificate of Substantial Completion, a Certificate of Occupancy is issued for the Project, and the Contractor has completed all items on the punch list delivered to Contractor by CMHA as provided in Article IX. The time period for Contract Completion in provided in Section 9.8.

5.1.2. Notice to Proceed:

A. The Contractor shall begin work upon the date indicated in a written Notice to Proceed from CMHA or its designee.

i. The Contractor shall not begin work prior to receiving such notice.

B. Typically, the Notice to Proceed shall be issued within 180 days of CMHA Board of Commissioner Approval.

C. If the Notice to Proceed is not issued with 180 days of CMHA Board of Commissioner Approval, CMHA may, in its sole discretion, terminate the Contract without recourse from the Contractor.

5.2. Environmental Controls

5.2.1. The Contractor shall protect its Work and materials from damage from water, moisture, and other weather, including damage from water run-off from other property or structures, and damage from heat, cold, and humidity.

5.2.2. Contractor is not authorized to use permanent HVAC system without express written authorization from CMHA.

5.2.3. Until the permanent HVAC system is complete and available for use:

A. The Contractor shall make arrangements and pay for installation and maintenance of temporary heating, cooling and ventilating systems; and

B. The Contractor shall pay the costs incurred in operating the temporary heating, cooling and ventilating systems.

5.2.4. When the permanent HVAC system is complete and available for use:

A. The Contractor shall start up and maintain operation of the permanent HVAC system, including filters, and promptly remove temporary heating, cooling and ventilating systems.

B. If the Project consists entirely of new construction, the Contractor shall pay the costs of energy consumed in operating the permanent HVAC system until Substantial Completion.

5.2.5. From the date of Substantial Completion, CMHA shall pay the cost of operating the permanent HVAC system for the occupied portion of the Project.

5.2.6. Use of the permanent HVAC system during construction shall not change, modify or reduce the Contractor's warranty and service obligations under the Contract Documents.

5.3. Construction Procedures

5.3.1. The Contractor is solely responsible for and has control over all construction means, methods, techniques, sequences, and procedures, for safety precautions and programs in connection with the Work, and for coordinating all portions of the Work.

5.3.2. If the Contract Documents give instructions that affect construction means, methods, manners, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety of them and, except as expressly stated herein, be fully and solely responsible for the jobsite safety of the means, manners, methods, techniques, sequences, or procedures.

5.3.3. If the Contractor determines that the means, methods, manners, techniques, sequences, or procedures specified in the Contract Documents may not be safe, the Contractor shall give timely written notice to CMHA.

A. The Contractor shall not proceed with that portion of the Work without further written instructions from CMHA.

5.3.4. Additional Contractor Responsibilities:

A. The Contractor shall lay out and coordinate all lines, levels, elevations, and measurements for all of the Work, coordinate and verify existing conditions, and notify the A/E and CMHA of discrepancies and conflicts before proceeding with installation or excavation.

B. The Contractor shall perform all cutting, fitting, or patching required for the Work and shall not endanger the Project by cutting, excavating, or otherwise altering the Project or any part of it.

C. If the Design requires sleeves for completing the specified Work, the Contractor and all Subcontractors shall coordinate to furnish and install the sleeves.

i. The Contractors are responsible for the exact location of and size of all holes and openings required to be formed or built for the Work.

D. The Contractor's patching shall match and blend with the existing adjacent surfaces.

E. In addition to the items herein, The Contractor is responsible for all items in REF _Ref449941734 \h CONTRACTOR'S RESPONSIBILITIES.

5.4. Utilities

5.4.1. Availability and Use of Utilities

A. If CMHA has existing access to utilities, CMHA shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and service as specified herein so long as the utility use does not interfere with CMHA's operations.

i. Unless otherwise provided in the Contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to CMHA or where the utility is produced by CMHA, at reasonable rates as determined by CMHA.

ii. The Contractor shall carefully conserve any utilities furnished by CMHA without charge.

B. The Contractor, at its expense and in a manner satisfactory to CMHA, shall install and maintain all necessary temporary connections and distribution lines, and all meters required to measure the amount of each utility used for the purpose of determining charges.

i. Before final acceptance of the Work by CMHA, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

5.4.2. The Contractor shall comply with the requirement of the Ohio Revised Code, including ORC.

A. In addition, before starting excavation or trenching, the Contractor shall determine the location of any underground utilities and notify any public authority or utility having jurisdiction over the Project and secure any required approval.

5.4.3. The Contractor shall give CMHA at least two (2) business days advance notice of excavation of underground utilities registered with the Ohio Underground Utility Protection Services ("OUPS") and underground utilities shown on the drawings and Specifications who are not registered member of OUPS.

A. The Owner of an underground utility is required within 48 hours' notice to stake, mark, or otherwise designate the location for its utilities in the construction area together with its approximate depth.

B. In the event that any underground utility owner fails to timely perform, the Contractor shall notify the A/E and contact CMHA regarding the failure of the underground utility to timely perform its work.

5.4.4. Water and Drainage

A. The Contractor shall provide water necessary for the Work until the permanent plumbing system is available for use.

B. The Contractor shall provide all temporary drainage and all dewatering necessary for the Work and shall employ pumps, trenches, drains, sumps, and any other equipment necessary or required to provide satisfactory working conditions for the protection, execution, and completion of the Project. The Contractor shall be responsible for determining the specific means and methods to be used for dewatering.

C. The Contractor shall make arrangements and pay for installation and maintenance of temporary plumbing systems until the permanent plumbing system is available for use.

D. When the permanent plumbing system is complete and available for use:

i. The Contractor shall start up and maintain operation of the permanent plumbing systems, and make arrangements and pay for removal of temporary plumbing systems.

ii. If the Project consists entirely of new construction, the Contractor shall pay the costs of water consumed and sewage charges until Substantial Completion.

iii. If the Project is a renovation of an existing building or structure, addition(s) to an existing building or structure, or any combination of new construction and renovation work that does not allow separate metering of utilities, CMHA shall pay the costs of water consumed and sewage charges.

(a) If separate metering of utilities is available, the Contractor and CMHA will pay the costs of their respective use.

E. After the date of Substantial Completion, CMHA shall pay the costs of water consumed and sewage charges for the occupied portion of the Project.

F. Use of the permanent plumbing system during construction shall not change, modify, or reduce the Contractor's warranty and service obligations under the Contract Documents.

5.4.5. Electric Service

A. The Contractor shall provide temporary light and power; pay the charges for temporary electric service, installation, and removal if required.

B. If the Project consists entirely of new construction, the Contractor shall pay the cost of energy consumed until Substantial Completion.

C. If the Project is a renovation of an existing building or structure, addition(s) to an existing building or structure, or any combination of new construction and renovation work that does not allow separate metering of utilities, CMHA shall pay the cost of energy consumed.

i. If separate metering of utilities is available, the Contractor and CMHA will pay the costs of their respective use.

D. From the date of Substantial Completion, CMHA shall pay the cost of energy consumed for the occupied portions of the Project.

E. Use of the permanent electrical system during construction shall not change, modify, or reduce the Contractor's warranty and services obligations under the Contract Documents.

5.4.6. Payment of Utility Services

A. Unless otherwise expressly stated in the Contract Documents, Contractor shall reimburse CMHA the cost of utility services during the Construction Period.

B. Unless otherwise expressly stated in the Contract Documents, payment for reimbursement of CMHA for the cost of utility services during the Contract Period shall be made directly to CMHA.

i. If payment is not received, CMHA may deduct the cost of utility services from payments otherwise due to the Contractor.

ii. If the payments otherwise due to the Contractor are not sufficient to fully reimburse CMHA, either Contractor or its surety shall make whatever payments are necessary to fully reimburse CMHA.

C. Process for Payment:

i. Reimbursement from the Contactor shall be performed on a quarterly basis unless a more frequent payment schedule is agreed upon between CMHA and the contractor prior to start of the project.

5.4.7. Hoisting Facilities

A. The Contractor shall erect and maintain any hoisting equipment required for its Work.

B. If the electric service requirements of hoisting facilities differ from that available at the Site, the Contractor shall provide and pay for all necessary connections.

C. If a permanent elevator is identified in the Contract Documents to be used for hoisting materials or personnel during construction, the Contractor shall furnish an extended warranty and service contract in effect until the expiration of the Correction Period.

5.4.8. Interruption of Existing Services

A. Whenever it becomes necessary to interrupt existing services in use by CMHA or its tenants, including, but not limited to, sewer, water, gas, steam lines, electric, telephone, and cable service, the Contractor shall continue the associated Work on a non-stop 24-hour per day basis until that Work is completed and the service restored, or perform the associated Work at an alternate time as required by and in coordination with CMHA.

B. Before beginning that Work, the Contractor shall apply in writing to, and receive approval in writing from CMHA to establish a time when interruption of the service will cause a minimum of interference with the activities of CMHA and its tenants.

5.5. Construction Supervision

5.5.1. Unless waived by CMHA in writing, the Contractor shall provide continuous supervision at the Site through a competent project manager or superintendent when any Work is being performed.

A. The Contractor's project manager or superintendent shall not be involved with any work for Contractor other than the Project.

5.5.2. The Contractor's project manager and superintendent shall each have responsibility and authority to act on behalf of the Contractor.

A. All communication to the Contractor's project manager and superintendent shall be binding as if given directly by the Contractor.

5.5.3. The Contractor shall submit an outline of the qualifications and experience of the Contractor's proposed project manager and superintendent, including references, to CMHA no later than two (2) business days after request from CMHA.

A. For all Subcontracts in excess of $200,000 and for all other Subcontracts requested by CMHA, the Contractor shall submit an outline of the qualifications and experience of the Subcontractor's proposed project manager and proposed superintendent, including references, to CMHA no later than two (2) business days after CMHA's request.

B. CMHA may reject the Contractor or Subcontractor's proposed project manager and/or proposed superintendent.

i. If CMHA does not notify the Contractor of the rejection within thirty (30) calendar days after receiving the required information, it shall then indicate that CMHA does not have an objection, but does not affect CMHA's rights under the Contract Documents or any other provision relative to the project manager or superintendent.

C. If CMHA rejects the Contractor or Subcontractor's proposed project manager or proposed superintendent, the Contractor shall replace, or cause the Subcontractor to replace the project manager or superintendent (as appropriate) with someone acceptable to CMHA at no additional cost.

5.5.4. If CMHA does not object the proposed project manager or superintendent, the Contractor and its Subcontractor shall not replace their respective project managers and superintendents without prior written approval of CMHA.

5.6. Construction Progress Schedule

5.6.1. The Contractor shall, no later than seven (7) calendar days of the issuance of the Notice to Proceed or another period of time determined by the CMHA, prepare and submit to CMHA for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the Work, the dates on which the Contractor contemplates starting and completing the several salient features of the Work (including acquiring labor, materials, and equipment).

A. The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period.

i. The Chart must be in a Critical Path Method (CPM) format.

B. If the Contractor fails to submit a schedule, that is acceptable to CMHA, within the time prescribed, CMHA may withhold approval of progress payments or take other remedies under the Contract until Contractor submits the required schedule that is acceptable to CMHA.

5.6.2. The Contractor shall monitor the Work for conformance with the Construction Progress Schedule and shall initiate revisions as required herein.

5.6.3. The Contractor shall enter the actual progress on the Construction Progress Schedule as required by CMHA, and after each update, Contractor shall immediately deliver three copies of the annotated Construction Progress Schedule to CMHA.

A. If CMHA determines, upon the basis of inspection conducted, herein that the Contractor is not meeting the approved Construction Progress Schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by CMHA, without additional cost to CMHA.

B. If the Contractor is not meeting the approved Construction Progress Schedule, CMHA may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules in chart form as CMHA deems necessary to demonstrate how the approved rate of progress will be regained.

5.6.4. Failure of the Contractor to comply with the requirements of CMHA shall be grounds for a determination by CMHA that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the Contract.

A. Upon making this determination, CMHA may terminate the Contractor's right to proceed with the work, or any separable part of it.

5.6.5. Unless otherwise agreed to in writing, the Contractor shall develop the Construction Progress Schedule using commercially available, personal computer software acceptable to CMHA and shall submit all baseline and updated schedules to CMHA in the schedule's native format.

A. This submission shall be in both electronic and paper format.

5.6.6. The Construction Progress Schedule shall not exceed the time limits under the Contract Documents, shall provide for reasonable, efficient, and economical execution of the Project and shall relate to the entire project to the extent required by the Contract Documents.

A. In the event that a Construction Progress Schedule submitted by Contractor shows a completion date that extends beyond the Contract Time permitted to Contractor in the Contract Documents, such Construction Progress Schedule shall not be deemed to modify the Contract Time permitted in the Contract Documents. The Contract Time can only be changed by a properly executed Change Order.

5.6.7. The Contractor shall use the Construction Progress Schedule to plan, organize, and execute the Project, record and report actual performance and progress, and show how it plans to coordinate and complete all remaining work by Contract Completion within applicable Milestones.

A. The Project participants shall use the Construction Progress Schedule as a tool for scheduling and reporting sequences and/or the progress of the Work.

B. The Contractor shall provide a clear graphics legend and other data including without limitation Milestone dates, constraints, and other items required by the Project and CMHA.

C. Each submission shall show CMHA's Project number and Project name, and provide a signature approval and date line for the Contractor.

5.6.8. The Contractor shall provide the following in each Construction Progress Schedule:

A. Activity identification and description of each activity broken down to a maximum duration that is appropriate for the activity;

B. Contractor or Subcontractor performing each task;

C. Contractor's resources and crew size for each activity; and

D. Provide early start, early finish, late start, late finish dates.

5.6.9. Each Construction Progress Schedule shall show predecessor activities and successor activities for each activity, entry free float, total float and percentage of completion, and identify the appropriate predecessors and successors for all related activities.

5.6.10. The Construction Progress Schedule shall show all submittal dates, review and approval durations for coordination drawings, Shop Drawings, other action submittals and mock-up Work.

5.6.11. The Contractor shall submit the initial and all updates of the Construction Progress Schedule in graphic and tabular form to CMHA.

A. With each monthly Construction Progress Schedule update, the Contractor shall include a list of all changes to the previously approved baseline schedule or monthly updated schedule.

5.6.12. The Construction Progress Schedule shall be managed using early start dates and early finish dates.

A. The Contractor must exhaust all existing float before claiming additional time for a Change Order.

5.6.13. The Contractor's failure to submit and properly maintain an approved Construction Progress Schedule may result in withholding payment in accordance with the Contract Documents.

5.6.14. For each Progress Meeting, the Contractor shall provide a 2-6 week look-ahead schedule, as appropriate for the Project.

5.6.15. On a monthly basis, the Contractor shall prepare and submit to CMHA a written report describing:

A. Activities begun or finished during the preceding month;

B. Activities in progress and expected completion;

C. Activities to be started or finished in upcoming month including, without limitation, the Contractor's workforce size and total resource hours associated with those activities;

D. Recommendations for adjusting the Construction Progress Schedule to meet Milestone dates, the Substantial Completion date and the Contract Completion date; and

E. Other information requested by CMHA.

5.6.16. If it is apparent that the Contractor may be unable to meet Critical Path activities, Milestone completion dates, the Substantial Completion date(s) or the Contract Completion date, CMHA shall direct the Contractor to submit within three (3) business days a Recovery Plan to avoid or minimize a delay in the Project.

5.6.17. A Recovery Plan shall include, without limitation, adjustments to one or more of the following:

A. Workforce

B. Hours per shift

C. Shifts per workday

D. Workdays per week

E. Equipment

F. Activity logic

5.6.18. If CMHA approves the Recovery Plan, the Contractor shall prepare a revised Construction Progress Schedule within three (3) business days to CMHA.

A. If CMHA rejects the Recovery Plan, the Contractor shall submit, within three (3) days of CMHA's rejection, an alternate Recovery Plan to CMHA in writing for review and in accordance the Contract Documents.

5.6.19. The Contractor shall update the Construction Progress Schedule on a monthly basis, or other interval as approved by CMHA, in accordance with the Contract Documents.

A. The Contractor shall submit a tabular copy showing all changes to the previously approved schedule including, without limitation, logic, float, and actual start date of activities.

i. The original or initially approved Construction Progress Schedule and all subsequent Construction Progress Schedules submitted by the Contractor, and accepted by CMHA, shall serve as an affirmation that the Contractor agrees to meet the applicable requirements and updated Construction Progress Schedule.

B. The Contractor's failure to timely submit updated Construction Progress Schedules as deemed necessary by CMHA may result in withholding payments in.

5.7. Progress Meetings

5.7.1. Unless otherwise indicated in writing, CMHA shall schedule weekly Progress Meetings for the Contractor and other persons involved in the Project as deemed necessary for coordination of the Work by CMHA, including Contractor's Subcontractors on the Project.

A. The purpose of the Progress Meeting is to review progress on the Project during the previous week, discuss anticipated progress during the following weeks, review critical operations, and discuss critical problems.

5.7.2. The Contractor shall be represented at every Progress Meeting by a person authorized with signatory authority to make decisions regarding possible modifications of the Contract Documents or Construction Progress Schedule.

A. CMHA shall notify the Contractor and other persons involved in the Project of the time and place of the Progress Meeting that shall thereafter be the same day and hour of the week for the duration of the Project, unless CMHA notifies the Contractor and other Persons involved in the Project of a different day and hour at least two (2) business days in advance.

B. The Contractor shall have any of its Subcontractors attend the Progress Meeting as determined by the Contractor, or as requested by CMHA.

C. Unless otherwise indicated in writing, CMHA shall prepare a written report of each Progress Meeting and distribute the report to the A/E and the Contractor.

D. If any person in attendance objects to anything in a report of a Progress Meeting, the person shall notify CMHA and any other affected person in writing explaining the objections within seven (7) calendar days of receipt of the Progress Meeting report.

E. The report of each Progress Meeting shall reflect any objection made to the report of the previous Progress Meeting and any response.

5.8. Project Coordination

5.8.1. If determined needed by CMHA, the Contractor or Subcontractor(s), the Contractor shall prepare Coordination Drawings for any Coordination Area.

A. The Contractor shall prepare the Coordination Drawings with Computer-Aided Design ("CAD") or Building Information Modeling ("BIM") software acceptable to CMHA.

B. The Coordination Drawings shall show the all affected work, including without limitation, plan and elevation dimensions.

5.8.2. After the Contractor completes the Coordination Drawings, the Contractor shall forward a copy of the Coordination Drawings to CMHA.

A. The A/E shall report any concerns in writing to the Coordination Participants within fourteen (14) calendar days after receiving the Coordination Drawings.

5.9. Additional Tests and Inspections

5.9.1. If the A/E or CMHA determines that any portion of the Work requires special inspection, testing, or approval not otherwise required under the Contract Documents, the A/E and/or CMHA shall order such inspection, testing, or approval.

5.9.2. If the special inspection, testing, or approval reveals Defective Work, the Contractor shall pay all associated costs and will not be entitled to any related adjustment of the Contract Times.

A. Those costs may include without limitation:

i. The cost of special inspection, testing, or approval;

ii. The cost of additional special inspections, testing, or approvals, to evaluate Remedial Work;

iii. The cost of correcting Defective Work; and

iv. All related CMHA-incurred fees and charges of contractors, engineers, architects, attorneys, and other professionals.

5.9.3. CMHA may deduct the costs described under the Contract Documents from payments then or thereafter due the Contractor.

A. If payments then or thereafter due to the Contractor are not sufficient to cover those amounts, the Contractor or it surety shall immediately pay the amount of the insufficiency to CMHA.

5.9.4. If the special inspection, testing, or approval reveals that the Work complies with the Contract Documents, and the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of the special inspection, testing, or approval, the Contractor may file a Claim by requesting a Change Order by giving written notice within seven (7) calendar days after the special inspection, testing, or approval.

5.9.5. If the Contractor is aware of the need of an inspection, testing, or approval, or of a need to have any inspection, testing, or approval completed by a particular time to avoid delay, then the Contractor shall timely communicate such information to CMHA.

5.9.6. Except as described in Additional Tests and Inspections, CMHA shall pay for any inspection, testing, or approval that did not become a requirement until after award of the Contract.

5.9.7. The Contractor shall coordinate with and give CMHA reasonable notice of the anticipated dates of all inspections, testing, or approvals.

5.10. Review of Contract Documents

5.10.1. Before starting each portion of the Work, the Contractor shall carefully study and compare the various Contract Documents relative to that portion of the Work, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the Site affecting it.

5.10.2. If the Contractor finds any perceived ambiguity, conflict, error, omission, or discrepancy on or between any of the Contract Documents, or between any of the Contract Documents and any Applicable Law, the Contractor, before proceeding with the Work, shall promptly submit a Request for Information ("RFI") to CMHA for an interpretation or clarification.

A. Before submitting any RFI, the Contractor shall carefully review the Contract Documents to ensure that the Contract Documents do not answer the RFI.

B. If Contractor indicates that the information requested in the RFI affects the critical path of the Project's Construction Progress Schedule and attaches the portion of the Project's Construction Progress Schedule that verifies that the information requested in the RFI affects the critical path, CMHA shall make all reasonable efforts to respond to the RFI within seven (7) business days of receiving the RFI.

5.10.3. If the Contractor believes that it is entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of clarifications or instructions issued in response to a RFI, the Contractor may submit a Claim by requesting a Change Order by giving notice within three (3) business days of receiving the RFI response.

5.10.4. If Contractor does not notify CMHA in accordance with 5.10.3 or any other section that addresses adjustments to the Contract Sum and Contract Time, the Contractor will have accepted the RFI response without an adjustment to the Contract Sum or Contract Time and irrevocably waives his right to submit or request an adjustment to the Contract Sum and/or Contract Time.

5.10.5. Frivolous RFI

A. If the Contractor submits a frivolous RFI, as determined by CMHA, Contractor shall be liable to CMHA for the costs related to the review and response of the RFI.

i. CMHA may deduct the costs described herein from payments then or thereafter due the Contractor.

ii. If payments then or thereafter due to the Contractor are not sufficient to cover CMHA's costs, the Contractor or it surety shall immediately pay the amount of the insufficiency to CMHA.

B. Frivolous RFIs may be returned unanswered.

5.10.6. Delays caused by improper or frivolous RFI's are the sole responsibility of the Contractor who shall waive the Contractor's right to seek adjustments to the Contract Sum and Contract Time.

5.11. Site Investigation and Conditions Affecting the Work

5.11.1. The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including, but not limited to:

A. Conditions bearing upon transportation, disposal, handling, and storage of materials;

B. The availability of labor, water, electric power and roads;

C. Uncertainties of weather, river stages, tides, or similar physical conditions at the site;

D. The conformation and conditions of the ground; and

E. The character of equipment and facilities needed preliminary to and during work performance.

5.11.2. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by CMHA, as well as from the drawings and specifications made part of this contract.

A. Any failure of the Contractor Site Investigation and Conditions Affecting the Work will not relieve the Contractor from responsibility for properly estimating or properly evaluating the difficulty and cost of successfully performing the Work without additional expense to CMHA.

5.11.3. CMHA assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by CMHA.

A. Nor does CMHA assume responsibility for any understanding reached or representations made concerning conditions which can affect the Work by any of its officers or agents before execution of this Contract, unless that understanding or representation is expressly stated in this Contract.

5.12. Protection of the Project

5.12.1. The Contractor shall protect the Project from weather and maintain the Work and all materials, apparatus, and fixtures free from injury or damage until Substantial Completion of the Work.

A. The Contractor shall at all times cover or protect the Work and materials.

B. The Contractor, at its own expense, shall remove, and replace with new, any Work damaged as a result of the Contractor's failure to provide coverage or protection.

C. After the date of Substantial Completion of the Work, CMHA is responsible for protecting and maintaining all materials, apparatus, and fixtures for the occupied portion of the Project from injury or damage.

5.12.2. The Contractor shall protect the Project and existing or adjacent property from damage at all times and shall erect and maintain necessary barriers, lateral support, furnish and keep lighted necessary danger signals at night, and take reasonable precautions to prevent injury or damage to individuals or property.

5.12.3. Temporary Heating

A. The Contractor shall provide and pay for temporary heating, covering, and enclosures necessary to protect all Work and materials against damage by dampness and cold, to dry out the Work, and to facilitate the completion of Work.

B. Any permanent heating equipment used by Contractor or Subcontractors shall be turned over to CMHA in the condition and at the time required by the specifications.

5.12.4. The Contractor shall not load, or permit any part of the Project to be loaded, in any manner that endangers the Project, or any proportion thereof.

A. The Contractor shall not subject any part of the Project or existing or adjacent property to stress or pressure that endangers the Project or property.

5.12.5. Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work sites, which are not to be removed under this Contract, and which do not unreasonably interfere with the Work required under this Contract.

B. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place.

i. If any limbs or branches of trees are broken during performance of this Contract, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as specifically directed by CMHA.

C. The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor.

i. Prior to disturbing the ground at the construction site, the Contractor shall ensure that all underground utility lines are clearly marked.

D. The Contractor shall shore up, brace, underpin, secure, and protect as necessary all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be affected by the excavations or other operations connected with the construction of the Project.

E. Any equipment temporarily removed as a result of work under this Contract shall be protected, cleaned, and replaced in the same condition as at the time of award of this Contract.

F. New work which connects to existing Work shall correspond in all respects with that to which it connects and/or be similar to existing Work unless otherwise required by the specifications.

G. No structural members shall be altered or in any way weakened without the written authorization of CMHA, unless such work is clearly specified in the Plans or specifications.

H. If the removal of the existing Work exposes discolored or unfinished surfaces, or work out of alignment, such surfaces shall be refinished, or the material replaced as necessary to make the continuous work uniform and harmonious.

i. This, however, shall not be construed to require the refinishing or reconstruction of dissimilar finishes previously exposed, or finished surfaces in good condition, but in different plans or on different levels when brought together by the removal of intervening work, unless such refinishing or reconstruction is specified in the plans or specifications.

I. The Contractor shall give all required notices to any adjoining or adjacent property owner or other party before commencement of any Work.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs arising out of or related to the settlement or the loss of lateral support of adjoining property, any damages from changes in topography affecting drainage, and from all loss or expense and all damages for which CMHA may become liable in consequence of such injury or damage to adjoining and adjacent structures and their premises.

K. The Contractor shall repair any damage to vegetation, structures, equipment, utilities, or improvements, including those that are the property of a third party, resulting from failure to comply with the requirements of this Contract or failure to exercise reasonable care in performing the work.

i. If the Contractor fails or refuses to repair the damage promptly, CMHA may have the necessary Work performed and charge the cost to the Contractor.

5.12.6. Vibration, Noise, and Dust Control

A. The Contractor shall provide controls/barriers for vibrations, noise, and dust control in occupied buildings as required by the construction operations.

B. The Contractor will not be permitted to exhaust or release unfiltered air, dust, construction debris, or other undesirable products into the exterior atmosphere or into occupied areas of the building.

i. CMHA may limit or stop the Work if the Contractor does not maintain proper air-quality standards.

ii. Such stoppage may result in a charge to the Contractor.

C. In certain occupied buildings, tasks might be of such a nature that noise and vibration cannot be tolerated.

i. In such spaces and as approved by CMHA, Work may be scheduled for other than normal working hours.

ii. The Contractor is cautioned that weekend or overtime work, if required, shall be performed at no additional cost.

iii. Permission to work other than standard hours shall be received from CMHA prior to the occurrence.

iv. Weekend or overtime Work shall be reflected in the Construction Progress Schedule.

D. The Contractor is responsible for vibration control and control of transmission of noise arising from the Work.

E. Principal considerations that shall be given to noise and vibrations control are:

i. Noise control in compliance with Occupational Safety and Health Administration (OSHA) shall be for all areas of the facility, including equipment rooms, boiler rooms, and fan rooms.

ii. Vibration control to limit sound produced by construction equipment, and for protection of the equipment existing in the building and the building structure.

iii. Vibration control to provide for the maximum usefulness of the facility by keeping levels of vibration within ranges conducive to peaceful enjoyment of residential living or work or other uses for which the facility was designed

5.13. General Warranty - Materials, Equipment and Workmanship

5.13.1. The Contractor warrants to CMHA and A/E that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise.

A. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit.

B. Work, materials, or equipment not conforming to these requirements may be considered defective.

C. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

D. If required by the A/E, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

5.13.2. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, arising out of or relating to the Contractor's breach of any warranty obligations.

A. The Contractor's obligation shall be joint and several.

5.13.3. Additional Warranties

A. The Contractor gives the Owner the following additional warranties:

i. If the Contractor's Work includes all or part of the exterior roofing system, provided that the A/E has designed the roofing system to be weather tight, the Contractor warrants that the roofing system will be weather tight; and

ii. If the Contractor's Work includes all or part of the exterior wall system, provided that the A/E has designed the wall system to be weather tight, the Contractor warrants that the wall system will be weather tight.

(a) Weather tight shall mean the roofing and/or wall system does not permit any infiltration of water in any form that would have any adverse effect on the Owner's operations or the Project.

5.13.4. The Contractor shall, prior to Contract Completion and as a condition precedent to final payment to Contractor, assign to CMHA all manufacturer's warranties related to the materials and labor used in the Work and further agrees to perform the Work in such manner as to preserve any and all such manufacturer's warranties and deliver to the A/E the warranties, project manual, operating procedures, and other materials related to each of the building systems and materials included in the Contractor's Work and as required by the Specifications.

5.13.5. Upon notice of the breach of any of the warranties or guarantees identified herein, or any other warranties or guarantees under the Contract Documents, the Contractor, in addition to any other requirements in the Contract Documents, shall commence to correct such breach and all damage resulting therefrom within two (2) business days from written notice thereof, thereafter use its best efforts to correct such breach and damage to the satisfaction of CMHA and A/E, and, except when an extension of time is granted in writing by CMHA, correct such breach and damage to the satisfaction of CMHA within thirty (30) calendar days of such notice, or such other time as provided in the notice; provided, however, that if such notice is given after final payment the 2-day period shall be extended to seven (7) calendar days.

A. If the Contractor fails to commence to correct such breach and damage, or to correct such breach or damage as provided above, the Owner, without prejudice to any of its other rights or remedies at law or under the Contract Documents, may correct the breach without further notice to Contractor.

B. The Contractor shall pay the Owner's reasonable costs and expenses incurred in connection with the or related to such correction and/or breach, including without limitation the Owner's administrative, legal, and consulting expenses and additional service fees of the A/E.

C. The foregoing warranties and obligations of the Contractor shall survive final payment and/or termination of the Contract and shall not be limited by any other terms contained in the Contract Documents.

D. If the Contractor fails to pay the Owner any amounts due hereunder, the Contactor shall pay the Owner, in addition to the amounts due, a late payment fee of one and one-half percent (1.5%) per month for each month or part thereof that the payments are not paid when due.

5.13.6. Contractor shall bring to or store at the Site only the materials and equipment required for the Work.

A. If possible, materials and equipment should be installed in their final positions when brought to the Site.

5.13.7. All equipment, material, and articles furnished under this Contract shall be of the most suitable grade for the purpose intended, unless otherwise specifically provided in this Contract.

A. References in the Contract to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

B. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of, and as approved by CMHA in writing, is equal to that named in the specifications, unless otherwise specifically provided in this Contract so long as Contractor has submitted a substitution request to CMHA.

C. If the substituted material has not been approved by CMHA in writing, the substituted material may be considered Defective Work by CMHA or A/E.

5.13.8. Approval of Equipment and materials

A. The Contractor shall obtain CMHA's approval of the machinery and mechanical and other equipment to be incorporated into the work.

i. When requesting approval, the Contractor shall furnish to CMHA the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment

ii. When required by this contract or by CMHA, the Contractor shall also obtain CMHA's approval of the material or articles which the Contractor contemplates incorporating into the work.

iii. When requesting approval, the Contractor shall provide full information concerning the material or articles.

iv. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

B. When required by the specifications or CMHA, the Contractor shall submit appropriately marked samples (and certificates related to them) for approval at the Contractor's expense, with all shipping charges prepaid.

i. The Contractor shall label, or otherwise properly mark on the container, the material or product represented, its place of origin, the name of the producer, the Contractor's name, and the identification of the construction project for which the material or product is intended to be used.

C. Certificates shall be submitted electronically in triplicate, describing each sample submitted for approval and certifying that the material, equipment or accessory complies with contract requirements.

i. The certificates shall include the name and brand of the product, name of manufacturer, and the location where produced.

D. Approval of a sample shall not constitute a waiver of CMHA's right to demand full compliance with contract requirements.

i. Materials, equipment and accessories may be rejected for cause even though samples have been approved.

E. Wherever materials are required to comply with recognized standards or specifications, such specifications shall be accepted as establishing the technical qualities and testing methods, but shall not govern the number of tests required to be made nor modify other Contract requirements.

i. CMHA may require laboratory test reports on items submitted for approval or may approve materials on the basis of data submitted in certificates with samples.

ii. Check tests will be made on materials delivered for use only as frequently as CMHA determines necessary to insure compliance of materials with the specifications.

iii. The Contractor will assume all costs of retesting materials which fail to meet contract requirements and/or testing materials offered in substitution for those found deficient.

F. After approval, samples will be kept in the Project office until completion of work.

i. They may be built into the work after a substantial quantity of the materials they represent has been built in and accepted.

G. Requirements concerning lead-based paint

i. The Contractor shall comply with the requirements concerning lead-based paint contained in the Lead-Based Paint Poisoning Prevention Act.

5.13.9. Substitutions

A. If the Contractor provides approved Substitutions that require changes to the Contract Documents, the Contractor shall be solely responsible for the additional costs incurred as a result, including without limitation changes to the design by the A/E.

B. CMHA shall consider Requests for Substitutions after the bid opening only when the Contractor can conclusively demonstrate CMHA the following conditions:

i. The specified Basis of Design Components, Acceptable Components, or previously approved Substitutions through no fault of the Contractor are not available; or

ii. The specified Basis of Design Components, Acceptable Components, or previously approved Substitutions will not perform as designed or intended.

C. The Contractor's incorporation of unapproved Substitutions in the Work shall constitute Defective Work.

D. If the Contractor provides an unacceptable Component, the Contractor shall be solely responsible for the costs of coordination and modification required.

5.14. Specifications and Drawings for Construction

5.14.1. The Contractor shall keep on the work site a stamped, permit set of the drawings and specifications and shall at all times give CMHA access thereto.

A. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both.

B. In case of difference between drawings and specifications, the specifications shall govern.

C. In case of a discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to CMHA, who shall promptly make a determination in writing.

D. Any adjustment by the Contractor without such determination shall be at its own risk and expenses.

E. CMHA shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

5.14.2. Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of CMHA is intended.

5.14.3. Where "shown," indicated", "detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this Contract unless otherwise stated, the word "provided" as used herein shall be understood to mean "provide complete in one place" that is "furnished and installed".

5.14.4. "Shop Drawings" means drawings, submitted to CMHA by the Contractor, subcontractor or any lower tier subcontractor, showing in detail, 1) the proposed fabrication and assembly of structural elements and 2) the installations (i.e., form, fit, and attachment details) of materials of equipment.

A. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the Contract.

B. CMHA may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

5.14.5. If this Contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with other Contract requirements and shall indicate its approval thereon as evidence of such coordination and review.

A. Shop Drawings submitted to the A/E without evidence of the Contractor's approval may be returned for resubmission.

B. CMHA will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate CMHA's reasons therefore.

C. Any Work done before such approval shall be at the Contractor's risk.

D. Approval by the A/E shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this Contract, except with respect to approved variations.

5.14.6. If shop drawings show variations from the Contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission.

A. If the A/E approves any such variation and CMHA concurs, CMHA shall issue an appropriate modification to the Contract, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

5.14.7. It shall be the responsibility of the Contractor to make timely requests to CMHA for such large scale and full size drawings, color schemes, and other additional information, not already in possession, which shall be required in the planning and production of the work.

A. Such requests may be submitted as the need arises, but each such request shall be filed with ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

5.14.8. The Contractor shall electronically submit to CMHA for approval (unless otherwise indicated) all shop drawings as called for under the various headings of the specifications.

A. As required by CMHA, the Contractor, upon completing the work under this Contract, shall furnish a complete set of drawings as finally approved.

B. These drawings show all changes and revisions made up to the time the work is completed and accepted.

5.14.9. Specifications and Drawings for Construction shall be included in all Subcontracts at any tier.

A. It shall be the responsibility of the Contractor to ensure that all shop drawings prepared by Subcontractors are submitted to CMHA.

5.15. As Built Drawings

5.15.1. "As-built drawings," means drawings submitted by the Contractor or subcontractor at any tier to show the construction of a particular structure or Work as actually completed under the Contract.

A. "As-built drawings" shall be synonymous with "Record Drawings".

5.15.2. As required by CMHA, the Contractor shall provide CMHA accurate information to be used in the preparation of permanent as-built drawings.

A. For this purpose, the Contractor shall record on one set of Contract drawings all changes from the installations originally indicated, and record final locations of underground lines by depth from finish grade and by accurate horizontal offset distances to permanent surface improvements such as buildings, curbs, or edges of walks.

5.15.3. As Built Drawings shall be included in all subcontracts at any tier.

5.15.4. It shall be the responsibility of the Contractor to ensure that all As-Built Drawings prepared by Subcontractors are submitted to CMHA.

5.16. Project Document Maintenance and Submittal

A. During Construction

i. The Contractor shall maintain in good order at a secure location on the Site:

(a) A complete copy of all Contract Documents; Shop Drawings, Product Data, samples and similar required submittals; manufacturer operating and maintenance instructions; certificates; warranties; RFIs and responses thereto; and other Project-related documents, all marked currently and accurately to record field changes and selections made during construction and to show actual installation where installation varies from Work as originally shown, including the exact location and depth of underground utility lines; and

(b) A set of Drawings as approved by any applicable jurisdiction and Specifications.

B. Before submitting each Contract Payment Request, the Contractor shall record all changes on the Contract Documents, neatly in a contrasting color, noting new information not shown on the original Contract Documents.

i. Failure to record all changes may cause payment to be withheld or delayed by CMHA.

C. The Contractor shall keep a record of changes made to the Specifications, noting particularly any approved variation from manufacturer's installation instructions and recommendations.

D. If the Contractor uses Shop Drawings to indicate as-built conditions, the Contractor shall cross-reference the Shop Drawing sheet numbers to the corresponding sheet numbers on the Contract Documents.

i. The Contractor shall note related numbers where applicable.

5.16.2. Before Contract Completion

A. The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall organize the As-Built Documents into manageable sets, bind the sets with durable paper cover sheets, and deliver the As-Built Documents to CMHA.

B. The Contractor's As-Built Documents submission shall include, but is not limited to:

i. Certificate of Occupancy;
ii. Inspection certificates for pressure piping, elevator, boiler, electrical, plumbing or piping purification, etc.
iii. Letter of Approval from the local fire authority or State Fire Marshal for the fire suppression system;
iv. Operation and Maintenance Manuals, organized into suitable sets of manageable size;
v. Indexed data bound in individual binders, with pocket folders for folded sheet information and appropriate identification marked on the front and the spine of each binder;
vi. Neatly and accurately marked sets of As-Built Documents, and other Contract Documents reflecting the actual construction of the Project;
vii. Detailed Drawings reflecting the exact location of any concealed utilities, mechanical or electrical systems, and components;
viii. Assignment to CMHA of all warranties and guarantees, including the most-recent address and telephone number of any Subcontractors or manufacturers;
ix. An affidavit to certify that all Subcontractors have been paid in full for all Work performed or materials furnished for the Project;
x. A final lien waiver for both the Contractor and all Subcontractors of any tier;
xi. Final certified payroll reports; and
xii. An affidavit to certify that the Contractor and each of its Subcontractors, regardless of tier, have complied with all requirements of ORC.

C. By submitting the As-Built Documents to CMHA, the Contractor certifies that its As-Built Documents are complete, correct, and accurate.

5.17. Temporary Buildings and Transportation of Materials

5.17.1. Temporary buildings (e.g., storage sheds, shops, offices, sanitary facilities) and utilities may be erected by the Contractor only with the approval of CMHA and shall be built with labor and materials furnished by the Contractor without expense to CMHA.

A. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work.
B. With the written consent of CMHA, the buildings and utilities may be abandoned and need not be removed.

5.17.2. The Contractor shall, as directed by CMHA, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by CMHA.

A. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any federal, state, or local law or regulation.
B. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage.
C. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

5.18. Facilities

5.18.1. The Contractor shall provide and maintain in a clean condition:

A. Suitable facilities, including temporary facilities, equipment, services, and enclosed storage for its use at the Site;
B. Adequate space, equipment, and furnishings to conduct progress meetings, and store approved documents and permits; and
C. Adequate sanitary facilities for use by all Persons at the Site.

5.19. Progress Cleaning

5.19.1. The Contractor shall remove all waste materials, rubbish, and mud attributable to the Work in accordance with the Specifications, if applicable, and to an appropriate disposal location at, or near, the Site.

5.19.2. The Contractor shall perform weekly broom cleaning of hard flooring surfaces in the area of the Work.

5.19.3. The Contractor shall remove, at the end of each working day or more frequently, as appropriate, for the Project, all waste materials and rubbish from the disposal location at, or near, the Site.

5.19.4. The Contractor shall remove, as appropriate for the Project or as the A/E or CMHA directs, any waste materials or rubbish from areas adjacent to the Project.

5.19.5. The Contractor shall dispose of waste materials, rubbish, and construction debris in a lawful manner in approved recycling facilities or landfills and record of such disposal shall be available upon written request of CMHA.

5.19.6. If the Contractor fails to clean up during the progress of the Work, CMHA may clean up on behalf of the Contractor and at the Contractor's expense.

A. If the Contractor fails to maintain the areas adjacent to the Project clean and free of waste materials and rubbish, CMHA may also direct the local jurisdiction responsible for the area to have the area cleaned to its satisfaction at the Contractor's expense.

B. CMHA may deduct the cleaning costs from payments then or thereafter due the Contractor.

i. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to CMHA.

5.19.7. The Contractor shall remove excavated material and spoil to a suitable off-site location approved by CMHA.

A. If CMHA designates a location on its property for disposal or storage of clean topsoil and/or subsoil in the Contract Documents, the Contractor shall remove such materials to the designated location.

5.20. Use of Premises

5.20.1. The Contractor shall use corridors, stairs, and elevators as designated by CMHA and only during those times that are designated by CMHA.

A. The Contractor shall exercise extreme care to not exceed the carrying capacity of elevators or damage the cab interior in any way.

5.20.2. Loitering or wandering through interior of buildings or exterior grounds outside the limits of the Work will not be permitted.

5.20.3. The Contractor shall confine its apparatus, materials, and the operations of its workers to the limits indicated by law, ordinances, permits and the directions of CMHA.

5.20.4. Unless expressly required or approved by CMHA, no signs or advertising of any kind will be permitted on or about the Site, except those appearing on trucks and trailers.

5.20.5. CMHA Use of Premises / Possession Prior to Completion

A. CMHA shall have the right to take possession of or use any completed or partially completed part of the Work.

i. Before taking possession of or using any work, CMHA shall furnish the Contractor a list of items of Work remaining to be performed or corrected on those portions of the Work that CMHA intends to take possession of or use.

ii. However, failure of CMHA to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the Contract.

iii. CMHA's possession or use shall not be deemed acceptance of Work under the Contract.

B. While CMHA has such possession or use, the Contractor shall be relieved of the responsibility for:

i. The loss of or damage to the Work resulting from CMHA's possession or use, notwithstanding the terms herein;

ii. All maintenance costs on the areas occupied; and

iii. Furnishing heat, light, power, and water used in the areas occupied without proper remuneration therefore.

C. If requested by the Contractor and if prior possession or use by CMHA delays the progress of the Work or causes additional expense to the Contractor, an equitable adjustment shall be made in the Contract Sum, the Contract Time, or both, and the Contract shall be modified in writing accordingly.

5.21. Smoking and Tobacco Products

5.21.1. Smoking is not permitted at any property under construction, unless CMHA has a specifically designated area for smoking, and is not permitted within 50 feet of any entrance of a CMHA owned building.

A. This prohibition applies to new construction and rehabilitation.

B. The Contractor shall enforce these restrictions on any individual employed by the Contractor, or a Subcontractor.

5.22. Correction of the Work

5.22.1. Before Substantial Completion

A. If the Contractor provides Defective Work or fails or neglects to perform the Work in accordance with the Construction Progress Schedule, CMHA or the A/E may issue a written notice to the Contractor and Contractor's Surety directing the Contractor to correct the Defective Work or recover schedule deficiencies.

i. Unless otherwise specified in that written notice, the Contractor shall begin to correct the Defective Work and recover the schedule deficiencies within no more than three (3) business days after CMHA issues the written notice.

B. If the Contractor fails to commence and diligently pursue correction of Defective Work or recovery of schedule deficiencies within three (3) business days of Contractor's receipt of written notice from CMHA or the A/E, CMHA may correct the Defective Work or take action to recover schedule deficiencies without giving further notice to the Contractor or Contractor's Surety.

5.22.2. During the Correction Period

A. If CMHA issues a notice during the Correction Period, CMHA may correct the Defective Work itself without giving further notice to the Contractor or Contractor's Surety if the Contractor fails to:

i. Notify CMHA in writing of the Contractor's intent to correct the Defective Work within three (3) business days after CMHA issues the notice; and

ii. Thereafter promptly commence and diligently pursue correction of Defective Work.

B. *The Correction Period:*

i. Commences in accordance with 23.1.41;

ii. Relates only to the Contractor's specific obligation and opportunity to correct the Work during the Correction Period;

iii. Does not establish a period of limitation with respect to any of the Contractor's other obligations under the Contract Documents;

iv. Has no relationship to the time within which CMHA may seek to enforce the Contract; and

v. Does not establish a period of limitation with respect to the commencement of litigation to establish the Contractor's liability under the Contract or otherwise.

C. *After the Correction Period:*

i. CMHA may correct, at the Contractor's expense, the Defective Work without giving further notice to the Contractor or Contractor's Surety if the Contractor or Contractor's surety fails to

(a) Notify CMHA in writing of the intent to correct the Defective Work; and

(b) Promptly commence and diligently pursue correction of Defective Work.

5.22.3. After Substantial Completion

A. In addition to the Contractor's other obligations under the Contract Documents, if any of the Work is found to be Defective Work after Substantial Completion, the Contractor shall correct it promptly after receipt of written notice from CMHA to do so, unless CMHA has previously acknowledged and accepted the Defective Work in writing.

B. CMHA may send a copy of the written notice to the Contractor's Surety, but are not obligated to do so.

5.22.4. Emergency Correction of Defective Work

A. Notwithstanding any other provision of the Contract, if in CMHA's opinion the Defective Work presents a threat of imminent harm or danger to people, property, or the environment, CMHA may order the Contractor to immediately correct Defective Work or CMHA may correct the Defective Work, at Contractor's expense, itself without any prior notice to the Contractor or Contractor's Surety.

5.22.5. Responsibility for Costs of Correction

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, associated with the correction of Defective Work and the recovery of schedule deficiencies.

B. Those costs and damages may include, but are not limited to:

i. The related fees and charges of contractors, engineers, architects, attorneys, and other professionals; and

ii. The cost of correcting or replacing adjacent work.

C. CMHA may deduct those costs and damages from payments then or thereafter due the Contractor.

i. If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to CMHA.

6. ARTICLE VI SUBCONTRACTORS

6.1. Evaluation and Approval

6.1.1. When submitting its Bid, the Contractor shall submit a Subcontractor and Material Supplier Declaration form through which the Contractor identifies its Subcontractor.

A. Provide list of subcontractors and material supplier and equipment with bid.

6.1.2. Within ten (10) calendar days after the Notice to Proceed, the Contractor shall submit to CMHA, an **updated** Subcontractor and Material Supplier Declaration form.

6.1.3. If CMHA rejects any proposed Subcontractor, the Contractor shall propose a replacement Subcontractor with no adjustment of the Contract Sum.

A. The proposed replacement will also be evaluated by CMHA.

6.1.4. The Contractor's failure to timely submit the information regarding a proposed Subcontractor may result in withholding payment to Contractor.

6.2. Suspension/Debarment

6.2.1. The Contractor shall not enter into any Subcontract with any Subcontractor who has been temporarily denied participation in a HUD program or who has been suspended or debarred from participating in contracting program by any agency of the United States Government or the State of Ohio.

6.3. Contractor's Responsibility

6.3.1. The Contractor shall be as fully responsible for the acts or omissions of its Subcontractors and of persons either directly or indirectly employed by them as for the acts or omissions of persons directly employed by the Contractor, and is responsible for scheduling and coordinating the Work of the Subcontractors.

6.3.2. The Contractor is fully responsible for any delay, interference, disruption, or hindrance attributable to the Contractor's Subcontractors.

6.3.3. The Contractors shall require that each of its Subcontractors have a competent supervisor at the Site whenever the Subcontractor is performing Work.

6.3.4. The Contractor shall bind its Subcontractors to the terms and conditions of the Contract Documents, so far as applicable to the Work of the Subcontractor, and shall not agree to any provision, which seeks to bind CMHA with terms inconsistent with or at variance from the Contract Documents.

6.3.5. The Contractor will not be relieved of its full responsibility for Subcontractors and their performance of the Work by:

A. The participation of CMHA, HUD, or the A/E in the processes described under ARTICLE VI SUBCONTRACTORS or other related provisions of the Contract Documents; or

B. CMHA's rejection of a Subcontractor or failure to reject a Subcontractor.

6.4. Mandatory Contract Provisions/Forms

6.4.1. The Contractor shall insert appropriate clauses in all Subcontracts to bind Subcontractors to the terms and conditions of this Contract insofar as they are applicable in the work of Subcontractors.

6.4.2. CMHA reserves the right to reassign accepted agreements

6.4.3. Nothing contained in this Contract shall create any contractual relationship between any Subcontractor and CMHA or between the Subcontractor and HUD.

6.4.4. The Contractor must include in the contract with its Subcontractors the applicable labor provisions and prevailing wages as was provided to the Contractor by CMHA.

6.4.5. No less than ten (10) calendar days before the Work is to be performed by a Subcontractor, or within a shorter period as mutually agreed by the Contractor and CMHA, the Contractor shall submit to CMHA a complete copy of the executed Subcontract between the Contractor and Subcontractor.

6.5. Replacement of Subcontractors

6.5.1. The Contractor shall not replace any Subcontractor after execution of the Subcontract without prior written approval of CMHA.

6.5.2. The Contractor shall not add any subcontractors after the Contract Execution without updating the Material supplier and subcontractor form or prior to written approval of CMHA.

6.6. Contingent Assignment of Subcontract

6.6.1. The Contractor hereby assigns its Agreement with each Subcontractor to CMHA provided that the assignment is effective only after termination of the Contract by CMHA and only for those agreements that CMHA accepts by notifying Contractor and applicable Subcontractor in writing.

6.7. Prompt Payment of Subcontracts

6.7.1. The Contractor shall make payments to the Subcontractor in accordance with Applicable Law, including ORC that include, without limitation, the requirements under 6.7 - Prompt Payment of Subcontracts.

6.7.2. If a Subcontractor requests payment in time to allow the Contractor to include the request in its Contractor Payment Application Request the Contractor, within ten (10) calendar days after receipt of payment from CMHA, shall pay to the:

A. Subcontractor, an amount equal to the percentage of completion of the Subcontractors contract allowed by CMHA for the amount of labor or work performed;

B. Material Supplier, an amount that is equal to all or a portion of the invoice for materials which represents the materials furnished by the material supplier

6.7.3. The Contractor may reduce the amount paid by any retainage provision contained in the Contract, invoice, or purchase order between the Contractor and Subcontractor and may withhold amounts that may be necessary to:

A. Resolve disputed liens or claims involving the Work or labor performed by the Subcontractor; or

B. Account for failure of the Subcontractor to perform its obligations under its agreement with the Contractor required under ORC

6.7.4. Labor Payments

A. Within ten (10) calendar days of receipt of payment from CMHA, the Contractor shall pay Subcontractor in the following manner:

i. Partial payments to the Subcontractor for labor performed under either a Unit Price or lump sum Subcontract shall be made at the rate of 92 percent of the amount invoiced through the Subcontractor's request for payment that shows the Work of the Subcontractor is 50% complete.

ii. After the Work of the Subcontractor is 50 percent complete, as evidenced by payments of at least 50 percent of the total amount due under the Subcontract, no additional funds shall be retained from payments for labor.

6.7.5. Material Payment

A. Required by ORC for payment to Contractor by CMHA

i. The Contractor shall pay the Subcontractor at the rate of 95% of the invoice cost, not to exceed the scheduled value in a unit price or lump sum Subcontract, for materials delivered to the Site, or other offsite storage location approved by CMHA, provided the Subcontractor provides the information required with its request for payment.

ii. The Contractor shall pay the Subcontractor at the rate of 100% of the scheduled value for materials incorporated into the Project.

6.7.6. If Contractor fails to comply with the payment provisions set forth, the Contractor shall pay to the applicable Subcontractor, in addition to any payment due, interest in the amount of 18 percent per annum of the payment due, beginning the eleventh day following the receipt of payment from CMHA and ending on the date of full payment of the payment due plus interest.

6.7.7. If CMHA receives a Claim Affidavit from a Subcontractor, Subcontractor shall proceed in accordance with Applicable Law, including Ohio Revised Code.

6.7.8. Laborers, Subcontractors, and Material Suppliers may secure payment rights in accordance with Applicable Law, including Ohio Revised Code.

6.8. Subcontracting with Small and Minority Firms, Women's Business Enterprise, and Labor Surplus Area Firms

6.8.1. The Contractor shall take the following steps to ensure that, whenever possible, Subcontracts are awarded to small business firms, minority firms, women's business enterprises, and labor surplus area firms:

A. Placing qualified small and minority businesses and women's business enterprises on solicitations lists;

B. Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential resources

C. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses and women's business enterprises;

6.8.2. Establishing delivery schedule, where the requirements of the Contract permit, which encourages participation by small and minority businesses and women's business enterprises; and

6.8.3. Using the services and assistance of the U.S. Small Business Administration, the Minority Business Development Agency of the U.S. Department of Commerce, and State and local governmental small business agencies

7. ARTICLE VII PAYMENTS

7.1. CMHA Obligation

7.1.1. CMHA shall pay the Contractor the price as provided in the Contract.

7.2. Forms

7.2.1. Unless expressly authorized to the contrary, Contractor must use appropriate CMHA forms.

7.3. Step One – Pencil Application

7.3.1. The purpose of a pencil application is assisting the Contractor in identifying any potential error or omission in the pay application.

A. If submitted timely (as set forth below) CMHA will review and help identify any potential issues. However, the CMHA Construction Administrator's approval or suggestion does not guarantee approval of the payment application by the CMHA.

7.3.2. The Contractor shall initially submit a Pencil Application by no later than the 15th of each month.

A. The CMHA Construction Administrator will review the Pencil Application, and make any suggested corrections and return to the Contractor in approximately two (2) business days.

7.3.3. The Contractor shall then submit the final payment application to the CMHA Construction Administrator by the 23rd of each month.

7.3.4. Failure to submit a pencil application may result in a significant delay in payment.

7.4. Progress Payments

7.4.1. CMHA shall make progress payments approximately every forty-five (45) calendar days as the work proceeds on estimates of Work accomplished which meets the standards of quality established under the Contract, as approved by CMHA.

A. Subject to CMHA's written determination and approval more frequent payments may be made to contractors which are qualified as small businesses.

7.4.2. Before the first progress payment under this contract, the Contractor shall furnish, in such detail as requested by CMHA, a breakdown of the total contract price showing the amount included therein for each principal category of the work, which shall substantiate the payment amount requested in order to provide a basis for determining progress payments.

A. The breakdown shall be approved by CMHA and must be acceptable to HUD.

B. If the contract covers more than one Project, the Contractor shall furnish a separate breakdown for each.

C. The values and quantities employed in making up this breakdown are for determining the amount of progress payments and shall not be construed as a basis for additions to or deductions from the Contract Sum.

D. The Contractor shall prorate its overhead and profit over the construction period of the Contract.

7.4.3. The Contractor shall submit, on forms provided by CMHA, periodic estimates showing the value of the work performed during each period based upon the approved breakdown of the Contract Sum.

A. Such estimates shall be submitted not later than nine (9) calendar days in advance of the date set for payment and are subject to correction and revision as required.

B. The estimates must be approved by the CMHA prior to payment.

C. If the contract covers more than one project, the Contractor shall furnish a separate progress payment estimate for each.

D. Each payment application should include affidavits for the Contractor, Sub Contractors and Material Suppliers. Lien waivers should be submitted as proof of payment for the prior payment application affidavits.

7.4.4. Along with each request for progress payments and the required estimates, the Contractor shall furnish the following certification, or payment shall not be made:

A. I hereby certify, to the best of my knowledge and belief, that:

i. The amounts requested are only for performance in accordance with the specifications, terms,

ii. Payments to subcontractors and suppliers have been made from previous payments received under the contract, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements; and

iii. This request for progress payments does not include any amounts which the prime Contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract.

7.5. Allowances

7.5.1. The Contract Sum includes the Allowances (if any) identified in the Contract.

7.5.2. All allowances include the costs to the Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes.

7.6. Unit Prices

7.6.1. Where the Contract provides that all or a part of the Work is to be Unit Price Work, initially that Contract Sum will include for all Unit Price Work:

A. An amount equal to the sum of the established Unit Prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract.

B. The Contractor's fee on that Unit Price Work.

7.6.2. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Sum.

A. CMHA will determine the actual quantities and classifications of Unit Price Work performed by the Contractor.

7.6.3. Before final payment, an appropriate Change Order will be issued to reconcile the Contract Sum so that it reflects actual amount due to the Contractor on account of Unit Price Work actually performed.

7.7. Schedule of Values

7.7.1. Within seven (7) calendar days after issuance of Letter of Intent or other period as mutually agreed by the Contractor and CMHA, the Contractor shall submit to CMHA a Schedule of Values on a form provided for by CMHA, with separate amounts shown for labor and materials for each branch of Work.

A. The Contractor shall clearly indicate on the Schedule of Values, but is not necessarily limited to, the cost of payment and performance bond(s), permit costs, the amount(s) allocated, including separate items for the Contractor's Fee (Overhead and Profit), and the amount(s) of labor and materials, as appropriate.

7.7.2. The grand total shown on the Schedule of Values shall equal the total Contract Sum.

7.7.3. CMHA may use the approved Schedule of Values to determine cost or credit to CMHA resulting from any change in the Work.

A. The first items shall be a breakdown of the General Conditions Cost.

B. The amounts for labor and materials shall accurately reflect the cost for each item.

i. The Contractor shall clearly indicate on the Schedule of Values, the amount(s) allocated, including separate items for Contractor's Fee (overhead and profit), for each Section 3 certified Business used in the performance of the Work.

ii. Contractor's Fee shall be included in the totals for labor and materials.

C. If the material allocation exceeds 55 percent of the Contract Sum, the Contractor shall provide, upon request, sufficient information to support the higher percentage.

D. Subcontract Work shall show amounts for labor and materials.

i. Fringe benefits shall be shown as a part of labor costs.

E. When more than one major structure is included in the Work, the Contractor shall subdivide the Schedule of Values accordingly, with cost details for each structure shown separately.

F. The line items shall be coordinated with line items in the Construction Progress Schedule, which may require division of items of Work by area of the Project by floor, phase, or other appropriate area.

G. Mechanical and electrical Work shall be included in separate line items for all major pieces of equipment, and group smaller equipment items by type.

H. Line items shall be included for each Allowance, Punch List Work, Project Record Document Submittals, delivery of attic stock, and specified demonstrations and training.

7.7.4. CMHA may return the Schedule of Values to the Contractor for re-submittal if it does not meet the requirements or contains insufficient items or details of the Work, or approve the Schedule of Values if CMHA determines that it conforms to section 7.7

7.7.5. No payment shall be made until the CMHA has approved the Contractor's Schedule of Values.

7.8. Labor Payments/Retainage

7.8.1. Partial payments to the Contractor for labor performed under either a Unit Price or lump sum Contract shall be made at the rate of 90 percent of the amount invoiced through the Contractor Payment Request.

7.9. Material Payments/Retainage

7.9.1. CMHA shall pay the Contractor at the rate of 100 percent of the scheduled value for materials incorporated into the Project.

7.9.2. CMHA shall pay the Contractor at the rate of 90 percent of the invoice cost, not to exceed the scheduled value in a Unit Price or lump sum Contract, for materials delivered to the Site, or other off-Site storage location approved by CMHA provided the Contractor provides the following information with the Contractor Payment Request:

A. A list of the fabricated materials consigned to the Project, giving the place of storage, together with copies of invoices, in order to verify quantity and cost; and

B. A certification of materials stored off-site, prepared by the Contractor and signed by CMHA to evidence that the materials are in conformity with the Specifications and have been tagged with the Project name and number for delivery to the Project.

7.9.3. CMHA shall pay the balance of the scheduled value when the materials are incorporated into and become a part of the Project.

7.9.4. When payment is allowed for materials delivered to the Site or other approved off-site storage location but not yet incorporated into the Project, the materials are the property of CMHA.

7.9.5. CMHA may, at its sole discretion, retain any material not ultimately incorporated into the Project or return it to the Contractor for credit of an amount proportionate to the value of the extra materials.

7.9.6. Release of Retainage

A. When the Contractor has achieved Substantial Completion of all Work, and there is no other reason to retain funds; upon request of the Contractor, the funds retained in connection with that Work shall be released and paid to the Contractor, withholding only that amount necessary to assure faithful completion in the sole discretion of CMHA, including but not limited to compliance with CLOSEOUT.

7.10. Payments Withheld

7.10.1. CMHA may withhold funds from or may assess Liquidated Damages against a Contractor Payment Request.

7.10.2. CMHA may decline to approve any Contractor Payment Request or part thereof, or nullify any previous Contractor Payment Request, in whole or in part, to the extent necessary in CMHA's sole opinion to protect CMHA from loss because of:

A. Defective Work not remedied;

B. Overpayment of any schedule of values line item without prior approval of related change order by Contracting Officer;

C. Overpayment due to calculation error;

D. Damage caused by the Contractor;

E. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

F. Reasonable evidence that the Work will not be completed within the Contract Times, and that the unpaid balance would not be adequate to cover damages under the Contract Documents for the anticipated delay;

G. Failure to comply with Applicable Law including, but not limited to, the requirements of ORC.

7.11. Payment Request

7.11.1. The Contractor and each of its Subcontractors, regardless of tier, shall execute a Payment Release Affidavit to certify that the Contractor and each of its Subcontractors, regardless of tier, have complied with all applicable requirements of ORC, and to certify that all of its Subcontractors have been paid in full for all Work performed or materials furnished under the Contract.

7.11.2. CMHA shall pay Contractor in approximately forty-five (45) calendar days from the date of acceptance of the Payment Request.

7.11.3. The Contractor, as a condition precedent to final payment, shall complete all requirements of the Contract Documents.

7.11.4. Acceptance of final payment by the Contractor or a Subcontractor constitutes the payee's waiver of all claims against CMHA expect those previously made in writing and identified by that payee as unsettled at the time of the final Contractor Payment Request.

8. ARTICLE VIII CONTRACT MODIFICATIONS

8.1. Changes in the Work

8.1.1. Except as provided, no order, statement or conduct of CMHA shall be treated as a change or entitle the Contractor to an equitable adjustment.

8.1.2. Only CMHA's Contracting Officer has authority to modify any term or condition of this Contract.

A. Any Contract modification shall be authorized in writing.

8.1.3. The Contracting Officer may modify the contract unilaterally:

A. Pursuant to a specific authorization stated in a Contract clause; or

B. For administrative matters which do not change the rights or responsibilities of the parties.

8.1.4. All other Contract Modifications shall be in the form of supplemental agreements signed by the Contractor and CMHA.

A. If notice of any change affecting the Contract is required by the provision of any Bond, notice is the Contractor's responsibility.

8.1.5. Except as expressly stated herein, the Contractor's failure to obtain prior written authorization from CMHA for a change in the Work constitutes a waiver by the Contractor of an adjustment to the Contract Sum or Contract Time or both.

8.1.6. The Contractor shall perform all changes in the Work under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly with the change unless otherwise provided in the Change Order or order for a minor change in the Work.

8.1.7. HUD Approval

A. When a proposed modification requires the approval of HUD prior to its issuance; such modification shall not be effective until the required approval is received by CMHA.

8.2. Change Order

8.2.1. CMHA may order changes in the Work without invalidating the Contract and such change in Work may be accomplished, by Change Order or an order for a minor change in the Work.

8.2.2. CMHA may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make changes in the Work within the general scope of the Contract including, but not limited to, changes:

A. In the specifications (including drawings and designs);

B. In the method or manner of performance of the Work;

C. CMHA-furnished facilities, equipment, materials, services, or site; or

D. Directing the acceleration of the Work.

8.2.3. If any change causes an increase or decrease in the Contractor's cost of, or the time required for the performance of any part of the Work under this contract, whether or not changed by any such order, CMHA shall make an equitable adjustment and modify the Contract in writing.

A. However, except for an adjustment based on defective specifications, no proposal for any change shall be allowed for any costs incurred more than twenty (20) calendar days before the Contractor gives written notice as required.

B. In the case of defective specifications for which CMHA is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specification.

8.2.4. The Contractor must assert its right to an adjustment within thirty (30) calendar days after:

A. Receipt of a written change order, or

B. The furnishing of a written notice by submitting a written statement describing the general nature and the amount of the proposal.

8.2.5. If the facts justify it, CMHA may, in its sole discretion, extend the period for submission.

8.3. Change Order Directive

8.3.1. A Change Order Directive is a written order prepared by CMHA directing a change in the Work and may, if necessary, state a proposed basis for adjustment, if any, of Contract Sum or Contract Time, or both.

8.3.2. A Change Directive shall be used to direct a change in the Work in the absence of a total agreement on the terms of a Change Order and shall only be used in the absence of total agreement on the terms of a Change Order concerning the associated change of the Work.

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

8.3.4. Within fourteen (14) calendar days after receiving the Change Directive, the Contractor shall respond with a Change Order Proposal for adjustment of the Contract Sum or Contract Time or both.

8.3.5. If the Contractor does not respond to the Change Directive as required above, CMHA shall determine the adjustments, if any, of the Contract Sum and Contract Times.

A. If the Contractor does not agree with CMHA's determination, the Contractor shall initiate a claim within ten (10) calendar days of the date on which CMHA issues the determination, and the Contractor's failure to do so shall constitute an irrevocable waiver the Claim.

8.3.6. If CMHA and the Contractor agree on the adjustment of the Contract Sum and/or Contract Time associated with the Change Order Directive, CMHA shall prepare an appropriate Change Order.

8.4. Change Order Procedure

8.4.1. Any Change Order Request must be in writing and submitted by the Contractor to CMHA in accordance with the Notice Provision.

8.4.2. The Contractor's cost of preparing and providing Proposals is included in the Contract Sum.

8.4.3. If CMHA Agrees with Change Order Proposal:

A. CMHA shall prepare each Change Order, attach the supporting documentation, and issue the Change Order to the Contractor for signature.

B. Within three (3) business days after issuance of Change Order to Contractor, Contractor must sign the Change Order and resubmit to CMHA.

C. Change Order is not approved until CMHA's Contracting Officer signs the Change Order.

8.4.4. If CMHA disagrees with Change Order Proposal or Contracting Officer doesn't Approve Change Order:

A. CMHA will notify Contractor in writing with reasons; and

B. Contractor has fourteen (14) calendar days to modify the Change Order Request or invoke ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE.

8.4.5. Failure to reach an agreement on any proposal shall be a dispute under ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE herein.

A. Nothing in Change Order Procedure, however, shall excuse the Contractor from proceeding with the contract change pursuant to an issued Change Directive.

8.5. Change Order Proposal

8.5.1. The Contractor's written proposal for equitable adjustment shall be submitted in the form of a lump sum proposal supported with an itemized breakdown of all increases and decreases in the contract in at least the following details:

A. Direct Costs:

i. Materials (list individual items, the quantity and unit cost of each, and the aggregate cost)

ii. Transportation and delivery costs associated with materials

iii. Labor breakdowns by hours or unit costs (identified with specific Work to be performed)

iv. Construction equipment exclusively necessary for the change

v. Costs of preparation and/ or revision to shop drawings resulting from the change

vi. Worker's Compensation and Public Liability Insurance

vii. Employment taxes under FICA and FUTA

viii. Bond Costs

B. Indirect Costs:

i. Indirect costs may include overhead, general and administrative expenses, and fringe benefits not normally treated as direct costs.

C. Profit:

i. The amount of profit shall be negotiated and may vary according to the nature, extent, and complexity of the work required by the change.

ii. The allow-ability of the direct and indirect costs shall be determined in accordance with the Contract Cost Principles and Procedures for Commercial Firms, in effect on the date of this Contract.

iii. The Contractor shall not be allowed a profit on the profit received by any subcontractor.

iv. Equitable adjustments for deleted work shall include a credit for profit and may include a credit for indirect costs.

v. On proposals covering both increases and decreases in the amount of the contract, the application of indirect costs and profit shall be on the net-change in direct costs for the Contractor or subcontractor performing the Work.

8.5.2. The Contractor shall include in the proposal its request for time extension (if any), and shall include sufficient information and dates to demonstrate whether and to what extent the change will delay the completion of the Contract in its entirety.

8.5.3. CMHA shall act on proposals within thirty (30) calendar days after their receipt, or notify the Contractor of the date such action will be taken.

8.5.4. By signing a Change Order, the Contractor irrevocably certifies that the elements of a Change Order described herein are completely satisfied, and waives all rights, if any, to seek further adjustment of the Contract Sum or Contract Times, or both, at a later date with respect to the associated change in the Work, including without limitation on account of the "cumulative impact" of the associated change in the Work in combination with in one or more of the other changes in the Work.

8.5.5. No Proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this Contract.

Except in an emergency endangering life or property, no change shall be made by the Contractor without a prior written authorization from CMHA's Contracting Officer. When the Change Order is signed by the Contractor and CMHA's Contracting Officer, the fully executed Change Order modifies the Contract Documents and authorizes and directs the Contractor to proceed, and the Contractor shall promptly proceed with the associated change in the Work.

8.6. Differing Site Conditions

8.6.1. The Contractor shall promptly, and before the conditions are disturbed, give a written notice to CMHA of:

A. Subsurface or latent physical conditions at the site which differ from those indicated in this contract; or

B. Unknown physical conditions at the site(s), of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the Contract.

i. Written notice of the condition shall be given immediately to CMHA.

C. The Contractor's failure to give notice of the Differing Site Condition as required shall constitute an irrevocable waiver of any associated claim.

8.6.2. CMHA shall investigate the site conditions promptly after receiving the notice.

A. Work shall not proceed at the affected site, except at the Contractor's risk, until the Contracting Officer has provided written instructions to the Contractor.

B. If the conditions do materially so differ and cause an increase or decrease in Contractor's cost of, or the time required for, performing any part of the Work under this Contract, whether or not changed as a result of the conditions, the Contractor shall file a claim in writing to CMHA within ten (10) calendar days after receipt of such instructions and, in any event, before proceeding with the work.

C. An equitable adjustment in the Contract price, the delivery schedule, or both shall be made under this.

8.6.3. No request by Contractor for an equitable adjustment to the Contract under Differing Site Conditions shall be allowed, unless the Contractor has given the written notice required; provided that the time prescribed for giving written notice may be extended by CMHA.

8.6.4. If CMHA determines that the Contractor has not encountered a Differing Site Condition and the Contractor does not agree with that determination, the Contractor must initiate a Claim within ten (10) calendar days of the date that CMHA issues its determination.

8.7. Minor Changes in the Work

8.7.1. CMHA may order minor changes in the Work not involving adjustment of the Contract Sum or extension of the Contract Times and not inconsistent with the intent of the Contract Documents.

A. Those changes shall be effected by written order issued to the Contractor.

8.7.2. The Contractor shall promptly carry out each order for a minor change in the Work if the Contractor agrees that the order does not involve adjustment of the Contract Sum and Contract Times.

8.7.3. If the Contractor reasonably believes that it would be entitled to an adjustment of the Contract Sum or Contract Times, or both, on account of an order for a minor change in the Work, the Contractor, within three (3) business days after receiving the order, shall give CMHA written notice of the Contractor's position, and not proceed with the subject Work without first receiving a Change Order related to it.

8.7.4. The Contractor waives its right to an adjustment of the Contract Sum or Contract Times on account of an order for a minor change in the Work by:

A. Starting the Work that is the subject of the order for a minor change in the Work; or

B. Failing to give the notice described within three (3) business days after receiving the order for a minor change in the Work.

8.8. Change Order Cost or Credit Determination

8.8.1. General

A. The maximum cost or credit resulting from a change in the Work shall be determined as described below.

i. Proposals shall include the information required.

ii. A Unit Price Proposal shall only be valid when incorporated into the Contract by Change Order.

iii. The maximum cost or credit includes all compensation for impact costs.

(a) Additional costs for impacts shall not be allowed.

B. The Contractor shall not assign any portion of the Work to another Person whereby the Contractor would benefit directly or indirectly from the double application of charges for overhead or profit.

C. CMHA may require notarized invoices for material costs and may audit the records of the Contractor and Subcontractors.

D. For each change in the Work, the Contractor shall furnish a detailed Proposal itemized on the Proposal Worksheet Summary Form published by CMHA through which the Contractor shall document the related changes in the Contract Sum.

i. Any Subcontractor pricing shall also be itemized on the Proposal Worksheet Summary Form.

E. Section 8.8.2 Pricing Criteria establishes the exclusive and maximum amount that CMHA shall pay for any Change Order, including, but not limited to, all amounts for interference with, delay, hindrance, disruption, or impact of the Work

i. These Pricing Criteria also govern the value of deduct Change Orders and the Contractor's entitlement to additional compensation or damages through the Claims and dispute resolution processes on account of changes in the Work.

ii. In order to expedite the review and approval process, Proposals shall be prepared in the categories and order listed in - Pricing Criteria**.**

8.8.2. Pricing Criteria

A. Contractor Personnel Costs

i. The Contractor's on-Site management (including supervision and administrative personnel) are not subject to State or Federal Prevailing Wage Rates.

ii. These costs will be calculated on an hourly basis according to the rates acceptable to CMHA.

iii. In no event will the Contractor be entitled to an increase in the Contract Sum on account of Contractor Personnel Costs unless the Contractor actually incurs additional Contractor Personnel Costs solely on account of the associated change in the Work.

B. Labor

i. Field labor directly involved in the Work based upon the actual rate of pay to the worker.

ii. If the Project is subject to payment of prevailing wage rates, field labor shall be paid according to the applicable classification of labor as established in the applicable prevailing wage determination.

iii. In no event will the Contractor be entitled to an increase in the Contract Sum on account of labor costs unless the Contractor actually incurs additional labor costs solely on account of the associated change in the Work.

iv. Under no conditions will the increase exceed those additional labor costs the Contractor actually incurs.

v. The cost for supervision above the level of working forepersons (such as general forepersons, superintendent, project manager, etc.) is included in the adjustment Contractor Personnel Costs.

C. Fringes

i. Fringe benefit credit for labor is only allowable for prevailing wage fringe benefits including, but not limited to, Health and Welfare, vacation, apprenticeship training, and certain types of pension plans.

ii. Each fringe benefit for which credit is requested shall be calculated on an hourly basis and listed as a separate line item.

iii. The Contractor shall submit documentation supporting the calculation of the amounts for each fringe benefit for each worker classification, including labor provided by Subcontractors.

D. Allowable Payroll Expenses

i. Allowable payroll expenses for labor including payroll taxes as well as other benefits that are required by Applicable Law, shall each be a separate line item.

E. Equipment Rentals

i. All charges for certain non-owned heavy or specialized equipment at up to 100 percent of the documented rental cost

ii. No rental charges shall be allowed for hand tools, minor equipment, simple scaffolds, etc. Downtime due to repairs, maintenance and weather delays shall not be allowed.

iii. Contractor shall submit copies of actual paid invoices to substantiate rental costs.

F. Owned Equipment

i. All charges for certain heavy or specialized equipment owned by the Contractor or Subcontractor performing the Work at up to 100 percent of the cost listed by the current edition of the Associated Equipment Distributors' *AED Green Book* heavy equipment rental rates.

ii. No recovery shall be allowed for hand tools, minor equipment, simple scaffolds, etc.

iii. The longest period of time that the equipment is to be required for the Work shall be the basis for the pricing.

iv. Downtime due to repairs, maintenance, and weather delays shall not be allowed.

G. Trucking

i. A reasonable delivery charge or per-mile trucking charge for delivery of required materials or equipment

ii. Charges for use of a pick-up truck shall not be allowed.

H. Materials

i. The actual cost (including all discounts, rebates or related credits) of all materials incorporated into the changed Work

ii. Documentation shall show costs, quantities, or Unit Prices of all items, as appropriate.

iii. The cost or credit for reusable materials shall be limited to 33 percent of the material cost for each use.

I. Contractor's General Conditions Costs

i. The Contractor's General Conditions Costs to the extent attributable to an associated change in the Contract Time for achievement of Final Acceptance resulting from the change in Work

ii. In no event shall the Contract Sum adjustment per day of Contract Time adjustment exceed an amount equal to **(1)** the sum of the General Conditions Costs line items in the Contractor's Schedule of Values approved by CMHA, **(2)** divided by the total number of days of the original Contract Time for achievement of Final Acceptance.

iii. The Contractor shall:

(a) Exclude the bond premium from the Schedule of Values for the purposes of the calculation; and

(b) Include the actual adjustment of the Bond Premium attributable to an associated change in the Contract Sum.

iv. If the Contractor purchases Builder's Risk insurance for the Project, the Contract shall:

(a) Exclude the Builder's Risk insurance premium from the Schedule of Values for the purposes of the calculation; and

(b) Include the actual adjustment of the Builder's Risk insurance premium attributable to an associated change in the Contract Sum.

J. Subcontractor Overhead and Profit

i. Adjustment of the Contract Sum on account of a change in Subcontractor-performed Work shall include the Subcontractor's aggregate overhead and profit allowance equal to 15 percent of the sum of the Subcontractor's costs that are associated with that changed Work.

ii. The allowance applies to each Subcontractor tier.

iii. The allowance covers:

(a) The costs required to schedule and coordinate the Work
(b) Telephone
(c) Telephone charges
(d) Facsimile
(e) Telegrams
(f) Postage
(g) Photos
(h) Photocopying
(i) Hand tools
(j) Simple scaffolds (one level high)
(k) Tool breakage
(l) Tool repairs
(m) Tool replacement
(n) Tool blades
(o) Tool bits
(p) Home office estimating and expediting
(q) Home office clerical and accounting support
(r) Home office labor (management, supervision, engineering)
(s) All other home office expense, legal services, travel, and parking expenses

iv. An exception is allowed for shop or engineering labor, which shall not be subject to Prevailing Wage rates for steel fabricators, sheet metal fabricators, and sprinkler system fabricators performing work off-site.

(a) Recovery for these matters shall be allowed on an hourly basis.

v. An exception is allowed for field supervision labor, for those portions of the Change Order Work that will be performed, or was performed, at times when the superintendent is not required to be on site, including but not limited to overtime hours due to acceleration and\ extensions of the Contract Times.

(a) Recovery for this matter will be allowed on an hourly basis.

K. Contractor's Fee

i. Adjustment of the Contract Sum on account of a change in the Work shall include an allowance for the Contractor's Fee equal to 10 percent of the sum of the costs that are associated with that changed Work.

L. Miscellaneous

i. Adjustment of the Contract Sum on account of a change in Work may include the following costs with no allowance for Contractor's Fee or Subcontractor overhead and profit.

ii. The premium portion only for approved overtime (labor and fringes)

iii. The straight time portion is included.

8.8.3. Costs that shall not be reimbursed for Change Order Work include the following

A. Voluntary employee deductions including, but not limited to, deductions for charitable donations or U.S. savings bonds

B. Employee profit sharing

8.9. Time Extension

8.9.1. Every adjustment of the Contract Times associated with any change in the Work shall be determined as provided herein, which establishes the Contractor's maximum entitlement for any change in the Work, including without limitation all adjustments for interference, delay, hindrance, or disruption of the Work.

8.9.2. This also governs time adjustments for deduct Change Orders and the Contractor's entitlement to additional time through the claims and dispute resolution processes on account of changes in the Work.

8.9.3. The Contractor shall substantiate all changes in the Contract Times with:

A. A written description of the nature of the interference, disruption, hindrance or delay;

B. Identification of Persons and events responsible for the interference, disruption, hindrance or delay;

C. Date, or anticipated date, of commencement of the interference, disruption, hindrance or delay;

D. Identification of activities by schedule activity number and name on the Construction Progress Schedule, which may be affected by the interference, disruption, hindrance or delay, or new activities created by the interference, disruption, hindrance or delay and the relationship with existing activities;

E. Anticipated duration of the interference, disruption, hindrance or delay and of any remobilization period;

F. Specific number of days of extension requested and specific number of days for remobilization requested;

G. Recommended action to avoid or minimize any future interference, disruption, hindrance or delay; and

H. A detailed written proposal for an increase in the Contract Sum which would fully compensate the Contractor for all costs of acceleration of the Work needed to completely overcome the associated delay, if any.

8.9.4. A Change Order may authorize extension of the Contract Time for specific elements, while maintaining milestone dates for unaffected elements.

A. Such a Change Order may also authorize an appropriate adjustment to Liquidated Damages.

8.9.5. Critical Path

A. Time extensions shall depend upon the extent to which the Work on the critical path of the Construction Progress Schedule is affected.

8.9.6. A Change Order granting a time extension may provide that the Contract Times shall be extended for only elements so interfered with, disrupted, hindered, or delayed and related remobilization and that shall not be altered and may further provide for adjustment of Liquidated Damages.

9. ARTICLE IX CONSTRUCTION CLOSEOUT

9.1. Final Cleaning

9.1.1. Before requesting the Substantial Completion inspection of the Work, the Contractor shall clean the Site, remove waste materials and rubbish attributable to the Project, and restore the property to an acceptable condition so that upon Substantial Completion, the premises are ready for occupancy by CMHA.

9.1.2. If the Contractor performs any Work after final cleaning, the Contractor shall clean the affected area as provided above so that upon Substantial Completion, the premises are ready for occupancy by CMHA.

9.1.3. Final cleaning shall be done to the reasonable satisfaction of CMHA.

9.2. Inspection and Construction of the Work

9.2.1. The Contractor shall maintain an adequate inspection system and perform such inspections as will ensure that the work performed under the Contract conforms to contract requirements.

A. All work is subject to CMHA inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract.

9.2.2. CMHA inspections and tests are for the sole benefit of CMHA and do not:

A. Relieve the Contractor of responsibility for providing adequate quality control measures;

B. Relieve the Contractor of responsibility for loss or damage of the material before acceptance;

C. Constitute or imply acceptance; or

D. Affect the continuing rights of CMHA after acceptance of the completed work.

9.2.3. The presence or absence of the CMHA inspector does not relieve the Contractor from any Contract requirement, nor is the inspector authorized to change any term or condition of the specifications without the Contracting Officer's written authorization.

A. All instructions and approvals with respect to the work shall be given to the Contractor by CMHA.

9.2.4. The Contractor shall promptly furnish, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by CMHA.

A. CMHA may charge to the Contractor any additional cost of inspection or test when work is not ready at the time specified by the Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary.

B. CMHA shall perform all inspections and tests in a manner that will not unnecessarily delay the work. Special, full size and performance tests shall be performed as described in the Contract.

9.3. Routine Inspections

9.3.1. CMHA may conduct routine inspections of the construction Site on a daily basis.

9.3.2. The Contractor shall, without charge, replace or correct Work found by CMHA not to conform to contract requirements, unless Contracting Officer decides that it is in its interest to accept the Work with an appropriate adjustment in Contract Sum.

A. The Contractor shall promptly segregate and remove rejected material from the premises.

9.3.3. If the Contractor does not promptly replace or correct rejected Work, CMHA may:

A. By Contract or otherwise, replace or correct the Work and charge the cost to the Contractor; or

B. Terminate for default the Contractor's right to proceed.

9.3.4. If any work requiring inspection is covered up without approval of CMHA, it must, if requested by the Contracting Officer, be uncovered at the expense of the Contractor.

A. If at any time before final acceptance of the entire work, CMHA considers it necessary or advisable, to examine work already completed by removing or tearing it out, the Contractor, shall on request, promptly furnish all necessary facilities, labor, and material.

B. If such Work is found to be defective or nonconforming in any material respect due to the fault of the Contractor or its subcontractors, the Contractor shall defray all the expenses of the examination and of satisfactory reconstruction.

C. If, however, such work is found to meet the requirements of the Contract, the Contracting Officer shall make an equitable adjustment to cover the cost of the examination and reconstruction, including, if completion of the work was thereby delayed, an extension of time.

9.4. Substantial Completion

9.4.1. Contractor's Punch List

A. When the Contractor considers the Work, or a designated portion thereof, Substantially Complete the Contractor shall inspect the Work and prepare a list of Defective Work and incomplete or unacceptable Work ("Contractor's Punch List").

B. The Contractor shall list all items of Work not in compliance with the Contract Documents, including items the Contractor is requesting to be deferred.

i. The Contractor shall proceed to correct all items listed on the Contractor's Punch List and certify that the incomplete items listed on the Contractor's Punch List are to its knowledge an accurate and complete list by signing the Contractor's Punch List.

ii. The Contractor's failure to include an item on the Contractor's Punch List shall not alter the Contractor's responsibility to complete the Work in accordance with the Contract Documents.

iii. The Contractor shall submit the signed Contractor's Punch List to CMHA together with a request for a Substantial Completion inspection of the Work.

9.4.2. Substantial Completion Inspection

A. The Contractor shall notify CMHA, in writing, as to the date when in its opinion all or a designated portion of the Work will be substantially completed and ready for inspection.

i. If CMHA and/or the A/E determine that the state of preparedness is as represented, CMHA will promptly arrange for the inspection.

ii. Unless otherwise specified in the Contract, CMHA shall accept, as soon as practicable after completion and inspection, all work required by the Contract or that portion of the Work that CMHA determines and designates can be accepted separately.

iii. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or CMHA's right under any warranty or guarantee.

B. Within three (3) business days after receipt of the request for the Substantial Completion inspection of the Work, CMHA shall notify the Contractor of acceptance or rejection of the request, stating reasons for any rejection.

i. Within seven (7) calendar days after its acceptance of the Contractor's request, CMHA and/or the A/E shall conduct the Substantial Completion inspection to determine whether the Work, or designated portion, is in conformity with the Contract Documents and Substantially Complete.

ii. If CMHA and/or the A/E determines that the Work is Substantially Complete, within three (3) business days after the Substantial Completion inspection, CMHA and/or the A/E shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion and include a list of Defective, incomplete, or unacceptable Work ("CMHA's Punch List").

iii. CMHA's Punch List shall include:

(a) The items on the Contractor's Punch List that are not yet completed or corrected as of the date of the Substantial Completion inspection; and

(b) Comments from CMHA regarding the Punch List and other issues related to the Project.

iv. CMHA shall submit the Certificate of Substantial Completion to the Contractor for their written acceptance.

(a) Upon their acceptance and consent of the Contractor's Surety, and subject to CMHA's right to withhold payment, CMHA shall release retainage.

v. CMHA and/or the A/E's failure to include an item on CMHA's Punch List shall not alter the Contractor's responsibility to complete the Work in accordance with the Contract Documents.

vi. If CMHA subsequently determines that the Work is not Substantially Complete, CMHA may request compensation for related expenses.

(a) CMHA may deduct the additional expenses from payments then or thereafter due the Contractor.

(b) If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to CMHA. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, associated with the failure of the Contractor to timely and properly complete the Punch List items.

9.4.3. Completion of Punch List Items

A. The Contractor shall complete all items on the CMHA's Punch List prior to date forContract Completion.

B. After completing all items on the CMHA's Punch List, the Contractor shall provide a written request for Final Inspection of the Work.

i. If Work on the Punch List cannot be timely completed, the Contractor shall submit a change order request MODIFICATIONS.

ii. Within three (3) business days after receipt of the request for the Final Inspection of the Work, CMHA and/or the A/E shall complete a Final Inspection of the Work for compliance with the Contract Documents.

iii. If multiple inspections of items on CMHA's Punch List are required due to the Contractor's failure to properly and timely complete them, the Contractor shall pay any additional costs incurred by the A/E and CMHA resulting from any attendant delay.

(a) CMHA may deduct those additional costs from payments then or thereafter due the Contractor.

(b) If payments then or thereafter due the Contractor are not sufficient to cover those amounts, the Contractor shall immediately pay the amount of the insufficiency to CMHA. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, related to multiple inspections by CMHA of items on the Punch List due to the Contractor's failure to properly and timely complete the Punch List.

9.5. Demonstration and Training, Operating Appurtenances

9.5.1. The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall perform demonstration and training of CMHA's maintenance personnel as specified in the Contract Documents.

9.5.2. The Contractor, as a condition precedent to execution of the Certificate of Contract Completion and final payment, shall organize and submit operating appurtenances and loose items related to operation and maintenance of the completed Project to CMHA, including, but not limited to:

A. Keys to door and window hardware, panels, and other devices not directly provided to CMHA from the manufacturer;

B. Operating handles, levers, cranks, specialized wrenches or drivers, remote controls, and similar items; and

C. Extra materials (e.g., attic stock).

9.6. Acceptance of Defective Work

9.6.1. Defective Work may only be knowingly accept by CMHA in writing instead of CMHA requiring its removal or correction, in which case the Contract Sum must be equitably reduced to account for the reduction in benefit of the Work received by CMHA on account of the Defective Work.

A. CMHA may only accept Defective Work though a deduct Change Order that makes explicit reference to Acceptance of Defective Work

9.6.2. None of the following will constitute acceptance of Defective Work, a release of the Contractor's obligation to perform the Work in accordance with the Contract, or a waiver of any rights set forth in the Contract or otherwise provided by Applicable Law:

A. Observations or inspections by CMHA or the A/E;
B. The making of any payment;
C. Substantial Completion or the issuance of a Certificate of Substantial Completion;
D. Partial Occupancy and CMHA's use or occupancy of the Work or any part of it;
E. Contract Completion or the issuance of a partial or final Certificate of Contract Completion;
F. Any review or approval of a submittal;
G. Any inspection, test, or approval by other Persons; or
H. Any correction of Defective Work by CMHA.

9.7. Building Commissioning

9.7.1. If the Project scope includes building commissioning, the Contractor shall participate in the Commissioning Process, as prescribed in the Contract Documents.

9.7.2. The Contractor shall permit the A/E, CMHA, or a third-party Commissioning Agent ("CxA") if applicable, access to commission performance based equipment, fixtures, and/or systems (e.g., HVAC, fire protection, smoke evacuation, fume hoods, emergency power, etc.), prior to Substantial Completion.

9.7.3. The A/E, CMHA, or CxA if applicable, shall promptly notify, in writing, the Contractor of any deficiency identified during the Commissioning Process.

9.7.4. To facilitate the Commissioning Process, the Contractor shall submit 4 sets of Operation and Maintenance manuals for dynamic and engineered systems to CMHA and CxA, if applicable, for approval. This submission shall occur within 30 days of obtaining approval of all related Contractor submittals required by the Contract Documents.

9.8. Contract Completion

9.8.1. Partial Contract Completion

A. When items of Work cannot be completed until a subsequent date, CMHA shall prepare a partial Certificate of Contract Completion that shall include a detailed list of the deferred Work and the date(s) by which the Contractor will complete that Work.
B. CMHA shall submit the partial Certificate of Contract Completion to Contractor for their written acceptance. Upon their acceptance of the partial Certificate of Contract Completion and consent of the Contractor's Surety, CMHA may release payment to the Contractor, as determined in the sole discretion of CMHA.

9.8.2. Final Contract Completion

A. Contract Completion shall occur no later than 30 calendar days from the date of Substantial Completion.
B. When all items on CMHA's Punch List have been completed to the satisfaction of CMHA, all requirements of the Contract Documents have been completed, and the provisions have been fulfilled, CMHA shall prepare and recommend execution of final Contract payment.
C. The date that CMHA executes the final Certificate of Contract Completion or issues Contract payment, whichever is later, is the date of Contract Completion.
D. Nothing in Contract Completion shall constitute a waiver of CMHA's ability to pursue damages as the result of any breach of the Contract by the Contractor or Liquidated Damages.

10. ARTICLE X SUSPENSION AND TERMINATION

10.1. Suspension of the Work

10.1.1. The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work of this contract for the period of time that the Contracting Officer determines appropriate for the convenience of CMHA.

10.1.2. If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of CMHA in the administration of this Contract, or by CMHA's failure to act within the time specified (or within a reasonable time if not specified) in this Contract, an adjustment shall be made for any increase in the cost of performance of the Contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the Contract modified in writing accordingly.

A. However, no adjustment shall be made for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or for which any equitable adjustment is provided for or excluded under any other provision of this Contract.

10.1.3. A Claim shall not be allowed:

A. For any costs incurred more than twenty (20) calendar days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and

B. Unless the Claim, in an amount stated, is asserted in writing as soon as practicable after the termination of the suspension, delay, or interruption, but no later than the date of final payment under the Contract.

10.1.4. If CMHA suspends the Work under ARTICLE X SUSPENSION AND TERMINATION and the Contractor submits a proper Payment Request, subject to all other provisions of the Contract Documents, the Contractor shall be entitled to payment of compensation due under the Contract Documents for the Work performed before the suspension based upon the Schedule of Values.

10.1.5. CMHA, without prejudice to any other right or remedy it may have, may order the Contractor in writing to suspend, delay, or interrupt the performance of the Work in whole or in part for such period as CMHA may determine for any of the following reasons:

A. Defective Work;

B. The Contractor is causing undue risk of damage to any part of the Project or adjacent area;

C. The Contractor fails to furnish or perform the Work in such a way that the complete Work will conform to the requirements of the Contract Documents; or

D. Any other cause CMHA reasonably believes justifies suspension.

i. CMHA's exercise of its right to suspend the Work shall not entitle Contractor to any adjustment of the Contract Sum, Contract Time or both.

10.1.6. Upon receipt of the notice of suspension, the Contractor shall cease Work on the suspended activities and take all necessary or appropriate steps to limit disbursements and minimize respective costs.

A. The Contractor shall furnish a report to CMHA within five (5) business days of receiving the notice of suspension, describing the status of the Work, including, but not limited to, results accomplished, resulting conclusions, and other information as CMHA may require.

10.1.7. CMHA's right to stop the Work shall not give rise to any duty to exercise the right for the benefit of the Contractor or any other party, and CMHA's exercise or failure to exercise the right shall not prejudice any of CMHA's other rights including the right to suspend the Work in the future under the same or similar circumstances.

10.2. Termination for Convenience

10.2.1. CMHA, through the Contracting Officer, may terminate this contract in whole, or in part, whenever the Contracting Officer determines that such termination is in the best interest of CMHA.

A. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which the performance of the work under the contract is terminated, and the date upon which termination becomes effective.

10.2.2. Upon delivery of the notice of termination for convenience, the Contractor shall immediately proceed with performance of the following duties in accordance with instructions from CMHA:

- **A.** Cease operations as specified in the notice;
- **B.** Place no further orders and enter into no further subcontracts for materials, labor, services, or facilities, except as necessary to complete continued portions of the Project;
- **C.** Terminate all subcontracts and orders to the extent they are related to the Work terminated;
- **D.** Proceed with Work not terminated; and
- **E.** Take actions that may be necessary, or that CMHA may direct, for the protection and preservation of the terminated Work.
  - **i.** Failure to do so may lead to Contractor's liability for actual damages as a result of Contractor's failure to protect the Work.

10.2.3. If the performance of the work is terminated, either in whole or in part, CMHA shall be liable to the Contractor for reasonable and proper costs resulting from such termination upon the receipt by CMHA of a properly presented claim setting out in detail:

- **A.** The total cost of the work performed to date of termination less the total amount of contract payments made to the Contractor;
- **B.** The cost of settling and paying claims under Subcontracts and material orders for work performed and materials and supplies delivered to the site, payment for which has not been made by CMHA to the Contractor or by the Contractor to the Subcontractor or supplier;
- **C.** The cost of preserving and protecting the work already performed until CMHA or assignee takes possession thereof or assumes responsibility therefore; and
- **D.** An amount constituting a reasonable profit on the value of the work performed by the Contractor.

10.2.4. CMHA will act on the Contractor's claim within sixty (60) calendar days (unless CMHA deems in writing that additional time is needed for review) of receipt of the Contractor's claim.

10.2.5. Any disputes are expressly made subject to the provisions of this Contract.

10.2.6. If CMHA terminates the Work the termination shall not affect the rights or remedies of CMHA against the Contractor then existing or which may thereafter accrue.

10.2.7. Notwithstanding, if CMHA terminates the Work but there exists an event of Contractor's default, the Contractor shall be entitled to receive only such amounts as it would be entitled to receive following the occurrence of an event of default as provided for below.

10.3. Termination for Cause/Default

10.3.1. If the Contractor materially breaches this Contract, including without limitation, the Contractor refuses or fails to prosecute the work, or any separable part thereof, with the diligence that will insure its completion within the time specified in this Contract, or any extension thereof, or fails to complete said work within this time, CMHA may, by written notice to the Contractor, terminate the right to proceed with the work (or separable part of the work) that has been delayed.

A. In this event, CMHA may take over the work and complete it, by contract or otherwise, and may take possession of and use any materials, equipment, and plant on the work site necessary for completing the work.

B. The Contractor and its sureties shall be liable for any damage to CMHA resulting from the Contractor's refusal or failure to complete the work within the specified time, whether or not the Contractor's right to proceed with the work is terminated.

i. This liability includes any increased costs incurred by CMHA in completing the Work.

C. Other examples of material breaches of the Contract include but are not limited to:

i. Refusal to remedy defective work;

ii. Failure to supply enough properly skilled workers or proper materials;

iii. Failure to provide revised Construction Progress Schedule or Recovery Plan;

iv. Failure to properly make payment to Subcontractors or Consultants; or

v. Disregarding laws, ordinances, or rules, regulations, or orders of a public authority with jurisdiction over the Project.

10.3.2. If CMHA intends to exercise its termination right, CMHA shall issue not less than five (5) business days written notice to the Contractor and the Contractor's Surety in accordance with ORC.

A. Notwithstanding any provision of the Contract to the contrary, the issuance of a 3-Day Notice is not a condition precedent to CMHA's exercise of its rights and CMHA's decision to not issue a 3-Day Notice will not prejudice CMHA's rights under this.

10.3.3. If the Contractor fails to satisfy the requirements set forth in the 5-Day Notice within fifteen (15) calendar days of receipt of the 5-Day Notice or as otherwise specified in the notice, CMHA may declare the Contractor in default, terminate the Contract, and employ upon the Work the additional force or supply materials or either as appropriate, and remove Defective Work.

10.3.4. If, after termination of the Contractor's right to proceed, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the Parties will be the same as if the termination had been for convenience of CMHA.

10.3.5. If the Contract is terminated, the Contractor's Surety may perform the Contract.

A. If the Contractor's Surety does not commence performance of the Contract within ten (10) calendar days of the date of Contract termination, CMHA may complete the Work by means that CMHA deems appropriate.

i. CMHA may take possession of and use all materials, facilities, and equipment at the Site or stored off-site, for which CMHA has paid.

B. If CMHA notifies the Contractor's surety that the Contractor is in default or terminates the Contract, the surety will promptly and in not less than twenty-one (21) calendar days investigate the claimed material default or termination.

i. If CMHA gives a notice of default and then terminates the Contract, the surety shall complete its investigation within twenty-one (21) calendar days of the notice of default.

(a) As part of such investigation, the surety shall visit the offices of the Contractor, A/E and CMHA to review the available project records.

ii. If the surety proposes to take over the Work, the surety shall do so no later than the expiration of such 21-day period or ten (10) calendar days after the date CMHA terminates the Contract, whichever is later.

iii. If CMHA terminates the Work, and the surety proposes to provide a replacement contractor, the replacement contractor shall be fully capable of performing the Work in accordance with the Contract Documents, including meeting all the requirements of the Contract Documents.

(a) If the Contractor is terminated, the replacement contractor shall not be the Contractor.

iv. The surety will provide the Owner with the results of its investigation, including any written report or documents.

C. Termination for Cause/Default is in addition to CHMA's other rights under the Contract Documents and is not intended to create any rights of the surety, including but not limited to the right to take over the Contractor's obligations.

10.3.6. If the Contract is terminated for cause, the Contractor shall not be entitled to further payment.

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, (whether alleged or proven), demands, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, arising out of or related the costs incurred by CMHA to finish the Work following termination of the Contractor for cause.

B. If the unpaid balance of the Contract Sum exceeds the costs of finishing the Work, including without limitation the fees and charges of engineers, architects, attorneys, and other professionals and court costs, and other damages incurred by CMHA and not expressly waived, the Contractor or Surety shall immediately pay the amount of insufficiency to CMHA.

C. This obligation for payment shall survive termination of the Contract.

10.3.7. If the Contractor's Surety performs the Work, the provisions of the Contract Documents govern the Surety's performance, with the Surety in place of Contractor in all provisions including, but not limited to, provisions for payment for the Work, and provisions of the right of CMHA to complete the Work.

10.3.8. If CMHA terminates the Contract, the termination shall not affect any rights or remedies of CMHA against the Contractor then existing or which may thereafter accrue.

A. CMHA's retention or payment of funds due to the Contractor shall not release the Contractor or the Contractor's Surety from liability for performance of the Work in accordance with the Contract Documents.

10.4. Contractor Insolvency

10.4.1. Bankruptcy of Contractor

A. If the Contractor files a voluntary petition in bankruptcy or has an involuntary petition in bankruptcy filed against it, the Contractor, the Contractor as the debtor-in-possession, or the trustee of the Contractor's bankruptcy estate shall notify CMHA in writing within five (5) days of such filing and file a motion to assume or reject the Contract within twenty (20) calendar days after the filing of the petition and shall diligently prosecute that motion to conclusion so as to obtain an order granting or denying that motion within forty-five (45) calendar days after the filing of the petition.

B. The failure of the Contractor to file and prosecute that motion Contractor shall constitute a material breach of the Contract by the Contractor as time is of the essence with respect to Contractor's performance of all terms of this Contract.

C. The Contractor agrees to the granting of relief from the automatic stay of the Bankruptcy Code, to permit CMHA to terminate the Contract for cause in such instance and issue and serve all notices necessary to terminate the Contract or arising out of termination of the Contract and to take any other action necessary to terminate the Contract.

10.4.2. Receivership or Assignment for the Benefit of Creditors

A. If the Contractor makes a general assignment for the benefit of creditors or if a receiver is appointed for all or a substantial part of Contractor's business or property, CMHA shall serve written notice to the Contractor and Contractor's Surety stating that any failure of the Contractor to provide adequate assurance of continued performance shall be considered a rejection of the Contract, which shall result in termination of the Contract for cause.

B. Termination of the Contract need not be evidenced by an order of any court.

11. ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE

11.1. General

11.1.1. "Claim," as used in ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE, means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, additional time, the adjustment or interpretation of contract terms, or other relief arising under or relating to the contract.

11.1.2. A Claim arising under the Contract, unlike a claim relating to the contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant.

11.1.3. A voucher, invoice, application for payment, or other routine request for payment that is permitted under the Contract Documents and is not in dispute when submitted, is not a Claim.

11.1.4. The submission may be converted to a Claim by complying with the requirements of ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

11.1.5. Except for disputes arising under ARTICLE XIX LABOR STANDARDS, herein, all disputes arising under or relating to this contract, including any claims for damages for the alleged breach thereof which are not disposed of by agreement, shall be resolved under ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE.

11.1.6. All Claims by the Contractor shall be made in writing and submitted to CMHA for a written decision.

A. A claim by CMHA against the Contractor shall be subject to a written decision by the Contracting Officer.

11.2. Initiation of a Claim

11.2.1. Every Claim shall accrue upon the date of occurrence of the event giving rise to the Claim.

11.2.2. Except as provided, the Contractor shall initiate every Claim by giving written notice of the Claim to CMHA within ten (10) calendar days after occurrence of the event giving rise to the Claim, with the following exceptions:

A. The 10-day time limit on initiating a Claim arising from the response of an RFI by CMHA begins to run on the date of the response.

B. The 10-day time limit on initiating a Claim arising from CMHA's determination concerning a Differing Site Condition begins to run on the date of the determination .

11.2.3. The Contractor's written notice of a Claim shall provide the following information:

A. Nature and anticipated amount of the impact, including all costs for any interference, disruption, hindrance, or delay, which shall be calculated and be a fair and reasonably accurate assessment of the damages suffered or anticipated by the Contractor;

B. Identification of the circumstances responsible for causing the impact, including, but not limited to, the date or anticipated date, of the commencement of any interference, disruption, hindrance, or delay;

C. Identification of activities on the Construction Progress Schedule that will be affected by the impact or new activities that may be created and the relationship with existing activities;

D. Anticipated impacts and anticipated duration of any interference, disruption, hindrance, delay, or impact, and any remobilization period; and

E. Recommended action to avoid or minimize any interference, disruption, hindrance, delay, or impact.

11.2.4. The Contractor's failure to initiate a Claim as and when required shall constitute the Contractor's irrevocable waiver of the Claim.

11.3. Substantiation of Claims General

11.3.1. Within thirty (30) calendar days after the initiation of a Claim, the Contractor shall submit three (3) copies of all information and statements required to substantiate a Claim and all other information that the Contractor believes substantiates the Claim.

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11.3.2. The Contractor shall substantiate all of its Claims by providing the following minimum information:

A. A narrative of the circumstances, which gave rise to the Claim, including without limitation the start date of the event or events and the actual or anticipated finish date;

B. Detailed identification of the Work affected by the event giving rise to the Claim;

C. Copies of the Contractor's daily log for each day of impact;

D. Copies of relevant correspondence and other information regarding or supporting Contractor's entitlement;

E. Copies of any and all information related to the Contractor's costs, including all job cost reports, bid take offs, and other financial information related to the Contractor's Claim;

F. The notarized Certification of a Claim

11.4. Substantiation of Claims for increase of the Contract Sum

11.4.1. In addition to the minimum information required by Contractor, the Contractor shall substantiate each Claim for an increase of the Contract Sum with:

A. Written documentation of the actual additional direct and indirect costs to the Contractor due to the event giving rise to the Claim;

B. A written statement from the Contractor that the increase requested is the entire increase in the Contract Sum associated with the Claim; and

C. The general substantiation documentation.

11.5. Substantiation of Claims for Extension of the Contract Time

11.5.1. In addition to the minimum information required by Contractor, the Contractor shall substantiate each Claim for an extension of the Contract Times with:

A. Written documentation of the actual delay to the critical path of the Construction Progress Schedule due to the event giving rise to the Claim;

B. A detailed written Proposal for an increase in the Contract Sum that would fully compensate the Contractor for all costs of acceleration of the Work needed to completely overcome the associated delay, A written statement from the Contractor that the extension requested is the entire extension of the Contract Times associated with the Claim; and

D. The general substantiating documentation.

11.5.2. In addition, if adverse weather conditions are the basis for a Claim for additional time, the Contractor shall document the Claim with data substantiating that weather conditions were abnormal for the period, could not have been reasonably anticipated, and had an adverse effect on a critical element of the scheduled construction.

11.6. Certification of a Claim

11.6.1. The Contractor shall certify each Claim within thirty (30) calendar days after initiating the Claim or before Contract Completion, whichever is earlier, by providing the notarized Certification of a Claim specified below, signed and dated by the Contractor:

A. *"The undersigned Contractor certifies that the Claim is made in good faith; that the supporting data is accurate and complete to the best of the Contractor's knowledge and belief; that the amount requested is a fair, reasonable, and necessary adjustment for which the Contractor believes that CMHA is liable; and that the undersigned is duly authorized to certify the Claim on behalf of the Contractor."*

11.7. Delay and Delay Damage Limitations

11.7.1. Subject to other provisions of the Contract, the Contractor will be entitled to an extension of the Contract Times on account of delay in the commencement or progress of Work on the critical path of the Construction Progress Schedule caused by acts of unforeseeable Nature or the public enemy, acts of the government not arising from the Contractor's failure to comply with Applicable Law, fires, floods, epidemics, weather, and labor disputes beyond the Contractor's control.

11.7.2. Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum, or an extension of the Contract Times, or both:

A. On account of the impact of any normal adverse weather on any of the Work or on account of the impact of any abnormal adverse weather on Work not on the critical path;

B. To the extent that a delay occurs concurrently with a delay attributable to the Contractor; or

C. On account of the delay of any Work not on the critical path.

i. When the Contractor is prevented from completing any part of the Work on the critical path within the Contract Time due to weather conditions, provided the Contractor properly initiates a Claim, the Contract Time will be extended by one (1) day for each work day lost due to weather that delays Work on the critical path in excess of those in the following table:

Month	Number of Workdays Lost Due To Weather
January	8
February	8
March	7
April	6
May	5
June	4
July	4
August	4
September	5
October	6
November	6
December	6

11.7.3. Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum or any type of damages on account of a delay in the commencement or progress of Work on the critical pathunless:

A. The delay is caused by CMHA; and

B. The delay was not authorized or permitted under the Contract.

11.7.4. Notwithstanding any other provision of the Contract Documents to the contrary, the Contractor shall not be entitled to an increase in the Contract Sum or any type of damages arising from a delay in the commencement or progress of any the Work caused by the occurrence or non-occurrence of an event beyond CMHA's control such as acts of Nature or the public enemy, acts of the government, fires, floods, epidemics, labor disputes, unusual delivery delays, weather, or damages caused by the Contractor.

11.8. Derivative Claims

11.8.1. Notwithstanding any other provision of the Contract to the contrary, if CMHA prosecutes a claim, suit, or appeal against a Separate Consultant or Separate Contractor to recover damages the Contractor suffers on account of the acts or neglects of a Separate Consultant or Separate Contractor or person or entity for whom either is legally responsible, CMHA's liability to the Contractor shall not exceed the amount CMHA actually recovers from the Separate Consultant or Separate Contractor on account of those damages less the costs CMHA incurs recovering them. CMHA is not obligated to prosecute any such claim, suit, or appeal.

11.9. Claim Decision

11.9.1. CMHA shall, within sixty (60) calendar days (unless otherwise requested), decide Claims submitted by Contractor or notify the Contractor of the date by which the decision will be made.

11.9.2. The Contracting Officer's decision shall be final with respect to Claims by Contractor unless the Contractor:

A. Appeals in writing to a higher level at CMHA in accordance with the CMHA's policy and procedures;

B. Refers the appeal to an independent mediator or arbitrator; or

C. Files suit in a court of competent jurisdiction. Such suit must be filed within fifteen (15) calendar days (unless a different time period is identified in the Claim Decision)after receipt of CMHA's decision.

11.9.3. The Contractor shall proceed diligently with performance of this Contract, pending final resolution of any request for relief, Claim, appeal, or action arising under or relating to the Contract, and comply with any decision of CMHA.

11.10. Audit of a Claim

11.10.1. All Claims submitted by Contractor shall be subject to audit at any time following filing of the Claim by Contractor, whether or not the Claim is part of any lawsuit.

11.10.2. The audit may be performed by employees of CMHA or by a consultant engaged by CMHA.

11.10.3. The audit may begin upon 10-days' notice to the affected Contractor or affected Subcontractor.

11.10.4. The Contractor shall cooperate with the request.

11.10.5. Failure of the Contractor or Subcontractor to produce sufficient records to allow CMHA to audit and verify a Claim shall constitute an irrevocable waiver of the Claim or portion of the Claim that could not be completely audited.

11.10.6. The Contractor shall make available to CMHA all Contractor and Subcontractor documents related to the Claim including, without limitation, the following documents:

- **A.** Daily time sheets and superintendent's daily reports;
- **B.** Union agreements, if any, and employer agreements;
- **C.** Insurance, welfare, fringes, and benefits records;
- **D.** Payroll tax returns;
- **E.** Material invoices, purchase orders, Subcontracts, and all material and supply acquisition contracts;
- **F.** Material cost distribution worksheets;
- **G.** Equipment records (list of Contractor equipment, rates, etc.);
- **H.** Vendor rental agreements and Subcontractor invoices;
- **I.** Subcontractor payment certificates;
- **J.** Canceled checks (payroll and vendors);
- **K.** Job cost report;
- **L.** Job payroll ledger;
- **M.** General ledger, general journal, (if used) and all subsidiary ledgers and journals together with all supporting documentation pertinent to entries made in these ledgers and journals;
- **N.** Cash disbursements journal;
- **O.** Financial statements for all years reflecting operations on the Project;
- **P.** Income tax returns for all years reflecting operations on the Project;
- **Q.** Depreciation records on all equipment utilized whether the records are maintained by the Contractor, its accountant, or others;
- **R.** If a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all other source documents;
- **S.** All documents that reflect the Contractor's actual profit and overhead during the years the Project was being performed;
- **T.** All documents related to the preparation of the Contractor's Bid, including the final calculations on which the Bid was based, unless the documents are placed in escrow under provisions of the Instructions to Bidders;
- **U.** All documents that relate to the Claim together with all documents that support the amount of damages as to the Claim;
- **V.** Worksheets used to prepare the Claim establishing the cost components for items of the Claim including, but not limited to, labor, fringes, benefits and insurance, materials, equipment, Subcontractors, and all documents that establish the periods of time, individuals involved, the hours and rate of pay for the individuals; and
- **W.** All other documents required by CMHA to reasonably review the Claim.

11.11. False Certification of a Claim

11.11.1. If the Contractor falsely certifies all or any part of a Claim, the portion of the Claim falsely certified shall be denied, and may be sufficient cause for CMHA to exclude Contractor from future contracting opportunities as permitted by law.

11.11.2. The Contractor shall not knowingly present or cause to be presented to the Owner a false or fraudulent Claim.

- **A.** Knowingly shall have the same meaning as in the Federal False Claims Act.

11.11.3. If the Contractor knowingly presents or causes to be presented a false or fraudulent Claim, then the Contractor shall be liable to the Owner for the same civil penalty and damages as the United States Government would be entitled to recover and shall also indemnify and hold the Owner harmless from all costs and expenses, including Owner's attorneys' and consultants' fees and expenses incurred in investigating and defending against such Claim and in pursuing the collection of such penalty, damages and fees and expenses.

12. ARTICLE XII WARRANTY

12.1. Warranty of Title

12.1.1. The Contractor warrants good title to all materials, supplies, and equipment incorporated in the Work and agrees to deliver the premises together with all improvements thereon free from any claims, liens or charges, and agrees further that neither it nor any other person, firm or corporation shall have any right to a lien upon the premises or anything appurtenant thereto.

12.2. Warranty of Construction

12.2.1. In addition to any other warranties in this Contract, the Contractor warrants that work performed under this contract conforms to the Contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any Subcontractor or supplier at any tier.

A. Work not conforming to those requirements, including Substitutions not properly approved and authorized, may be considered Defective Work.

B. If required by CMHA, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

12.2.2. The Contactor shall remedy, at the Contractor's expense, any Work that does not conform to the requirements of the Contract Documents, or any Defective Work.

A. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to CMHA-owned or controlled real or personal property when the damage is the result of:

i. Any action or inaction by Contractor;

ii. The Contractor's failure to conform to Contract requirements; or

iii. Any defects of equipment, material, workmanship or design furnished by the Contractor.

12.2.3. The Contractor shall restore any work damaged in fulfilling the terms and conditions of Warranty of Construction.

A. The Contractor's Warranty with respect to work repaired or replaced shall be extended for a period of not less than one year, beyond the original Warranty period required under the Contract, of repair or replacement.

12.2.4. CMHA shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect or damage.

A. If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, CMHA shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.

12.2.5. With respect to all warranties, express or implied, from Subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall:

A. Obtain all warranties that would be given in normal commercial practice;

B. Require all warranties to be executed in writing, for the benefit of CMHA; and

C. Enforce all warranties for the benefit of CMHA.

12.2.6. If the Contractor or a Subcontractor recommends a particular product, material, system, or item of equipment for incorporation into the Project and CMHA accepts that recommendation, the above Warranty shall include a warranty from the Contractor to CMHA that the recommended product, material, system, or item of equipment is fit and appropriate for the associated purpose.

12.3. Warranty Walk-through Contractor

12.3.1. At CMHA's request, Contractor shall perform a walkthrough of the property no earlier than three months prior to the expiration of any Warranty.

A. If Contractor is unavailable for the Warranty walk-thru, the Warranty shall be extended until the time Contractor is available.

13. ARTICLE XIII BONDS

13.1. Bid Bond/Guaranty

13.1.1. The Contractor shall provide to CMHA a Bid Guaranty in the form of either:

A. A Bond for 10% of the Bid; or

B. A certified check, cashier's check or letter of credit revocable only at the option of CMHA and shall be in the amount of 10% of the Bid.

13.1.2. The Bid Guaranty shall be conditioned to:

A. Provide that Contractor will, after award, enter into a contract with CMHA in accordance with the bid, plans, details, and specifications.

B. If the Bidder fails to enter into the Contract and CMHA awards Contract to next lowest bidder, the Bidder and the Surety on the Bidder's Bid are liable to CMHA for the lessor of either:

i. The difference between the Bidder's Bid amount and the bid amount of the next lowest bidder; or

ii. For a penal sum of the Bond in the amount of 10% of the Bidder's Bid.

C. If CMHA does not award the Contract to the next lowest bidder but resubmits the Project for bidding, the Bidder failing to enter into the Contract and the Surety on the Bidder's Bond are liable to CMHA for a penal sum on the Bond not to exceed 10% of the amount of the Bidder's Bid amount.

13.1.3. Where CMHA accepts a Bid but the Bidder fails or refuses to enter into a Contract in accordance with the Contract Documents included with the Bid, including the plans, details, and specifications, within ten (10) calendar days after Notice of Intent, the Bidder and Surety on any Bond are liable for the amount of the difference between the amount of the Bidder's Bid and the amount of the Bid from next lowest Bidder.

13.1.4. All Bid Guaranties shall be payable to CMHA, be for the benefit of CMHA and be deposited with CMHA.

13.2. Payment and Performance Bond

13.2.1. In addition to any other requirements in the Contract Documents, Contract Commencement does not occur until CMHA receives a Payment and Performance Bond.

13.2.2. Contractor shall, within ten (10) calendar days of CMHA's delivery of signed Contract to Contractor, unless otherwise specified by CMHA in writing, deliver to CMHA a payment and performance bond with a penal sum in the amount of 100% of the Contract Sum (which includes all acceptable alternates).

13.2.3. The Payment and Performance Bond shall contain the following a condition that indemnifies CMHA against all damages suffered by CMHA as a result of the failure of Contractor to perform the Work in accordance with the requirements of the Contract Documents, including, the plans, details, and specifications, and the Payment and Performance Bond shall state that Contractor shall pay all lawful claims of Subcontractors, material suppliers, and laborers for labor performed or material furnished in carrying forward, performing or completing the Contract.

13.2.4. All Bonds requirement by the Contract shall be obtained from companies holding certificates of authority as acceptable sureties and shall be listed on the U.S Treasury Circular 570 (T-List).

A. Each company shall be licensed to do business in Ohio and satisfactory to CMHA.

13.2.5. The Contractor shall submit with each executed Bond:

A. A certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety, and

B. A current signed Certificate of Compliance issued by the Ohio Department of Insurance demonstrating that Surety is licensed to do business in Ohio.

13.2.6. If the Contract Sum increases at any time such that it exceeds the sum of the Bond, the Contractor shall cause the penal sum of the Bond to be increased such that the sum equals one-hundred percent of the increased Contract Sum.

13.2.7. Any time Contractor increases the sum of the Bond, the Contractor shall deliver to CMHA written consent of the affected Surety confirming the increased penal sum of the Bond.

A. CMHA's receipt of that written consent is a condition precedent to CMHA's obligation to pay the Contractor for any portion of the Work associated with the increase.

13.2.8. If notice of any change affecting the Contract is required by any Surety or by the provision of any Bond, the Contractor shall provide that notice.

14. ARTICLE XIV INSURANCE

14.1. Contractor's General Insurance Requirements

14.1.1. Throughout the performance of the Work or longer as may be described below, the Contractor and each Subcontractor shall obtain, pay for and keep in force, the minimum insurance coverage.

14.1.2. On a case-by-case basis, CMHA and Contractor may mutually agree to adjust the insurance requirements for any particular subcontractor.

14.1.3. All insurance shall be carried with companies which are financially responsible and admitted to do business in the State of Ohio.

A. If any such insurance is due to expire prior to Contract Completion, the Contractor (including Subcontractors, as applicable) shall not permit the coverage to lapse and shall furnish evidence of coverage to the Contracting Officer.

B. All certificates of insurance, as evidence of coverage, shall provide that no coverage may be canceled or non-renewed by the insurance company until at least thirty (30) calendar days prior written notice has been given to CMHA.

14.2. Minimum Coverage Requirements

14.2.1. Workers' Compensation:

A. In accordance with the State of Ohio Workers' Compensation laws

14.2.2. Commercial General Liability

A. With a combined single limit for bodily injury and property damage of not less than $1,000,000 per occurrence unless otherwise specified by CMHA in writing, to protect the Contractor and each subcontractor against claims for bodily injury or death and damage to the property of others.

B. This shall cover the use of all equipment, hoists, and vehicles on the site(s) not covered by Automobile Liability.

C. If the Contractor has a "claims made" policy, then the following additional requirements apply:

i. The policy must provide a "retroactive date" which must be on or before the execution date of the Contract; and

ii. The extended reporting period may not be less than five years following the completion date of the Contract.

14.2.3. Employers Liability Coverage

A. Unless otherwise specified by CMHA in writing**,** the Contractor shall maintain employer's liability coverage with:

i. An each accident limit of not less than $1,000,000;

ii. A disease each-employee limit of not less than $1,000,000; and

iii. A disease policy limit of not less than $1,000,000.

14.2.4. Automobile Liability

A. On owned and non -owned motor vehicles used on the site(s) or in connection therewith for a combined single limit for bodily injury and property damage of not less than $ 1,000,000 per occurrence.

14.2.5. Builder's Risk Insurance

A. Before commencing Work, the Contractor shall furnish CMHA with a certificate of insurance evidencing that **Builder's Risk** (fire and extended coverage) **Insurance** on all work in place and/or materials stored at the building site(s), including foundations and building equipment, is in force.

i. The Builder's Risk Insurance shall be for the benefit of the Contractor and CMHA as their interests may appear and each shall be named in the policy or policies as an insured.

ii. The Contractor if installing equipment supplied by CMHA shall carry insurance on such equipment from the time the Contractor takes possession thereof until the Contract work is accepted by CMHA.

iii. The Builder's Risk Insurance need not be carried on excavations, piers, footings, or foundations until such time as work on the superstructure is started.

iv. It need not be carried on landscape work.

v. Policies shall furnish coverage at all times for the full cash value of all completed construction, as well as materials in place and/or stored at the site(s), whether or not partial payment has been made by CMHA.

vi. The Contractor may terminate this insurance on buildings as of the date CMHA issues a Certificate of Contract Completion.

B. The amount of Builder's Risk coverage shall not be less than the total completed value of the Project, including the value of permanent fixtures and decorations, with a deductible of not more than $25,000 per occurrence.

i. Contractor shall be responsible for paying all deductibles for any and all claims made under the Builder's Risk policy; and,

ii. Any deductible over the amount specified in this provision shall be authorized in writing by CMHA.

C. Coverage shall include a provision to pay the reasonable extra costs of acceleration and expediting temporary and permanent repairs to, or permanent replacement of, damaged property.

i. This shall include overtime wages and the extra costs of "express" or other means of expedited transportation and/or delivery of supplies necessary to the repair of replacement.

D. Coverage shall include "soft costs endorsement" including, but not limited to, the reasonable extra costs of the A/E and reasonable Contractor extension or acceleration costs.

E. Coverage shall include material in transit or stored in off-site and identified for the Project.

F. Coverage shall waive all rights between CMHA, Contractor, and Subcontractors at any tier, for damages caused by fire or any other perils to the extent of actual recovery of any insurance proceeds under the policy.

G. Coverage shall include appropriate sub-limits for installation coverage.

H. Coverage shall include provisions for mechanical or electrical breakdown, or boiler system testing.

I. Coverage shall include temporary structures and scaffolding, along with collapse coverage.

J. Coverage shall be primary to all other applicable insurance.

K. The Builder's Risk policy shall specifically permit partial occupancy by CMHA prior to Contract Completion and coverage shall remain in effect until CMHA issues a Certificate of Contract Completion.

L. The Contractor's tools and equipment shall not be covered under the Builder's Risk policy.

i. It is the Contractor's sole responsibility to maintain insurance coverage for tools and equipment used on the Project, which shall be included in its Overhead (a component of Contractor's Fee) and not included as a separate item in Contractor's Schedule of Values.

M. If Contractor is involved solely in the installation of material and equipment and not in new building construction, the Contractor shall purchase and maintain a Builder's Risk, Builder's Risk-renovations, or installation floater insurance policy that complies with the requirements of Article XIV.

14.2.6. Umbrella/Excess Liability

A. The Contractor may employ an umbrella/excess liability policy to achieve the above required minimum coverage.

B. Unless otherwise specified by CMHA in writing, for Construction Contracts in excess $1,000,000, the Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $2,000,000 (in addition to the above-required limits) if the Work (or Work to be performed by the Subcontractor) includes any of the following:

i. Brick/block masonry;

ii. Exterior caulking/sealant;

iii. Cast-in-place or precast concrete;

iv. Damp proofing/waterproofing;

v. Electrical;

vi. Elevator;

vii. Exterior glass and/or glazing;

viii. Exterior marble, granite, and/or other stonework;

ix. Miscellaneous metals;

x. Plaster/stucco;

xi. Plumbing;
xii. HVAC;
xiii. Roofing and/or sheet metal;
xiv. Scaffolding;
xv. Spray-on fireproofing;
xvi. Sprinkler and/or fire protection; or
xvii. Structural steel and/or metal deck.

C. Unless otherwise specified by CMHA in writing, the Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $5,000,000 (in addition to the above-required limits) if the Work (or the Work to be performed by the Subcontractor) includes any of the following:
i. Caissons and/or piles;
ii. Major Demolition;
iii. Excavation and/or utility work;
iv. Sheeting, shoring, and/or underpinning;
v. Window washing equipment; or
vi. Wrecking.

14.2.7. Professional Liability – Contractor

A. Unless otherwise specified by CMHA in writing, the Contractor shall maintain professional liability insurance (including without limitation for sprinkler and/or fire protection and other design-build work included in the Work) without design-build exclusions with a limit not-less than $1,000,000 each claim and an annual-aggregate limit of not less than $2,000,000.

B. The professional liability policy shall have an effective date on or before the date that the Contractor first started to provide any Project-related services.

C. Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise CMHA in writing of any actual or alleged claims that may erode the professional liability limits.

D. The Contractor shall maintain the professional liability insurance in effect for no less than 5 years after the earlier of the termination of the Contract or Substantial Completion of all Work.

14.2.8. Additional Property Insurance

A. For any demolition, blasting, excavating, tunneling, shoring, or similar operations, the Contractor shall provide and maintain Property Damage Liability insurance with a limit of liability equal to the limit as specified in the applicable provisions of ARTICLE XIV INSURANCE.

14.2.9. Equipment Coverage

A. CMHA will not insure or be liable for damage to any Contractor or Subcontractor owned, leased, rented, or borrowed tools, equipment, or vehicles.

B. The Contractor and Subcontractors are solely responsible for maintaining all insurance necessary to cover their tools, equipment, and vehicles.

14.3. Waivers of Subrogation

14.3.1. To the fullest extent permitted by applicable laws, the Contractor waives all rights against CMHA and its agents and employees for damages to the extent covered by any insurance, except rights to the proceeds of that insurance.

A. All policies shall accomplish the waiver of subrogation by endorsement or otherwise.

14.3.2. CMHA and Contractor waive all rights against each other for damages caused by fire or other perils to the extent actual recovery of any insurance proceeds under any property insurance or Builder's Risk insurance applicable to the Work.

15. ARTICLE XV INDEMNIFICATION

15.1. To the fullest extent permitted by Applicable Law, the Contractor shall indemnify, defend, and hold harmless the Indemnified Parties from and against all claims, costs, damages, losses, fines, penalties, and expenses (including but not limited to all fees and charges of attorneys and other professionals, and all court, arbitration, or other dispute-resolution costs) arising out of or in connection with the Project.

15.2. The Contractor's indemnification obligation under ARTICLE XV INDEMNIFICATION exists regardless of whether or not and the extent to which the claim, damage, loss, fine, penalty, or expense is caused by a party indemnified under ARTICLE XV INDEMNIFICATION.

15.2.1. Nothing in ARTICLE XV INDEMNIFICATION obligates the Contractor to indemnify any individual or entity from and against the consequences of that individual or entity's own negligence.

15.3. The Contractor's obligations under ARTICLE XV INDEMNIFICATION shall not extend to the liability of the A/E, A/E's consultants, agents, representatives, or employees for negligent preparation or approval of Drawings, Specifications, Change Orders, opinions, and other responsibilities of the A/E, except to the extent covered by the Contractor's insurance.

15.4. In claims against an Indemnified Party by any direct or indirect employee (or the survivor or personal representative of that employee) of the Contractor or a person or entity for whom the Contractor may be liable, the indemnification obligation under ARTICLE XV INDEMNIFICATION will not be limited by a limitation on the amount or type of damages, compensation, or benefits payable under workers' compensation acts, disability benefit acts, or other employee benefits acts.

15.5. The Contractor's indemnification obligation under ARTICLE XV INDEMNIFICATION will survive termination of the Contract and Date for Contract Completion.

15.6. CMHA may deduct from the Contract Sum any claims, losses, fines, penalties, and expenses for which the Contractor is liable under ARTICLE XV INDEMNIFICATION.

15.6.1. If those claims, damages, losses, fines, penalties and expenses exceed the unpaid balance of the Contract Sum, the Contractor shall immediately pay the difference to CMHA.

16. ARTICLE XVI DAMAGES

16.1. Liquidated Damages

16.1.1. If the Contractor fails reach Substantial Completion within the Contract Time for Substantial Completion, including any properly approved extension for the Contract Time for Substantial Completion, the Contractor shall pay to CMHA as Liquidated Damages, the sum of **$400.00** for each day ofdelay.

A. Liquidated Damages for the Date for Contract Completion and any Milestone Dates in the Contract, not including Substantial Completion, shall be assessed on in accordance

B. To the extent that the Contractor's delay or non-performance is excused under another clause in this Contract, Liquidated Damages shall not be due CMHA.

C. The Contractor remains liable for damages caused other than by delay.

16.1.2. If CMHA terminates the Contractor's right to proceed, the resulting damage will consist of Liquidated Damages incurred until the Date of Contract Completion, together with any increased costs incurred by CMHA in completing the Work.

16.1.3. If CMHA does not terminate the Contractor's right to proceed, the resulting damage will consist of Liquidated Damages incurred until the Date of Contract Completion.

16.1.4. If the Contractor fails to achieve a Milestone Date, excluding the Date for Substantial Completion, within the associated Contract Time, the Contractor shall (at CMHA's option) pay to or credit CMHA the Liquidated Damages per day sum determined according to the following schedule for each day that the Contractor fails to achieve a Milestone within the associated Contract Time.

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Contract Sum	Liquidated Damages per day
Less than $100,000	$200
From $100,000 to $500,000	$400
From $500,000.01 to $1,000,000	$500
From $1,000,000.01 to $3,000,000	$750
More than $3,000,000	$1,000

16.1.5. If the Contractor simultaneously fails to achieve two or more Milestones, including the Date for Substantial Completion, CMHA shall be entitled to recover the sum of the associated Liquidated Damages per day rates.

16.1.6. The Liquidated Damages described are only intended to compensate CMHA for the direct damages it incurs as a result of the Contractor's failure to achieve the Milestones, including the Date for Substantial Completion, within their associated Contract Times.

16.1.7. The Liquidated Damages described are not intended to compensate CMHA for any damages CMHA incurs on account of:

A. Any claims attributable to the Contractor that are brought by others including Separate Consultants and Separate Contractors; or

B. Any failure of the Contractor to timely, properly, and completely perform the Contract other than the failure to achieve the Milestones, including the Date for Substantial Completion, within their associated Contract Times.

16.1.8. The parties acknowledge that the above-listed Liquidated Damages per day sums are not penalties, and they each irrevocably waive the right (if any) to challenge the validity and enforceability of those Liquidated Damages per day sums.

A. Notwithstanding any other provision of the Contract Documents to the contrary, if a court determines that the Liquidated Damages per day sums or their application are void and unenforceable, CMHA shall be entitled to recover the actual damages that it incurs on account of the Contractor's failure to achieve the Date for Substantial Completion and/or one or more of the Milestones within the applicable Contract Times.

16.1.9. In addition to other rights that CMHA may have relative to the Liquidated Damages, CMHA may deduct the Liquidated Damages from the Contract Sum as the damages accrue.

A. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall immediately pay the amount of the insufficiency to CMHA. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, associated with the failure of the Contractor to timely and properly reimburse CMHA for any Liquidated Damages.

16.2. Mutual Waiver of Consequential Damages

16.2.1. Except as provided Liquidated Damages, CMHA and Contractor each waive against the other all Claims for consequential damages that may arise out of or relate to this Contract.

A. CMHA's waiver includes Claims for loss of use, income, profit, revenue, financing, cost of capital, business and reputation, management and employee productivity, and consequential damages arising from termination of the Contract or related to insolvency.

B. The Contractor's waiver includes:

i. Claims for unabsorbed home-office overhead;

ii. Any other form of overhead in excess of that specifically provided for;

iii. Delay damages except as otherwise specifically provided for;

iv. Increased cost of funds for the Project;

v. Lost opportunity to work on other projects;

vi. Losses of financing, business, and reputation;

vii. Loss of profit except anticipated profit, arising directly from properly performed Work;

viii. Loss of bonding capacity; and

ix. Consequential damages arising from termination of the Contract or related to insolvency.

16.2.2. Notwithstanding Section 16.2.1, this Section 16.2:

A. Does not apply to any damages that would be covered by insurance provided in connection with the Project if the Contract did not include Section 16.2.1 **;**

B. Does not apply to the Contractor's indemnity obligations for third-party claims against the Indemnified Parties even if those claims are for damages that Section 16.2.1 would otherwise preclude;

C. Does not preclude CMHA's recovery of Liquidated Damages; and

D. Does not apply to Claims for damages arising from CMHA's or the Contractor's gross negligence or willful misconduct.

16.3. This ARTICLE 16 shall survive termination of the Contract.

17. ARTICLE XVII EQUAL OPPORTUNITY

17.1. Prohibition Against Discrimination

17.1.1. During the performance of this Contract, the Contractor agrees as follows:

A. Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or handicap.

B. The Contactor shall 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, or handicap.

i. Such action shall include, but not be limited to:

(a) Employment;
(b) Upgrading;
(c) Demotion;
(d) Transfer
(e) Recruitment or recruitment advertising;
(f) Layoff or termination;
(g) Rates of pay or other forms of compensation; and
(h) Selection for training, including apprenticeship.

C. The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by CMHA that explain ARTICLE XVII EQUAL OPPORTUNITY.

D. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor; state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, or handicap.

E. The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's commitments under ARTICLE XVII EQUAL OPPORTUNITY, and post copies of the notice in conspicuous places available to employees and applicants for employment.

F. The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

G. The Contractor shall furnish all information and reports required by Executive Order 11246, as amended, the Rehabilitation Act of 1973, as amended, and by rules, regulations, and orders of the Secretary of Labor, pursuant thereto.

i. The Contractor shall permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

H. In the event of a determination that the Contractor is not in compliance with ARTICLE XVII EQUAL OPPORTUNITY or any rule regulations, or order of the Secretary of Labor, this contract may be canceled, terminated or suspended in whole or in part, and the Contractor may be declared ineligible for further Government Contracts, or Federally assisted construction contracts under the procedures authorized, in Executive Order 11246, as amended.

i. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law, including the following as provided by ORC:

(a) In the event Contractor fails to comply with these nondiscrimination provisions, CMHA shall deduct from the amount payable to the Contractor a forfeiture of the statutory penalty pursuant to ORC for each person who is discriminated against or intimidated.

(b) The Contract may be terminated or suspended in whole or in part by CMHA and all money due hereunder may be forfeited in the event of a subsequent violation of the foregoing nondiscrimination provisions.

(c) The Contractor shall include the terms and conditions of ARTICLE XVII EQUAL OPPORTUNITY in every Subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each Subcontractor or vendor.

(d) The Contractor shall take such action with respect to any subcontract or purchase order as the Secretary of Housing and Urban Development or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into the litigations to protect the interests of the United States.

I. Compliance with the requirements of ARTICLE XVII EQUAL OPPORTUNITY shall be to the maximum extent consistent with, but not in derogation of compliance with the Indian Self-Determination and Education Assistance Act and the Indians Preference clause of this Contract.

J. The Contractor shall cooperate fully with the States Equal Opportunity Coordinator (EOC), with any other official or agency of the state of federal government that seeks to eliminate unlawful employment discrimination, and with all other state and federal efforts to assure equal employment practices under the Contract.

18. ARTICLE XVIII SECTION 3

18.1. In order to promote Employment, Job Training and Contracting Opportunities to low- and very low-income persons, the Contractor shall adhere to HUD's and CMHA's Section 3 Program requirements.

18.2. The Work to be performed under this Contract is subject to the provisions of Section 3 of the Housing and Urban Development Act of 1968, as amended.

18.2.1. The purpose of Section 3 is to ensure that employment and other economic opportunities generated by Federal financial assistance for housing and community development programs HUD assistance or HUD-assisted projects covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons particularly persons who are recipients of HUD assistance for housing.

18.3. The parties to this Contract agree to comply with HUD's regulations in 24 CFR § 75, which implement Section 3.

18.3.1. As evidence by the execution of the Contract, the parties to this Contract certify that they are under no contractual or other impediments that would prevent them from complying with the regulations.

18.4. The Contractor agrees to send to each labor organization or representative of workers with which the Contractor has a collective bargaining agreement or other understanding, if any, a narrative advising the labor organization or workers' representative of the Contractor's commitments, and will post copies of this notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice.

18.4.1. The notice shall describe the preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work will begin.

18.5. The Contractor agrees to include ARTICLE XVIII SECTION 3 in every subcontract subject to compliance with regulations in 24 CFR § 75, and agrees to take appropriate action, as provided in an applicable provision of the Subcontract or in ARTICLE XVIII SECTION 3, upon a finding that the Subcontractor is in violation of the regulations in 24 CFR § 75.

18.5.1. The Contractor will not Subcontract with any Subcontractor where the Contractor has notice or knowledge that the Subcontractor has been found in violation of the regulations in 24 CFR § 75.

18.6. The Contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the Contractor is selected but before the Contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR § 75 require employment opportunities to be directed, were not filled to circumvent the Contractor's obligations under 24 CFR § 75.

18.7. Noncompliance with HUD's regulations in 24 CFR § 75 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD assisted contracts.

18.8. Section 3 Reporting Requirements

18.8.1. Monthly Section 3 Compliance Reports are required and are to be submitted to the Economic Inclusion Coordinator.

18.8.2. These reports should include a listing of the Contractor's current local workforce, any new hiring or subcontracting that has occurred, along with total labor hours and section 3 worker labor hours on all new hires and all subcontractors permanent employees working on the project.

18.9. The Contractor shall cooperate fully with requests for additional Section 3 information and documentation as needed by CMHA or the Contracting Authority.

19. ARTICLE XIX LABOR STANDARDS

19.1. Compliance with Davis Bacon and Related Acts requirements

19.1.1. All rulings and interpretations of the Davis Bacon and Related Acts contained in 29 CFR are herein incorporated by reference in this Contract.

19.2. Minimum Wages

19.2.1. All laborers and mechanics employed under this Contract in the development or construction of the project(s) involved will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

A. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the regular weekly period, are deemed to be constructively made or incurred during such weekly period.

B. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR.

C. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

D. The wage determination (including any additional classification and wage rates conformed under 29 CFR and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

19.2.2. Any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination.

A. HUD shall approve any additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met:

i. The work to be performed by the classification requested is not performed by a classification in the wage determination;

ii. The classification is utilized in the area by the construction industry; and

iii. The proposed wage rate, including bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

B. If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employee Standards Administration, U.S. Department of Labor, Washington, DC 20210.

i. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within thirty (30) calendar days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary.

C. In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator of the Wage and Hour Division for determination.

i. The Administrator or an authorized representative, should issue a determination within thirty (30) calendar days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time was necessary.

D. The wage rate (including fringe benefits where appropriate) shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in classification.

19.2.3. Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

19.2.4. If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met.

A. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

19.3. Withholding of Funds

19.3.1. HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract.

A. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working in the construction or development of the Project, all or part of the wages required by the contract, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

B. HUD or its designee may, after written notice to the Contractor or Subcontractor, issue payment to the respective employees to whom they are due.

19.4. Payrolls and Basic Records

19.4.1. Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working in the construction or development of the Project.

A. Such records shall contain:

i. The name, address, and social security number of each such worker;

ii. His or her correct classification

iii. Hourly rates of wages paid

(a) Including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in the Davis-Bacon Act;

iv. Daily and weekly number of hours worked;

v. Deductions made; and

vi. Actual wages paid.

B. Whenever the Secretary of Labor has found, under 29 CFR, that the wages of any laborer or mechanic include the amount of costs reasonably anticipated in providing benefits under a plan or program described in the Davis-Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

i. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

19.4.2. The Contractor shall submit for each week in which any contract work is performed a copy of all payrolls to the Contracting Officer for transmission to HUD or its designee.

A. The payrolls submitted shall set out accurately and completely all of the information required to be maintained.

B. This information may be submitted in any form desired.

i. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

C. The Contractor is responsible for the submission of copies of payrolls by all Subcontractors (Approved by the Office of Management and Budget under OMB Control Number 1214-0149).

i. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or Subcontractor, or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(a) That the payroll for the payroll period contains the information required to be maintained and that such information is correct and complete;

(b) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or from the full wages earned, other than permissible deductions as set forth in 29 CFR; and

(c) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated in to the Contract.

ii. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirements for submission of the "Statement of Compliance".

iii. The falsification of any of the above certifications may subject the Contractor or Subcontractor to civil or criminal prosecution under Title 18 and Title 31 of the United States Code.

19.4.3. Records

A. The Contractor or Subcontractor shall make the records available for inspection, copying, or transcription by authorized representatives of HUD or its designee, the Contracting Officer, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job.

B. If the Contractor or Subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds.

C. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR.

19.5. Apprentices & Trainees

19.5.1. Apprentices will be permitted to work at less than predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship and Training, Employer and labor Services (OATELS), or with a State Apprenticeship Agency recognized by OATELS, or if a person is employed in his or her first ninety (90) calendar days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by OATELS or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

A. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program.

i. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed , shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

ii. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

B. Where a Contractor is performing construction on a project in a locality other than that in which registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed.

C. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination.

i. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program.

ii. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification.

iii. If the Administrator of the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

D. In the event OATELS, or a State Apprenticeship Agency recognized by OATELS, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

19.5.2. Trainees

A. Except as provided for in 29 CFR, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

B. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

C. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination.

i. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program.

ii. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed in the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate in the wage determination which provides for less than full fringe benefits for apprentices.

iii. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate in the wage determination for the classification of work actually performed.

iv. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate in the wage determination for the work actually performed.

D. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work until an acceptable program is approved.

19.5.3. Equal Employment Opportunity

A. The utilization of apprentices, trainees, and journeymen shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR.

19.6. Compliance with Copeland Act requirements

19.6.1. The requirements of 29 CFR, which are hereby incorporated by reference in this Contract

19.7. Contract Termination; Debarment

19.7.1. A breach of ARTICLE XIX LABOR STANDARDS may be grounds for termination of the Contract and for debarment as a Contractor and a subcontractor.

19.8. Disputes Concerning Labor Standards

19.8.1. Disputes arising out of the labor standards provisions of Disputes Concerning Labor Standards shall not be subject to ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE of this contract.

A. Such disputes shall be resolved in accordance with the procedures of the Department of Labor.

19.8.2. Disputes within the meaning of Disputes Concerning Labor Standards include disputes between the Contractor (or any of its Subcontractors) and CMHA, HUD, the U.S. Department of Labor, or the employees or their representatives.

19.9. Certification of Eligibility

19.9.1. By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded contracts by virtue of the Davis-Bacon Act or 29 CFR.

19.9.2. No part of this Contract shall be subcontracted to any person or firm ineligible for award of a United States Government contract by virtue of the Davis-Bacon Act or 29 CFR.

19.9.3. The penalty for making false statements is prescribed in the U. S. Criminal Code 18 U.S.C.

19.10. Contract Work Hours and Safety Standards Act

19.10.1. As used in 19.10 - Contract Work Hours and Safety Standards Act, the terms "laborers" and "mechanics" include watchmen and guards.

19.10.2. Overtime Requirements

A. No Contractor or Subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one half pay for all hours worked in excess of 40 hours in such workweek.

19.10.3. Violation; liability for unpaid wages; Liquidated Damages

A. In the event of any violation, the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages.

B. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages.

C. Such liquidated damages shall be computed with respect to each individual laborer or mechanic (including watchmen and guards) employed in violation, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages.

19.10.4. Withholding for unpaid wages and liquidated damages

A. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by the Contractor or Subcontractor under any such Contract or any Federal contract with the same prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages.

19.11. Subcontracts

19.11.1. The Contractor or Subcontractor shall insert in any Subcontracts all the provisions contained in Subcontracts, and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the Subcontractors to include these provisions in any lower tier Subcontracts.

19.11.2. The prime Contractor shall be responsible for the compliance by any Subcontractor or lower tier Subcontractor with all these provisions.

19.12. Non-Federal Prevailing Wage Rates

19.12.1. Any prevailing wage rate (including basic hourly rate and any fringe benefits), determined under State or tribal law to be prevailing, with respect to any employee in any trade or position employed under the Contract, is inapplicable to the Contract and shall not be enforced against the Contractor or any Subcontractor, with respect to employees engaged under the contract whenever such non-Federal prevailing wage rate exceeds:

A. The applicable wage rate determined by the Secretary of Labor pursuant to the Davis-Bacon Act (40 U.S.C.) to be prevailing in the locality with respect to such trade;

B. An applicable apprentice wage rate based thereon specified in an apprenticeship program registered with the U.S. Department of Labor (DOL) or a DOL- recognized State Apprenticeship Agency; or

C. An applicable trainee wage rate based thereon specified in a DOL-certified trainee program.

20. ARTICLE XX HEALTH, SAFETY AND ACCIDENT PREVENTION

20.1. General Contractor Requirements

20.1.1. In performing this Contract, the Contractor shall:

A. Take reasonable precautions to ensure safety of individuals on the Project;

B. Ensure that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health and/or safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation;

C. Protect the lives, health, and safety of other persons;

D. Prevent damage to property, materials, supplies, and equipment; and

E. Avoid work interruptions.

20.1.2. For these purposes, the Contractor shall:

A. Comply with regulations and standards issued by the Secretary of Labor .

i. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act; and

B. Include the terms of ARTICLE XX HEALTH, SAFETY AND ACCIDENT PREVENTION in every Subcontract that such terms will be binding on each Subcontractor.

C. The Contractor shall be responsible for its Subcontractors' compliance with the provisions of ARTICLE XX HEALTH, SAFETY AND ACCIDENT PREVENTION.

i. The Contractor shall take such action with respect to any Subcontract as CMHA, the Secretary of Housing or Secretary of Labor shall direct as a means of enforcing such provisions.

D. The Contractor shall maintain an accurate record of exposure data on all accidents incident to work performed under this Contract resulting in death, traumatic injury, occupational diseases or damages to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR;

E. The Contractor shall pay any fine or cost incurred because of Contractor's violation, or alleged violation, of any Applicable Law.

20.2. Notification of Non-Compliance Procedure

20.2.1. To the extent CMHA is aware of Contractor's noncompliance with the safety requirements in the Contract, CMHA shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. However, CMHA's failure to notify Contractor of noncompliance with any applicable safety requirements, does not relieve Contractor of any obligation to comply with safety requirements for the Project.

A. This notice, when delivered to the Contractor or the Contractor's representative at the site of the work, shall be deemed sufficient notice of the noncompliance and corrective action required.

20.2.2. After receiving the notice, the Contractor shall immediately take corrective action.

20.2.3. If the Contractor fails or refuses to take corrective action promptly, CMHA may issue an order stopping all or part of the work until satisfactory corrective action has been taken.

20.2.4. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under Section 20.2.

20.3. Safety Plan

20.3.1. The Contractor is responsible for designing and implementing its own site-specific safety plan, including compliance with OSHA regulations and such plan shall meet or exceed CMHA's site-specific safety plan (if any).

20.3.2. Before starting any Work, the Contractor shall submit to CMHA a copy of the Contractor's site-specific safety plan and safety manuals.

20.4. Safety Data Sheets

20.4.1. The Contractor shall identify any material it uses at the Site with a Safety Data Sheet ("SDS") meeting the requirements of OSHA's Hazardous Communication Standard.

20.4.2. The Contractor shall maintain a notebook containing all of its applicable SDSs.

A. This notebook shall be kept at the Site for the duration of the Project.

20.5. Hazardous Materials

20.5.1. Prohibition Against Hazardous Materials

A. The Contractor shall not introduce Hazardous Materials to the Project

20.5.2. Work Stoppage Due to Hazardous Materials

A. If the Contractor encounters material the Contractor reasonably believes to be, or contain, a Hazardous Material that has not been rendered harmless, the Contractor shall immediately stop Work in the affected area and verbally report the condition to CMHA, and within one (1) business day deliver written notice of the condition to CMHA.

B. CMHA will promptly determine the necessity of CMHA retaining a qualified environmental consultant to evaluate the suspected Hazardous Material and to issue a related written report.

i. Where appropriate, CMHA will engage a licensed abatement contractor to remove the material or render it harmless as directed.

C. The Contractor shall resume Work in the affected area upon written notice from CMHA that:

i. The suspect material was evaluated and found not to be or contain a Hazardous Material; or

ii. The suspect material has been removed or rendered harmless.

D. If the Contractor knowingly or negligently proceeds with the Work in an area where a Hazardous Material exists and has not been rendered harmless, the Contractor shall be solely responsible for all related claims, damages, losses, and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performing the Work in the affected area. Further, to the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, associated with Contractor knowingly or negligently proceeds with the Work in an area where a Hazardous Material exists and has not been rendered harmless.

E. The term "rendered harmless" means that the level of exposure is less than any applicable exposure standards set forth in Applicable Law.

20.6. Fires or Hot-Work

20.6.1. Contractor shall not burn any fires on the Site(s).

A. The Contractor shall notify the Project Manager twenty-four (24) hours before the start of non-routine or non-recurring hot-work.

i. Use of sources of fire, flame or sparks and flammable materials shall be kept to an absolute minimum.

ii. At the beginning of the Project, the Contractor shall inform the Project Manager of its intent to use blowtorches, welding apparatus or similar exposed flame and sparking devices.

iii. Similar notice shall be given in regard to the use of flammable liquids, adhesives, and cleaners.

B. The Contractor shall furnish an appropriate number of fire extinguishers (minimum of 1), which shall be within the immediate areas where work is being done at all times.

i. The extinguisher shall be adequate and suitable for the class of fire likely to be caused by the Contractor's operations.

20.7. Explosives and Blasting

20.7.1. The Contractor shall not conduct blasting on, or bring explosives to the Work Site without written approval of CMHA and other authorities with jurisdiction.

20.7.2. The Contractor shall perform all blasting, storing, and handling of explosives as required under Applicable Law.

20.7.3. The Contractor shall carry appropriate liability insurance coverage, as required by the Contract Documents, for its blasting and explosives storage and handling operations.

A. Immediately upon request, the Contractor shall deliver evidence of that insurance to CMHA.

21. ARTICLE XXI CONTRACT DOCUMENTS AND CONTRACT RECORDS

21.1. Examination and Retention of Contractor's Records

21.1.1. CMHA, HUD, or the Comptroller of the United States, or any of their duly authorized representatives shall, until three (3) years after final payment under this Contract, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this Contract for the purpose of making audit, examination, excerpts, and transcriptions.

21.1.2. The Contractor agrees to include in first-tier Subcontracts under this Contract a clause substantially the same as 21.1.1.

A. "Subcontract," as used in Examination and Retention of Contractor's Records, excludes purchase orders not exceeding $10,000.

21.1.3. The periods of access and examination for records relating to (1) appeals under ARTICLE XI DISPUTE RESOLUTION/CLAIM PROCEDURE of this contract, (2) litigation or settlement of claims arising from the performance of this Contract, or (3) costs and expenses of this Contract to which CMHA, HUD, or Comptroller General or any of their duly authorized representatives has taken exception shall continue until disposition of such appeals, litigation, claims, or exceptions.

21.1.4. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, arising out of or related to any dispute regarding what Person or Persons should be given access to the documents under Section 21.1.

21.1.5. The right of inspection, audit, and reproduction extends to all documents necessary to permit CMHA, or its agents, to perform a complete evaluation of all of the Contractor's costs related to the Project, including, but not limited to, the cost of pricing data submitted along with the computations and projections used therein.

21.1.6. If the Contract has been terminated, in whole or in part, the records relating to the Work terminated shall be made available to CMHA for a period of six (6) years from the date of termination.

21.2. Examination and Audit of Contractor's Records

21.2.1. CMHA may examine all books, records, documents and other data of the Contractor and its Subcontractors related to the bidding, pricing, or performance of the Work for any purpose, including, but not limited to, evaluating any Contractor Payment Request, Proposal, Modification, or Claim.

21.2.2. The above referenced materials shall be made available at the office of the Contractor or Subcontractor, as applicable, at all reasonable times for inspection, audit, and reproduction until the expiration of six (6) years after the date of Substantial Completion of all Work.

A. The Contractor shall maintain, and require its Subcontractors to maintain, complete and accurate business records at its principal place of business.

i. If the principal place of business is greater than 50 miles from the Site, the Contractor shall timely make records available, and shall require its Subcontractors to timely make records available, at the office of CMHA upon request for the records.

B. To the extent that the Contractor or Subcontractor, as applicable, informs CMHA in writing that any documents provided to CMHA are trade secrets, CMHA shall treat these documents, to the extent permitted by law, as trade secrets of the Contractor or Subcontractor, as applicable.

i. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless CMHA, from and against all claims, costs, losses, and damages, including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs, arising out of or related to any dispute regarding what Person or Persons should be given access to the documents under Section 21.2.

21.2.3. The right of inspection, audit, and reproduction extends to all documents necessary to permit adequate evaluation of the cost of pricing data submitted along with the computations and projections used therein.

21.2.4. If the Contract has been terminated, in whole or in part, the records relating to the Work terminated shall be made available to CMHA for a period of six (6) years from the date of termination.

21.2.5. Records that relate to disputes, litigation, or settlement of Claims arising out of the performance of the Work shall be made available until the dispute, litigation or Claims have been finally decided or settled.

21.3. Ownership of Contract Documents

21.3.1. CMHA shall have exclusive ownership of, all proprietary interest in, and the right to full and exclusive possession of all information, materials and documents discovered or produced by Contractor pursuant to the terms of this Contract, including but not limited to reports, memoranda, drawings or letters concerning the research and reporting tasks of this Contract.

21.3.2. For data other than computer software, the Contractor grants to CMHA and others acting on its behalf, a paid-up, nonexclusive, irrevocable, world-wide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly by or on behalf of CMHA.

21.3.3. CMHA alone owns the Contractor's Documents and the Contract Documents and every right, title, and interest therein.

21.3.4. The Contractor must execute and deliver and cause its agents and subcontractors to execute and deliver, to CMHA any transfers, assignments, documents or other instruments necessary to vest in CMHA the complete right, title, interest in and ownership of the Contractor's Documents.

21.3.5. The Contractor may retain copies of the Contractor's Documents and the Contract Documents for information, reference, and performance of the Work.

21.3.6. The submission or distribution of the Contractor's Documents or the Contract Documents to meet official regulatory requirements or for similar purposes in connection with the Project is not a waiver of CMHA's reserved rights in the Contractor's Documents.

A. Any unauthorized use of the Contractor's Documents or the Contract Documents shall be at the sole risk of the entity making the unauthorized use.

21.4. Intent of Contract Documents

21.4.1. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of Work by the Contractor.

21.4.2. The Contract Documents are complementary, and what is required by one is binding as if required by all.

21.4.3. The Contractor shall provide all labor materials necessary for the entire completion of the Work described in the Contract Documents and reasonably inferable to produce the intended results.

21.4.4. The Drawings govern dimensions, details, and location of the Work.

A. The Specifications govern the quality of materials and workmanship.

21.4.5. The organization of the Specifications in divisions, sections, and articles, and the arrangement of Drawings shall not restrict the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

21.4.6. Unless otherwise defined in the Contract Documents, words that have well known technical or construction industry meanings are used within those recognized meanings.

21.5. Use of Electronic Files

21.5.1. CMHA and Contractor reasonably expect that they will provide Electronic Files to each other to facilitate the design and construction of the Project consistent with current practices and customs in the construction industry.

21.5.2. CMHA and Contractor acknowledge that the use of Electronic Files involves risks not generally associated with the use of paper documents.

A. Those risks may include, but not be limited to, alteration (inadvertent or intentional) and deterioration, both of which may not be apparent through casual observation.

21.5.3. In the event of a discrepancy between information contained in a paper version of a document and the Electronic File of that document, the paper will govern.

21.5.4. Use of Electronic Files does not relieve the Contractor of its responsibility for the preparation, completeness, or accuracy of the Contractor's Documents.

21.6. Order of Precedence

21.6.1. In the event of any inconsistency or conflict within any of the Contract Documents, the Contractor shall provide the better quality of Work and comply with the stricter requirement.

21.6.2. In the event of a conflict between the contract and any applicable state or local law or regulation, the state or local law or regulation shall prevail; provided that such state or local law or regulation does not conflict with, or is less restrictive than applicable federal law, regulation, or Executive Order.

A. In the event of such a conflict, applicable federal law, regulation, and Executive Order shall prevail.

22. ARTICLE XXII MISCELLANEOUS

22.1. Assignment

22.1.1. The Contractor shall not assign or transfer any interest in this Contract; except that Claims for monies due or to become due from CMHA under the Contract may be assigned to a bank, trust company, or other financial institution.

A. Such assignments of claims shall only be made with the written concurrence of CMHA.

B. If the Contractor is a partnership, this contract shall inure to the benefit of the surviving or remaining member(s) of such partnership as approved by CMHA.

22.1.2. Assignment of Antitrust Claims:

A. By signing the Agreement, the Contractor assigns, conveys and transfers to CMHA any right, title, and interest to any claims or causes of action it may have or acquire under state or federal antitrust laws relating to any goods, products, or services purchased, procured, or rendered to CMHA pursuant to the Contract.

22.1.3. CMHA and Contractor each bind themselves, their successors, assigns and legal representatives, to the other party to this Contract and to the successors, assigns, and legal representatives of the other party with respect to the Contract.

22.2. Contractor Performance Evaluation

22.2.1. CMHA may evaluate the Contractor's Performance at any time including without limitation during the progress of the Work, at the completion of a phase of the Project, and/or completion of the Project.

22.2.2. CMHA shall retain the evaluation.

A. The Contractor may request a copy of the completed evaluation(s).

i. If the Contractor wishes to comment or take exception to any rating or remark, the Contractor must send a response in writing to CMHA within thirty (30) calendar days of Contract Completion and/or Termination.

B. CMHA may use the evaluation(s) in determining the responsibility of the Contractor for award of future contracts.

C. Poor evaluations may lead to a determination that Contractor is not responsible and therefore ineligible for award of future contracts for a period of not less than one year.

D. CMHA may request information from the Contractor for use in evaluating the A/E's performance.

i. If information is requested, the Contractor shall comply in a timely and responsive manner.

E. If a breach of the Contract is committed by the Contractor or is attributable to a Subcontractor, that breach will be used in the responsibility analysis of the Contractor and Subcontractor (where applicable) for future contracts or subcontracts for a period of five (5) years after the date of the breach unless said breach results in Contractor being placed on debarment list, then for the period provided therein.

22.3. Prohibition Against Liens

22.3.1. The Contractor is prohibited from placing a lien on CMHA's property.

A. This prohibition shall apply to all Subcontractors at any tier and all materials suppliers.

22.4. Conflict of Interest

22.4.1. Interest of Members of Congress

A. No member of or delegate to the Congress of the United States of America shall be admitted to any share or part of this contract or to any benefit that may arise therefrom.

22.4.2. Interest of Members, Officers, or Employees and Former Members, Officers, or Employees

A. No member, officer, or employee of CMHA, no member of the governing body of the locality in which the Project is situated, no member of the governing body of the locality in which CMHA was activated, and no other public official of such locality or localities who exercises any functions or responsibilities with respect to the Project, shall, during his or her tenure, or for one year thereafter, have any interest, direct or indirect, in this Contract or the proceeds thereof.

22.5. Limitation on Payments Made to Influence Certain Federal Financial Transactions

22.5.1. The Contractor agrees to comply with Title 31, United States Code which prohibits the use of Federal appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions:

- **A.** The awarding of any Federal contract;
- **B.** The making of any Federal grant;
- **C.** The making of any Federal loan;
- **D.** The entering into of any cooperative agreement; or
- **E.** The modification of any Federal Contract, grant, loan, or cooperative agreement.

22.5.2. The Contractor further agrees to comply with the requirement of the Act to furnish a disclosure (OMB Standard Form LLL, Disclosure of Lobbying Activities) if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

22.6. Procurement of Recovered Materials

22.6.1. In accordance with the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, the Contractor shall procure items designated in guidelines of the Environmental Protection Agency (EPA) 40 CFR that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition.

- **A.** The Contractor shall procure items designated in the EPA guidelines that contain the highest percentage of recovered materials practicable unless the Contractor determines that such items:
  - **i.** Are not reasonably available in a reasonable period of time;
  - **ii.** Fail to meet reasonable performance standards, which shall be determined on the basis of the guidelines of the National Institute of Standards and Technology, if applicable to the item; or
  - **iii.** Are only available at an unreasonable price.

22.6.2. 22.6.1 shall apply to items purchased under this contract where:

- **A.** The Contractor purchases in excess of $10,000 of the item under this contract; or
- **B.** During the preceding:
  - **i.** Purchased any amount of the items for use under a contract that was funded with Federal appropriations and was with a Federal agency or a State agency or agency of a political subdivision of a State; and
  - **ii.** Purchased a total of in excess of $10,000 of the item both under and outside that contract.

22.7. Royalties and Patents

22.7.1. The Contractor shall pay all royalties and license fees and assume all costs incident to the use, in the performance of the Work or the incorporation in the Work, of any design, inventions, process, product, or devise that is the subject of patent rights or copyrights held by others.

- **A.** Contractor shall defined all suits or claims for infringement of any patent rights or copyrights and shall save CMHA harmless from loss on account thereof; except that CMHA shall be responsible for all such loss when a particular design, process, or the product of a particular manufacturer or manufacturers is specified and the Contractor has no reason to believe that the specified design, process, or product is an infringements.
- **B.** If, however, the Contractor has reason to believe that any design, process or product specified is an infringement of a patent or copyright, the Contractor shall promptly notify the Contracting Officer.
  - **i.** Failure to give such notice shall make the Contractor responsible for resultant loss.

22.8. Contract Time for Substantial Completion

22.8.1. The Contractor shall have the Work Substantially Complete as established in the Notice to Proceed issued by CMHA. If a Notice to Proceed is not issued, the date for commencement of the Work shall be the effective date of the Contract.

22.9. Other Contracts

22.9.1. CMHA may undertake or award other contracts for additional work at or near the site of the Work under this contract.

22.9.2. The Contractor shall fully cooperate with the other contractors and with CMHA employees and shall carefully adapt scheduling and performing the work under this Contract to accommodate the additional work, heeding any direction that may be provided by CMHA.

22.9.3. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by CMHA employees.

22.10. Drug-Free Workplace

22.10.1. Each contractor shall be enrolled in and in good standing and shall require all subcontractors with whom the Contractor is in contract for the public improvement to be enrolled in and be in good standing in the Bureau of Workers' Compensation's Drug-Free Workplace Program or a comparable program approved by the Bureau that meets the requirements specified in the Revised Code prior to a subcontractor providing labor at the Project site of the public improvement.

22.11. Energy Efficiency and Sustainability Requirements

22.11.1. The Contractor shall comply with mandatory standards and policies relating to energy efficiency which are contained in the energy conservation plan issued in compliance with the Energy Policy and Conservation Act for the State in which the work under the contract is performed.

22.11.2. If the Project is designed and constructed under the Leadership in Energy and Environmental Design ("LEED") Rating System developed by the U.S. Green Building Council or another rigorous rating system used to facilitate achievement of sustainability goals for the Project, the Contractor shall provide submittals certifying achievement of sustainable designed rating system criteria for verification by the Green Building Certification Institute or other third party in accordance with the Contract Documents.

22.12. Clean Air and Water

22.12.1. The Contactor shall comply with the Clean Air Act, as amended 42 USC, the Federal Water Pollution Control Water Act, as amended 33 U.S.C., and standards issued pursuant thereto in the facilities in which this Contract is to be performed.

22.13. Public Relations

22.13.1. Public relations or publicity about the Project shall be solely within the control of and consent of CMHA.

22.13.2. Contractor shall submit to CMHA all advertising and publicity related matter relating to this Contract, including without limitation, information provided in social media, wherein CMHA's name is mentioned or language used from which the connection of CMHA's name may, in CMHA's judgment, be inferred or implied.

A. Contractor shall not publish or use such advertising and publicity matters without prior express written consent of CMHA.

22.14. Governing Law

22.14.1. This Contract shall be governed and construed exclusively by its terms and by the laws of the State of Ohio and any suit filed to enforce any term of this Contract shall be filed only in a court of competent jurisdiction in Hamilton County, Ohio.

22.14.2. The parties to this Contract shall comply with applicable law.

22.15. Written Notice

22.15.1. Notice under the Contract Documents shall be validly given if:

A. Delivered personally to a member of the organization for whom the notice is intended.

22.16. Taxes

22.16.1. Parties acknowledge that CMHA is a tax exempt entity and Contractor must use tax exemption status for all purchases made for the Project in which tax emption is permitted under law.

22.17. Computing Time

22.17.1. When the Contract Documents refer to a period of time by a number of days, the period shall be computed to exclude the first and include the last day of the period.

A. If the last day of the period falls on a Saturday or Sunday, or a legal holiday, that say shall be omitted from the computation and the period shall end on the next business day.

22.17.2. Except as excluded, the Contract Times and all other periods referred to in the Contract Documents includes Saturdays, Sundays, and all days defined as legal holidays below.

22.17.3. The standard workdays for the Work are Monday through Friday, excluding legal holidays.

22.17.4. The Legal Holidays are as follows:

- **A.** New Year's Day
- **B.** Martin Luther King Jr. Day
- **C.** President's Day
- **D.** Memorial Day
- **E.** Independence Day
- **F.** Labor Day
- **G.** Columbus Day
- **H.** Veterans Day
- **I.** Thanksgiving Day
- **J.** Christmas Day

22.18. Time is of the Essence

22.18.1. All time limits set forth in the Contract Documents are of the essence.

- **A.** By signing this Contract, Contractor acknowledges that the Contract Times are reasonable, taking into consideration the usual weather and other conditions prevailing in the locality of the Project.
- **B.** By signing the Construction Progress Schedule, the Contractor acknowledges that the specified Milestone dates and the Date for Substantial Completion are reasonable, taking into consideration the usual weather and other conditions prevailing in the locality of the Project.

22.18.2. The Notice to Proceed establishes the date for commencement of the Work.

22.18.3. The Contractor acknowledges that it may be subject to interference, disruption, hindrance, or delay in the progress of the Work from any cause.

- **A.** The sole remedy for such interference, disruption, hindrance, or delay shall be an extension of the Contract TimeMODIFICATIONS, unless otherwise required by law.

22.19. Extent of Contract

22.19.1. The Contract Documents represent the entire and integrated agreement between CMHA and the Contractor and supersede all prior negotiations, representations, or agreement, either written or oral.

22.19.2. This Contract may be executed in any number of counterparts, each of which shall be regarded as original and all of which constitute but one and the same instrument.

22.19.3. The captions and headings in this Contract are for convenience only and in no way define, limit, or describe the scope or intent of any of the provisions or sections hereof.

22.20. Severability

22.20.1. If any provision of this Contract is determined by a court having jurisdiction to be unenforceable to any extent, the rest of the provisions of this Contract will remain enforceable to the fullest extent permitted by law.

22.21. Facsimile/Electronic Mail Signature

22.21.1. Any party hereto may deliver a copy of its counterpart signature page of any Contract Documents via email, fax, or web-based project management software.

22.21.2. Each party shall be entitled to rely upon a scanned or facsimile signature of the other party in such a manner as if such a signature were an original.

22.22. No Third Party Interest

22.22.1. Except as expressly provided herein, no person or entity, other than CMHA and Contractor, will have any right or interest under the Contract, and the Contract does not create a contractual relationship of any kind between any persons or entities other than CMHA and the Contractor.

22.23. No Waiver

22.23.1. The failure of CMHA or Contractor to insist on anyone or more instances upon strict performance of any one or more of the provisions of the Contract or to exercise any rights under the Contract or provided by law will not be construed as a waiver or relinquishment of that provision or of the right to subsequently demand strict performance or exercise the right and the rights will continue unchanged and remain in full force and effect.

22.24. Assignment of Antitrust Claims

22.24.1. By signing this Contract, the Contractor conveys, assigns and transfers to CMHA any right, title, and interest in any claims or causes of action it may have or acquire under state or federal antitrust laws relating to any goods, products, or services purchased, procured, or rendered to CMHA pursuant to this Contract.

22.25. Survival of Obligations

22.25.1. All representations, indemnity obligations, warranties, guarantees, and other expressed continuing obligations under the Contract, will survive final payment, completion and acceptance of the Work, and termination or completion of the Contract.

22.26. Force Majeure

22.26.1. Neither party shall be liable for failure to perform if such failure is caused by conditions beyond its control including, but not limited to, Acts of God, Government restrictions (including the denial or cancellation of any export or other necessary license), wars, and/or insurrections.

22.27. Privacy

22.27.1. The Contractor agrees to Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act and any Personal information collected, used, or acquired in connection with this Contract shall be protected against unauthorized use, disclosure, modification or loss.

22.27.2. Contractor shall ensure that its directors, officers, employees, subcontractors or agents use personal information solely for the purposes of accomplishing the services set forth herein.

22.27.3. Contractor agrees not to release, divulge, publish, transfer, sell or otherwise make known to unauthorized persons personal information without express written consent of CMHA or otherwise required by law.

22.27.4. Contractor agrees to indemnify and hold harmless CMHA for any damages related to Contractor's unauthorized use of personal information.

22.28. Contractor Status

22.28.1. It is understood that the Contractor is an independent contractor and is not to be considered an employee of CMHA, or assume any right, privilege or duties of an employee.

23. ARTICLE XXIII DEFINITIONS AND TERMINOLOGY

23.1. Whenever used in the Contract Documents, the terms listed below will have the meanings meaning ascribed which are applicable to both the singular and the plural and the male and female genderthereof:

23.1.1. Abandonment

A. A willful decision by the Contractor suspending the progress of the work for an uninterrupted period of three (3) or more consecutive days (excluding weekends and holidays) and such suspension was not requested by CMHA and not caused by natural occurrences or acts of God.

23.1.2. Acceptable Component

A. A component listed in the Specifications after the Basis of Design Component.

23.1.3. Addenda

A. Written or graphic instruments issued prior to the opening of Bids that clarify, correct, or change the Bidding requirements or the Contract Documents.

23.1.4. Agreement

A. The form provided by CMHA, including all of its exhibits, that, when completed and signed by the Contractor and CMHA is evidence of the execution of the Contract.

23.1.5. Allowance

A. An amount budgeted for during the Bidding process for an item that has yet to be specified or defined and for which no exact dollar amount is available.

23.1.6. Alternate

A. A change in the proposed Project scope, which may include alternate materials or methods of construction and an amount stated on the Bid form to be added or deducted from the Base-Bid if the corresponding Alternate is incorporated into the Contract.

23.1.7. Applicable Law

A. All federal, state, and local codes, statutes, ordinances, and regulations that apply to the performance of the Work.

23.1.8. Architect/Engineer (A/E)

A. The person or other entity engaged by the CMHA to perform architectural, engineering, design, and other services related to the work as provided for in the Contract.

B. When CMHA uses an engineer to act in this capacity, the terms “architect” and “engineer” shall be synonymous.

23.1.9. Asbestos

A. Any material that contains more than one percent (1%) asbestos fiber and is friable or is releasing asbestos fibers into the air above current action levels established by OSHA

23.1.10. As-Built Documents

A. Drawings, addenda, Specifications, executed Change Orders and other elements of the Contract Documents which the Contractor annotates and otherwise modified to indicate changes made during the construction process, the location of concealed and buried items, and other information useful to CMHA throughout the life of the completed Project.

23.1.11. Base-Bid

A. The amount stated in a Bid as the sum for which the Bidder offers to perform the Work in a particular trade or other category, which is described in the Contract Documents, excluding Alternates.

23.1.12. Basis of Design

A. A document that records the concepts, calculations, decisions, and product selections used to meet CMHA’s Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines.

B. The document includes both narrative descriptions and lists of individual items that support the design process.

23.1.13. Basis of Design Component

A. A component listed first in the Specifications.

23.1.14. Bid

A. The written offer of a Bidder submitted on the prescribed CMHA Bid Form setting forth the prices for the Work to be performed.

23.1.15. Bidder

A. The person that submits a Bid.

23.1.16. Bid Form

A. A form furnished by CMHA with the proposed Contract Documents that is to be completed, signed, and submitted containing the Bidder's Bid.

23.1.17. Bid Guaranty

A. A bid bond or other instrument of security authorized by 24 CFR submitted with the Bid to provide assurance that the Bidder will execute the Agreement.

23.1.18. Bond

A. Bid, performance and payment bonds and other instruments of security submitted by the Contractor to assure that the Contractor will perform the Work of the Contract, including making payment to Subcontractors and Material Suppliers.

23.1.19. Building Information Model (BIM)

A. A digital representation of physical and functional characteristics of a facility and a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.

i. It describes the process of designing a building collaboratively using one coherent system of computer models rather than as separate sets of drawings.

23.1.20. Building Permit

A. The term building permit as used in the Contract Documents shall mean any and all permits required to comply with local and state building codes.

23.1.21. Certificate of Completion or Certificate of Contract Completion

A. A form, issued by CMHA, that documents the Contractors achievement of Contract Completion.

23.1.22. Certificate of Substantial Completion

A. A form, issued by CMHA, which is used to document:

i. That the Contractor has achieved Substantial Completion of the Work or a designated portion of the Work; and

ii. The date on which the associated Substantial Completion of the Work was achieved.

23.1.23. Change Order

A. A document recommended by the A/E and executed by CMHA and the Contractor that modifies the Contract and authorizes an addition, deletion, or revision in the work and an adjustment in the Contract Sum or the Contract Time or both.

23.1.24. Change Order Request

A. A CMHA prescribed form issued after execution of the Contract requesting a Change Order from the Contractor(s), which may initiate a Change Order to modify the Contract.

23.1.25. Claim

A. A demand or assertion, initiated by written notice as prescribe in the Contract Documents, by the Contractor or CMHA seeking an adjustment of Contract Sum or Contract Time or both, or other relief with respect to the terms of the Contract.

23.1.26. Claim Affidavit

A. A sworn document used in conjunction with filing a lien, which contains a claim on the funds that are due to a Contractor, in favor of a person supplying labor, materials or services for the value of labor, materials, or services supplied.

23.1.27. Construction

A. The term used to include new construction, reconstruction, renovation, restoration, rehabilitation, major repair, demolition and all similar work upon buildings and ancillary facilities, including any draining, dredging, grading or similar work upon real property.

23.1.28. Construction Progress Schedule

A. The critical path schedule for performance of the Contract; showing the time for completing the Work within the Contract Times; the planned sequence for performing the various components of the Work; the interrelationship between the activities of the Contractor, A/E, and CMHA; and the Contractor's resource and cost loading information; as periodically updated during the performance of the Work.

23.1.29. Contract

A. The contract entered into between the Contractor and CMHA.

B. It includes:

i. The Bid;
ii. The Bid Bond;
iii. The Performance and Payment Bond or Bonds or other assurance of completion;
iv. The Certifications, Representations, and Other Statements of Bidders;
v. The HUD General Conditions of the Contract for Construction;
vi. The CMHA Construction Contract General Terms and Conditions;
vii. The applicable wage rate determinations from the U.S. Department of Labor;
viii. Any special conditions included elsewhere in the contract;
ix. The specifications; and
x. Drawings

C. It includes all formal changes to any of those documents by addenda, Change Order or modification.

23.1.30. Contract Documents

A. Collectively, the documents that constitute the substance of the Contract including, but not limited to:

i. The Bid;
ii. The Bid Bond;
iii. The Performance and Payment Bond or Bonds or other assurance of completion;
iv. The Certifications, Representations, and Other Statements of Bidders;
v. The HUD General Conditions of the Contract for Construction;
vi. The CMHA Construction Contract General Terms and Conditions;
vii. The applicable wage rate determinations from the U.S. Department of Labor;
viii. Any special conditions included elsewhere in the contract;
ix. The specifications; and
x. Drawings

B. It includes all formal changes to any of those documents by addenda, Change Order or modification.

23.1.31. Contract Commencement Date

A. The date established in the Notice to Proceed issued by CMHA to the Contractor to mark the start of the Work and the beginning of the running of the Contract Time. If a Notice to Proceed is not issued, the Contract Commencement Date shall be the effective date of the Contract.

23.1.32. Contract Completion Date

A. The date by which the Work must be finally complete

B. The Contract Completion Date is established in Section 9.8 herein.

23.1.33. Contract Sum

A. The Contractor's entire compensation for the Contractor's proper, timely, and complete performance of the Work and is subject to adjustment as provided in the Contract.

23.1.34. Contract Time

A. The periods stipulated in the Agreement for the achievement of associated Milestones and Substantial Completion, in consecutive days, beginning on the date established by the Notice to Proceed, including adjustments authorized by executed Change Orders.

23.1.35. Contractor

A. The person or other entity entering into the Contract with CMHA to perform all of the work required under the Contract.

23.1.36. Contractor Payment Application Request

A. The form furnished by CMHA that is to be used by the Contractor in requesting payments and which, when signed by the Contractor, shall serve as an affidavit that payments requested are in proportion to the Work completed as shown on the Schedule of Values.

23.1.37. Contractor's Documents

A. All Project-related documents, including those in electronic form, prepared by the Contractor and its Subcontractors.

23.1.38. Contractor's Fee

A. The portion of the Contract Sum attributable to the aggregate of the Contractor's profit and home-office overhead related to the Contractor's proper, timely, and complete performance of the Work.

23.1.39. Contractor's Punch List

A. A document prepared by the Contractor that consists of a list of items of Work to be completed or corrected by the Contactor as a condition precedent to Contract Completion.

23.1.40. Coordination Drawings

A. Drawings and Electronic Files prepared by the Contractor to demonstrate how multiple-system and interdisciplinary work will be coordinated.

B. Clash reports generated by BIM authoring software may be included in the Coordination Drawing submittals if applicable.

23.1.41. Correction Period

A. A period of one-year commencing on the date of Substantial Completion of the Work or a designated portion of the Work which CMHA has agreed to take Partial Occupancy.

23.1.42. Day

A. A calendar day of twenty-four (24) hours measured from midnight to midnight, unless otherwise expressly specified to mean a business day.

23.1.43. Defective Work

A. Work that:

i. Does not conform to the Contract Documents;

ii. Does not meet the requirements of any applicable statute, rule or regulation, inspection, reference standard, test or approval;

iii. Has been damaged prior to the A/E's recommendation of final payment, unless responsibility for the protection thereof has been expressly assumed by CMHA; or

iv. That is not free from defects in workmanship, materials or equipment during the period of any warranty or guarantee

23.1.44. Differing Site Condition

A. Subsurface or latent physical conditions at the site which differ materially from those indicated in this Contract; or

B. Unknown physical conditions at the site(s), of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the Contract Documents.

23.1.45. Drawings

A. The drawings enumerated in the schedule of drawings contained in the Specifications and as described in the Contract Documents; and

B. Graphic portions of the Contract Documents, showing the design, type of construction, location, dimension, and character of the Work to be provided by the Contractor, which generally includes plans, elevations, sections, details, schedules, diagrams, notes, and text.

23.1.46. Electronic File

A. Information maintained in a computer system or format that is intended to facilitate a Person's use and manipulation of the information including but not limited to Word, Excel, PDF, Primavera, CAD, and BIM files all in their native format.

23.1.47. Enclosure, Permanent

A. The condition in which the permanent exterior walls and roofs are in place, insulated, weatherproof and weather-tight, and permanent windows and entrances are in place

23.1.48. Enclosure, Temporary

A. The condition in which the permanent exterior walls and roofs are in place, insulated, weatherproof and weather-tight, and windows and entrances are provided with suitable temporary enclosures

23.1.49. Estimated Construction Cost

A. The sum of the Estimated Contract Cost amounts published in the Solicitation, as modified by Addenda, for a phase of the Project.

23.1.50. Estimated Contract Cost

A. The estimated amount for the Contract published in the Solicitation, including the Base Bid estimate and the estimates of selected Alternates, if any, as modified by Addenda.

23.1.51. Extra Materials

A. Materials required by the Contract Documents that are not incorporated into the Project but are given to CMHA to be used for future maintenance or repairs.

23.1.52. Final Inspection

A. The final review of the Work of the Contractor by the A/E and CMHA to determine whether issuance of the Certificate of Contract Completion will be issued by CMHA.

23.1.53. Frivolous RFI

A. RFI's that request information that is evident in the Contract Documents and/or RFI's that do not comply with the definition of an RFI as indicated below.

23.1.54. General Conditions

A. CMHA's General Conditions currently in effect, which may be modified by the CMHA from time to time.

23.1.55. General Conditions Costs

A. General Conditions Costs include only the Contractor's costs to provide the general conditions Work including without limitation the costs of all of the following Site related items:

i. Scheduling and coordinating the Work;
ii. Telephone;
iii. Telephone charges;
iv. Facsimile;
v. Telegrams;
vi. Postage
vii. Photos
viii. Photocopying;
ix. Hand tools;
x. Simple scaffolds (one level high);
xi. Tool breakage;
xii. Tool repairs;
xiii. Tool replacement;
xiv. Tool blades;
xv. Tool bits; and
xvi. Pre-approved travel, lodging, and parking costs

B. General Conditions Costs also include:

i. Bond premiums; and
ii. Premiums for Builder's Risk insurance, if the Contractor is required to purchase Builder's Risk insurance policy for the Project.

23.1.56. Hazardous Materials

A. Any material, substance, pollutant, or contaminant that is defined, regulated, referenced, or classified in the Comprehensive Environmental Response, Compensation and Liability Act, Federal Water Pollution Control Act, the Resource Conservation and Recovery Act, Clean Air Act, Hazardous Materials Transportation Uniform Safety Act, Toxic Substances Control Act, or any other Applicable Law relating to any hazardous, toxic, or dangerous waste, substance, or material.

B. Any substance or material that, after release into the environment or upon exposure, ingestion, inhalation, or assimilation, either directly from the environment or directly by ingestion through food chains, will, or may reasonably be anticipated to, cause death, disease, behavior abnormalities, cancer or genetic abnormalities and specifically includes but is not limited to asbestos, polychlorinated biphenyls ("PCBs"), radioactive materials, including radon and naturally occurring radio nuclides, natural gas, natural gas liquids, liquefied natural gas, synthetic gas, oil, petroleum and petroleum-based derivatives and urea formaldehyde.

23.1.57. HUD

A. The United States of America acting through the Department of Housing and Urban Development including the Secretary, or any other person designated to act on its behalf.

B. HUD has agreed, subject to the provisions of an Annual Contributions Contract (ACC), to provide financial assistance to CMHA, which includes assistance in financing the work to be performed under this Contract.

C. As defined elsewhere in Contract Documents, the determination of HUD may be required to authorize changes in the work or for release of funds to CMHA for payment to the Contractor.

D. Notwithstanding HUD's role, nothing in this Contract shall be construed to create any contractual relationship between Contractor and HUD.

23.1.58. Indemnified Parties

A. CMHA, the A/E, other Separate Consultants, and their respective officials, officers, consultants, agents, representatives, and employees, in both individual and official capacities.

23.1.59. Install

A. Put into use or place in final position, complete and ready for intended service or use.

23.1.60. Liquidated Damages

A. A sum established in the Contract Documents, pursuant to the statutory delay forfeiture authorized under ORC and federal regulations, to be paid to CMHA due to the Contractor's failure to complete the Work within the Contract Time for achievement of Substantial Completion, or any applicable portion of the Work on or prior to any Milestone date stated on the Contract Documents.

23.1.61. Material Supplier

A. A Person under a contract with the Contractor to furnish materials or supplies in furtherance of the Work, including all such Persons in any tier.

B. Material Supplier does not include any Separate Contractor unless expressly assigned in writing to the Contractor by CMHA and accepted by the Contractor.

23.1.62. Milestone

A. A principal event specified in the Contract relating to an intermediate completion date or time prior to Substantial Completion of all Work.

23.1.63. Modification

A. A written amendment to the Contract signed by both parties;

B. A Change Order;

C. A Change Directive; or

D. An order for a minor change in the Work.

23.1.64. Notice of Commencement

A. A notice prepared by CMHA identifying the Project, the Contractors, the Surety for each Contractor, and the name CMHA's representative upon whom a Claim Affidavit may be served.

23.1.65. Notice of Intent to Award

A. A written notice provided by CMHA to the apparent successful Bidder stating that upon satisfactory compliance with all conditions precedent for execution of a Contract within the time specified CMHA intends to execute a Contract with the Bidder.

23.1.66. Notice to Proceed

A. A written notice provided by CMHA authorizing the Contractor to proceed with the Work and establishing the date(s) for commencement and completion of the Work.

23.1.67. ORC

A. The Ohio Revised Code.

23.1.68. Owner

A. The Cincinnati Metropolitan Housing Authority or its instrumentality or affiliate for whom the Project is being constructed.

23.1.69. Owner's Project Requirements

A. A written document that details the functional requirements of the Project and the expectations of how it will be used and operated

B. These include project goals, measureable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

23.1.70. Partial Occupancy

A. The condition that occurs when CMHA occupies or uses a portion of the Project prior to Contract Completion, partial occupancy is approved by authorities having jurisdiction, and items of Work cannot be completed until a subsequent date.

23.1.71. Person

A. An individual, corporation, business trust, estate, partnership, association, or other public or private entity.

23.1.72. Phase

A. A separation in the Work of the Project by sequence or time intervals, which may include separate contractors for each Phase.

23.1.73. Plan Holder

A. A prospective Bidder that received a set of Contract Documents prior to the bid opening.

23.1.74. Product Data

A. Manufacturer's standard illustrations, schedules, diagrams, performance charts, instructions, and brochures that illustrate physical appearance, size, and other characteristics of materials and equipment.

23.1.75. PHA

A. A Public Housing Authority which at all times shall mean the Cincinnati Metropolitan Housing Authority unless otherwise specified in the Contract Documents.

23.1.76. Project

A. The entire project, whether construction or rehabilitation, the work for which is provided for in whole or in part under the Contract Documents.

23.1.77. Project Manager

A. An employee of CMHA assigned to the Project and authorized to perform specific responsibilities.

B. A Project Manager may also be referred to as a Construction Manager or Construction Contract Administrator.

23.1.78. Project Record Documents

A. Electronic files and printed documents of all nature prepared by the A/E, which incorporate the information shown on the Contractor's As-Built Documents.

B. They consist of:

i. The "Record Drawings";
ii. Certificate of Substantial Completion;
iii. Certificate of Contract Completion (as complete);
iv. Contractor's Warranty;
v. Manufacturers' Warrantees, certificate(s) of occupancy, approved shop drawings and other action submittals;
vi. Proposal Requests;
vii. Requests for Interpretation;
viii. Addenda;
ix. Change Orders;
x. Balancing Reports; and
xi. The final version of the approved Construction Progress Schedule

23.1.79. Proposal

A. The offer of a Contractor to perform the Work set forth in a Proposal Request.

23.1.80. Provide

A. Furnish and install, complete and ready for intended use.

23.1.81. Punch List

A. A document listing items of Work requiring correction or completion by the Contractor as a condition precedent to Contract Completion.

23.1.82. Record Drawings

A. Synonymous to As-Build Drawings; and,

B. The Drawings, which have been revised by the A/E to show the changes made during the construction process, conformed to represent the Work as executed by the Contractor.

23.1.83. Request for Interpretation/Information (RFI)

A. A written request to CMHA or the A/E seeking an interpretation or clarification of the Contract Documents.

23.1.84. Samples

A. Physical examples, color selection items, field samples, and mock-ups furnished by the Contractor to illustrate functional and aesthetic characteristics of products, materials, equipment, or workmanship and establish criteria by which the Work shall be judged.

23.1.85. Schedule of Values

A. A full, accurate, and detailed statement furnished by the Contractor reflecting a defined breakdown of the Contract Sum.

23.1.86. Separate Consultant

A. A Person engaged by CMHA to provide Project-related professional services other than the services under this Contract.

B. The term includes the Separate Consultant's authorized representatives, successors, assigns, and sub-consultants regardless of tier.

23.1.87. Separate Contract

A. The contract between CMHA and a Separate Consultant or a Separate Contractor.

23.1.88. Separate Contractor

A. A Person under contract CMHA to provide Project related work other than the Work under this Contract.

B. The term includes the Separate Contractor's authorized representatives, successors, assigns, and subcontractors regardless of tier.

23.1.89. Shop Drawings

A. Drawings, diagrams, illustrations, and schedules specifically prepared for the Project provided by the Contractor or a Subcontractor to illustrate some portion of the Work.

B. Shop Drawings are not Contract Documents.

C. Shop Drawings on equipment shall include a written statement from the manufacturer of the equipment certifying the equipment is in compliance with the Contract Documents.

23.1.90. Site

A. The location designated for the Project.

23.1.91. Specifications

A. The written description of the technical requirements for construction and includes the criteria and tests for determining whether the requirements are met.

23.1.92. Stage

A. A distinct period in the life cycle of a facility from concept through construction, to use and deconstruction or demolition.

B. Typical Stages include Program Verification, Schematic Design, Design Development, Construction Documents, Bidding and Award stages; and the Construction, which includes Construction and Closeout activities.

23.1.93. Subcontract

A. Any contract or agreement between the Contractor and a Subcontractor for performance of a portion of the Work.

23.1.94. Subcontract Form

A. The Subcontract Form prescribed CMHA and required for use by Contractor when engaging Subcontractors.

23.1.95. Subcontractor

A. A Person who undertakes to perform any part of the Work on the Project under a contract with a Contractor or with any Person other than the State, including all such Persons in any tier.

B. The term "Subcontractor" includes Material Suppliers, but does not include any Separate Contractor unless expressly assigned in writing to the Contractor by CMHA and accepted by the Contractor.

23.1.96. Supplementary Conditions

A. Amendments to the CMHA Construction Contract General Terms and Conditions, issued as a separate document, prescribed by CMHA, which describes conditions of the Contract unique to a particular Project, which may include:

i. Provisions regarding the assignment of responsibility for refuse removal;

ii. Safety and security precautions and programs;

iii. Temporary Project facilities and utilities;

iv. Weather and fire protection;

v. Scaffolding and equipment;

vi. Materials and services to be used commonly by the Contractor and Subcontractors and requiring the Contractor to provide assistance in the utilization of any applicable equipment system;

vii. Preparation of operation and maintenance manuals; and

viii. Training of CMHA personnel for operation and maintenance of the Project

B. The CMHA Construction Contract General Terms and Conditions shall not be superseded or amended by Drawings and Specifications, unless so provided in Supplementary Conditions.

23.1.97. Surety

A. A Person providing a Bid Guaranty or a Bond to a Bidder or a Contractor, as applicable, to indemnify CMHA against all direct and consequential damages suffered by failure of the Bidder to execute the Contract, or of the Contractor to perform the Contract and to pay all lawful claims of Subcontractors, Material Suppliers and laborers, as applicable.

23.1.98. Substantial Completion

A. The stage in the progress of the Work when the Work (or designated portion of the Work for which CMHA has agreed to take Partial Occupancy) is sufficiently complete in accordance with the Contract that CMHA can utilize the Work for its intended use, as determined by CMHA.

B. The issuance of a certificate of occupancy or partial certificate of occupancy (if applicable) is a condition precedent to the achievement of Substantial Completion.

23.1.99. Substitution

A. An article, device, material, equipment, form of construction, or other item, proposed by a prospective Bidder prior to the bid opening and approved by the A/E by Addendum, for incorporation or use in the Work as being functionally and qualitatively equivalent to essential attributes of a Basis of Design or Acceptable Component specified in the proposed Contract Documents.

23.1.100. Unit Price

A. The cost of providing a unit of Work including labor, materials, services, and associated expenses.

23.1.101. Work

A. The labor, materials, workmanship, manufacture or fabrication of components, equipment, and services, individually or collectively which are required by the Contract Documents, to be performed, installed, or provided by the Contractor for the Project.

B. The furnishing of all material, labor, detailing, layout, supplies, plants, tools, scaffolding, transportation, temporary construction, superintendence, demolition, and all other services, facilities and items reasonably necessary for the full and proper performance and completion of the requirements of the Project as set forth in the Contract Documents, and items reasonably inferable therefrom and consistent therewith for the proper execution and completion of the construction and other services required by the Contract Documents, whether provided or to be provided by the Contractor or a Subcontractor, or any other entity for whom the Contractor is responsible, and whether or not performed or located on or off of the Site.

PARTICIPATION REPORT

MINORITY BUSINESS ENTERPRISE (MBE) WOMEN BUSINESS ENTERPRISE (WBE)

Contract / PO#: _____

Please list below the names of all firmly committed MBE and WBE subcontractors that will work on the project, their MBE/WBE Status, the dollar amount, and the percentage of total contract amount that will be performed by the entities. The MBE/WBE participation can include subcontracts or purchases of services, materials and supplies directly related to the contract.

(Please check one)_____Proposed_____Amended_____Final

	MBE	WBE	Name of Subcontractor(s)	Contract Amount $ Amount	% Percentage
1	☐	☐		$	%
2	☐	☐		$	%
3	☐	☐		$	%
4	☐	☐		$	%
5	☐	☐		$	%
6	☐	☐		$	%
7	☐	☐		$	%
8	☐	☐		$	%
9	☐	☐		$	%
10	☐	☐		$	%
11	☐	☐		$	%
12	☐	☐		$	%
			Total MBE Dollar Amount and Percentage of Contract	$	%
			Total WBE Dollar Amount and Percentage of Contract	$	%

Fill with legible block letters

Signature:_____

Contact Person: _____

Company Name: _____

Date: _____

S3 RESIDENTS AND BUSINESS CONCERNS

MINORITY BUSINESS ENTERPRISE (MBE) & WOMEN BUSINESS ENTERPRISE (WBE)

.

Prospective Business Vendor:
Section 3 is a provision of the Housing and Urban Development (HUD) Act of 1968 that helps foster local economic development, neighborhood economic improvement, and individual self- sufficiency. The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent feasible, provide job training, employment, and contracting opportunities for low-or very low-income residents in connection with projects and activities in their neighborhoods.

Anyone claiming to be a Section 3 Business Concern shall be required, as set forth by procedure, to provide evidence of such status. Section 3 Business Concerns claiming Section 3 Preference status must meet that status at the time the bid, Bid or proposal is submitted to CMHA.

If you need any assistance or help regarding Section 3, feel free to contact us at Section3@cintimha.com

Section 3 Clause

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notices shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 75, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part75.9 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 75.9

F. Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. In the event of a determination by the Executive Director or his/her designee that the Contractor is not in compliance with the section 3 clause or any rule, regulation, or report submission requirements of the CMHA, this contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further CMHA contracts for a period of one to three years.

H. Section 3. The work to be performed under this Agreement is subject to the requirements of Section 3. The Parties agree to comply with HUD's regulations in 24 C.F.R. part 75, which implement Section 3 and hereby certify to the best of their knowledge that they are under no contractual or other impediment that would prevent them from compliance. The Authority shall monitor the Developer's compliance from time to time during the Project. The Developer agrees to require all Subcontractors to the greatest extent feasible to comply with Section 3 and the regulations promulgated in 24 C.F.R. part 75, and agrees to take appropriate action upon a finding that the Subcontractor is in violation of the regulations in 24 C.F.R. part 75. The Developer will not contract with any Subcontractor where the Developer has notice or knowledge that the Subcontractor has been found in violation of the regulations in 24 C.F.R. part 75.

I. Number. The Developer agrees to meet the following Section 3 benchmarks of 25/5 (25% Section 3 Total Labor Hours / 5% Targeted Section 3 Total Labor Hours) and the stated percentages when selecting Subcontractors for the Project: (i) at least twenty percent (20%) of the general construction Subcontractors to qualify as a MBE Subcontractor; (ii) at least five percent (5%) of the general construction to qualify as a MBE Subcontractor (iii) at least ten percent (10%) of the construction contract Subcontractors to qualify as Section 3 Subcontractors. Additionally, any hiring or training opportunities generated should be provided to Section 3 and Targeted Section 3 workers to the greatest extent feasible. The list of proposed Subcontractors, including the MBE, WBE and Section 3 Subcontractors, shall be submitted to the Authority for approval prior to the Closing.

J. CMHA is committed to fostering neighborhood economic improvement and the self- sufficiency of its residents. This is done through taking proactive steps to hire local low- income persons and to award contractors to business that are registered Section 3 businesses. Therefore, CMHA strives to ensure that at least fifteen percent (15%) of all subcontracts are awarded to Section 3 businesses.

K. In accordance with the findings of the Congress, as stated in section 3, that other economic opportunities offer an effective means of empowering low-income persons, a recipient is encouraged to undertake efforts to provide to low-income persons economic opportunities other than training, employment, and contract awards, in connection with section 3 covered assistance.

L. The Developer shall require all Subcontractors to send to each labor organization or representatives of workers with which such Subcontractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the Developer's and/or Subcontractor's commitments under Section 3, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. Each Subcontractor shall certify to the Developer that any vacant employment positions, including training positions, that are filled (i) after a Subcontractor is selected but before the relevant contract is executed and (ii) with persons other than those to whom the regulations of 24 C.F.R. Part 75 require employment opportunities to be directed, were not filled to circumvent the Subcontractor's obligations under 24 C.F.R. Part 75 and the Developer shall certify to the Authority that it has obtained all suchcertifications.

M. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

Assurance of Compliance Training, Employment, and Contracting Opportunities

The project assisted under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 170u. Section 3 requires that to the greatest extent feasible, newly created opportunities that are generated by the awarding of this contract be given to:

- Section 3 Workers (25% minimum goal of labor hours) upon theirqualifications.
- Section 3 Targeted Workers (5% Minimum of laborhours)

Notwithstanding any other provision of this contract, the applicant shall carry out the provisions of said Section 3 and the regulations issued pursuant thereto by the Secretary set forth in 24 CFR Part 75, and all applicable rules and orders of the Secretary issued thereunder prior to the execution of this contract. The

requirements of said regulations include but are not limited to development and implementation of a Section 3 Action Plan/Strategy for utilizing Section 3 Business Concerns; the making of a good faith effort, as defined by the regulation, to provide training, employment and business opportunities required by Section 3; and incorporation of the "Section 3 Clause" specified by Section 75.9 and 75.17 of the regulations in all contracts for work in connection with the project. The applicant and recipient agency, certifies and agrees that it is under no contractual or other disability which would prevent it from complying with these requirements.

Compliance with the provision of Section 3, the regulations set forth in 24 CFR Part 75, and all applicable rules and orders of the Secretary issued thereunder prior to approval by the Government of the application of this contract, shall be a condition of the Federal financial assistance provided to the project, binding upon the applicant, its contractors and subcontractors, its successors, and assigns to the sanctions specified by the contract, and to such sanctions as are specified by 24 CFR Section 75.

Action Plan Submission
The Section 3 Action Plan is a requirement for contracting opportunities with CMHA. The Section 3 Action Plan must indicate/describe the proposed strategies for achieving the Section 3 training and/or employment goals, and subcontracting numerical goals, when and if newly created opportunities are generated upon awarding of contracts. Failure to submit the Section 3 Action plan may jeopardize the proposal/bid up to and including the possibility of said proposal/bid being deemed non-responsive.

Please review and complete the Section 3 Action Plan - Opportunities Strategies in the *Bid*. All Sections need to be completed. This information will help to assist you in formulating your Section 3 Action Plan. You will need to address each question and check the appropriate boxes in regards to how your company will strive to achieve Section 3 Compliance to the "greatest extent feasible". Please identify individual(s) responsible for planning, implementing and tracking the projects' Section 3 training, employment and/or contracting goals.

TO THE CINCINNATI METROPOLITAN HOUSING AUTHORITY (CMHA)

In submitting this Bid, I acknowledge that:

A. The Prevailing Wages shall be paid for a legal day's work to laborers, workmen or mechanics engaged in work under this Contract, at the site of the Project, in the trade or occupation listed.

B. The Wage Determinations provided shall be closely monitored by the contractor/bidder/Proposer for any modifications until the actual construction work begins locking in the wage determination for the duration of the contract. Wage determinations and modifications can be monitored and obtained at www.wdol.gov. Failure to include the current wage determination will not relieve the contractors of potential wageliabilities.

C. It shall be the Prime Contractor's responsibility to verify the accuracy of the reported wages, including his subcontractors.

D. It shall be the Contractors responsibility to be certain that all the classifications needed to accomplish the contract fall underneath one of the classifications listed on the Wage Determination provided in the scope of work.

E. In the event that a required classification is not listed, a contractor may submit a request for an additional classification. Remember the request is not valid unless the Department of Labor approves it. There will be no justification for an adjustment to a contract price due to an increased wage rate. The contractor should have been aware of any particular skilled trades that were not included in the original wage determination and thus accepted anyrisk that DOL would "conform" a pay rate higher than what they estimated when they priced their proposal. The contractor is responsible to propose wage/benefit rates that "bear a reasonable relationship" to the other classifications and rates listed on the wage determination.

F. The following pages are the Prevailing Rates of Wages as ascertained by the State or other Agency for thisProject.

G. Listed below is a checklist of items required for Wage and Hour Compliance.

H. Remember, prompt correction of deficiencies is essential. Failure to correct in a timely manner will be the withholding of payments on your contract until the deficiencies are corrected.

I. For your convenience listed below is a checklist of items required:

- □ Appointment of Paymaster
- □ Equal Employment Opportunity Affirmative Action Policy Statement *(EEOAAPS*)
- □ Equal Employment Opportunity Compliance Certificate (*EEOCC*)
- □ Letter of Understanding
- □ General and Subcontractors form (*if applicable*)
- □ Employment Utilization Report (*upon completion*)
- □ Section 3 Form (*if applicable*)
- □ Weekly certified payrolls that include:
  - □ Contractor's Name
  - □ Contractor's Address
  - □ Payroll #
  - □ Week Ending Date
  - □ Project and Location
  - □ Contract or Purchase Order No.
  - □ Name of Employee
  - □ Social Security Number
  - □ Address of Employee
  - □ No. of Exemptions
  - □ Work Classification
  - □ Calendar Days
  - □ Hours Worked
  - □ Total Hours
  - □ Rate of Pay
  - □ Gross Amount Earned
  - □ Taxes or Write 1099 across columns if employee files his own taxes
  - □ Statement of Compliance (back page of the payroll sheet)
  - □ One of the boxes checked indicating if fringes benefits are paid in cash or approved program
  - □ Contract's Signature Certifying Payroll

Fill with legible block letters

Signature:_____

Contact Person: _____

Company Name: _____

Date: _____

PART 1 ADMINISTRATIVE

1.1 GENERAL

A. Gold Standard

In 2012, CMHA established its Gold Performance Standards which consist of the principles and values by which the Agency performs and how our partners, vendors, contractors and consultants are measured.

The Gold Performance Standards are: Respect, Timely, Exceptional, Initiative, Excellent, Quality, Accurate, Integrity, Value, Creativity, Accountability and Professionalism. It's very imperative that our partners, vendors, contractors and consultants abide by these standards that has been establish.

B. CMHA's Vendor Registration

1. The Contractor shall register as a CMHA's Vendor if not one already. To complete CMHA's vendor registration packet visit www.cintimha.com under Business Opportunities / Vendor Registration.

C. Prevailing Wages

1. The Contractor is responsible to consider the Prevailing Wage determination. The Attached Wage Determination can be subject to change from the time of contractor walk through to the date the bid is due. Typically, the wage rates are updated/revised/modified on Friday's every week. To monitor the Wage Determination visit: www.wdol.gov

D. Permits

1. The Contractor Shall Obtain all necessary permits for construction activities in accordance with Federal, State and Local Jurisdiction.

E. Existing conditions

1. The contractor shall field verify all existing condition prior to quoting. Contractor is responsible to examine the job conditions and field measurement, distances, elevations, clearances, etc. and base their quote and work on verified conditions. No Change Order will be approved for modifications/alterations required to existing conditions that are

apparent on the drawings and specifications and visible during the walk through.

F. Drawings and Specifications

1. The Contractor is responsible for comprehending the specifications, plans and becoming familiar with the site location and performing/completing all the work in the specifications at high standards in a professional manner.
2. Drawings and specifications take precedence in case of conflict with this document.

G. Contract Management

1. The Contractor shall provide a Construction Schedule and all applicable insurances at the Pre-Construction meeting before starting construction.
2. The contractor shall furnish all labor, materials, tools, equipment and devices to complete the work as specified in scope of work.
3. The contractor is responsible pay all utilities during construction ie. electric power, natural gas and water. The contractor shall provide those not available on the property and needed for construction.

H. Site Management

1. The Contractor shall provide the Construction Project Manager and the Property Manager (PM) with 48-hour advance notice prior to the start of work.
2. The Unit will be

   X vacant during construction. ◯ occupied during construction.
3. The Building will be

   ◯ vacant during construction. X occupied during construction (1st floor).
4. Construction working hours are 8:00 a.m. - 4:00 p.m. Monday thru Friday. Weekend work is prohibited if not approved in writing.
5. The Contractor shall coordinate and cooperate with surrounding residents who currently reside in the houses and buildings to minimize conflicts. The contractor is fully responsible for properly securing the house at the end of the work day.
6. The Contractor shall keep areas under construction clean on a daily basis. All un-used construction material shall be removed from site at the end of each work day. The contractor is prohibited from using any dumpsters and/or totters that are on site. The contractor shall clean all areas that are affected by the renovation (i.e. mechanical room,

public walk ways, driveway, etc.)

7. The Contractor shall secure the construction site. The Contractor shall secure and protect all materials, tools and equipment stored on site and all work completed. CMHA assumes no liability for these material, tools and equipment that may become missing and/or damaged and not guarantees that the property's video surveillance captures the incident, if available.
8. The contractor may store materials, tools and equipment on site if approved in writing and as instructed by the owner.
9. The contractor shall have at least one person in charge and on site during the duration of the project. This person shall be familiar with the project scope and daily construction activities and other persons in the work area.
10. The contractor shall maintain all lawns/sites within the area contracted for the duration of the project. Lawns shall be cut a minimum of once every 10 days from March through October. The contractor shall also be responsible for the removal of all rubbish, debris limbs, leaves, etc., within the area.
11. The Contractor shall coordinate with owner location of barriers and separations as necessary to protect occupied areas from noise, dust or other disruptive activities.
12. The Contractor shall perform the work with a minimum of disruption by noise, odors, dust or other disruptive causes to owner's normal operations.
13. The contractor is responsible for any damages that may occur to the existing exterior and interior finish (i.e. landscaping, exterior façade, grass, concrete walks, asphalt/concrete paving, drywall, flooring materials, wall base, wall/door finishes, etc.) during the construction duration.
14. Protect all adjacent surfaces or finishes during all work. Restore affected surfaces if damaged during construction.
15. CMHA does not furnish janitorial supplies. However, the contractor is encouraged to contact the CMHA Materials Controls Department or Field Representative to get a list of janitorial products commonly used by CMHA.
16. The contractor is responsible for all trash and debris in the units, and in the front, sides

and rear yards.

I. End of Construction

1. The contractor is to submit an Operation and Maintenance manual at the end of the project, one hard copy and one digital copy in PDF format. The Operation and Maintenance manual shall include manufacturer manual and warranty of all equipment and/or devices used/purchased for this project.
2. The Contractor shall warranty all material and workmanship for a period of one year after acceptance.
3. The contractor shall perform all tests, adjustments, etc. as required by equipment manufacturer.
4. The Contractor shall perform all tests, adjustments, etc. as required on all new installed devices. The equipment and devices are to be 100% operable/functional after installation.

PART 2 CONTRACTOR RESPONSABILITIES

1. The Contractor shall:
   i. Verify quantities to successfully complete the project.
   ii. Coordinate with building operations and residents to minimize the interference of day to day activities.
   iii. Coordinate with building manager location of dumpster.
   iv. Coordinate with any other contractor working in the building. CMHA has several projects ongoing in this building.
   v. The contractor or any of its personnel shall not enter any unit, at any time. No exceptions.
   vi. Smoking is not permitted inside the building or its surrounding areas.
   vii. Keep all areas clean and free of debris during construction activities and after hours.
   viii. The contractor, subcontractors, material men, or suppliers shall use only unmanufactured articles, materials, and supplies that have been mined or produced in

the United States; and manufactured articles, materials, and supplies that have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured in the United States.

PART 3 MAKE READY PROCEDURES **X APPLY** **◯ DO NOT APPLY**

3.1 GENERAL (All units expect as noted)

A. Preparation and Finishing

2. Remove all hangers, hooks, mails, tape, contact paper, wall paper, borders, etc.
3. Remove any obvious imperfections in walls or ceilings.
4. Remove any imperfections around fixtures of any sort and outlets. Do not paint electrical fixtures, switches, outlets or cover plates.
5. Wipe debris off all surfaces. This includes but is not limited to webs, dust, dirt, insect eggs and feces.
6. Paint all walls, ceilings, doors, window sills, trim, etc.
7. Drywall should be prepped for level 4 drywall finish. This will require drywall to be skim coated to provide smooth finish prior to painting.
8. In the kitchen, wash all surfaces of excessive smoke or grease damage. Special care shall be given to cleaning the area behind the range and refrigerator.
9. Properly use drop clothes.
10. Remove excessive debris and dust from heat registers before painting them.
11. Caulk all edges of countertops, window frames, door frames, kitchen cabinets, the base of all walls that connect apartments and public spaces, etc.
12. Cleaning of paint and drywall utensils and tools of any kind are not permitted in the apartment unit(s).
13. The contractor shall inspect all surfaces requiring painting to verify the work has been completed before turning over the unit as PAINTED.
14. Paint to use:
    i. Primary wall paint: Promar 200 Interior Latex Eggshell, SW 7015
    ii. Bathroom paint: Promar 200 Interior Latex Semi-Gloss, SW 7015

iii. Ceiling paint: Promar 200 Interior Latex Flat, SW 7006

iv. Door and trim paint: Promar 200 Interior Latex Eggshell, SW 7006

3.2 MAINTENANCE (All units expect as noted)

A. Leaking Faucets

1. All faucets and toilets shall be operable and without leaks.
2. All drains shall be open and without leaking waste lines.
3. Laundry station(s) shall be operable, open and without leaks.

B. Windows

1. Clean all windows, doors, frames and seals, including front and back storm doors, and including handles and knobs. They should open, close and be able to lock.
2. Remove and repair any damage from any old hardware remaining from previous blinds and shades no longer in use.
3. Windows shall have vinyl 1" mini-blinds in working condition.
    i. All screens should be cleaned and in place without any rips or holes.
4. All missing screen shall receive new matching screens.

C. Doors

1. Make sure that all storm and prime doors are in place and operable (open, close and are able to lock).
2. All doors (interior, exterior, closets and cabinets) must be able to open and close properly without any missing hardware.
3. Replace or repair wheels, tracks, hardware, door knobs, etc. so that doors are operable and function properly.
4. Exterior Doors must be cleaned both on the inside and outside, including screen doors/storm doors.
5. Exterior doors must be painted as necessary.
6. Interior doors must be painted or shellacked as necessary.
7. Check door sweeps and weather stripping. Replace where needed.
8. Install doorstops throughout the unit.

9. Busted doors must be replaced. A busted door may consist of veneer coming off, excessive holes, cracks, or anything beyond repair. If the replacement of the door is in question, the property manager will have the final say in determining whether or not to replace it. It is the contractor's responsibility to ensure a proper fit within the frame, the holes are accurately drilled for hinges, door knob and lockset. Should the contractor damage the door during this process, they will be held financially responsible and/or required to replace the door with new like-kind door.
10. Do not paint door hardware, if painted previously paint must be removed.

D. Cover Plates

1. Replace (provide where missing) all cracked or damaged electrical/cable/telephone cover plates.
2. Do not paint cover plates.

E. Stair Treads

1. All stair treads shall be securely in place and without any cracks, chips, breaks or tripping hazards. No tripping hazards.
2. All stair treads must be cleaned thoroughly.

F. Electric Fixtures and Outlets

1. Clean all interior and exterior light fixtures, light shades, globes and switch plates and switches.
2. Fixtures shall be free of fingerprints, marks, dust and insects.
3. All switches shall be operable.
4. All outlets (including GFCI) shall be operable.
5. All exterior light fixtures, doorbells, etc. shall be operable.

G. Smoke Alarms/Detector

1. Remove all smoke alarms/detectors and install new per all applicable codes and regulations.
2. All smoke alarms/detectors should be properly installed and working.
3. Smoke alarms should not be painted or have stickers or other decorations present.
4. Smoke alarm/detector location guidelines

i. If mounted on the ceiling, it must be more than 4 inches from the wall.
ii. It cannot be closer than 4 inches or more than 12 inches from the ceiling if mounted on the wall.
iii. Smoke alarms should not be installed near windows, doors, or ducts where drafts might interfere with their operation.

H. Carbon Monoxide (CO) Alarms/Detector

1. Remove all smoke alarms/detectors and install new per all applicable codes and regulations.
2. Carbon Monoxide Detection shall be installed in dwelling units containing a fuel-burning appliance or fireplace.
3. Carbon Monoxide detection shall be included in any dwelling units with attached private garages.
4. Carbon Monoxide detectors shall be installed in dwelling units outside each sleeping area and within 10 ft. of the bedroom. If a fuel-burning appliance is installed in the bedroom, a CO detector must be installed in the bedroom.

I. LVT / VCT Floors

1. In locations where the floor tile terminates between rooms, provide a transition strip.
2. Remove/replace all damaged, missing and/or defective wood/vinyl baseboards, toe strips or transition strips.

J. Ceramic Tile

1. Replace any damaged drywall/green board behind ceramic wall tile.
2. Repair or replace any loose, broken or missing ceramic wall tile. Replace all loose, broken or missing grout (match existing). Remove/replace or provide caulk at all tub/ceramic tile locations that terminate at wall surfaces.

K. Water Heater(s)

1. Inspect water heater(s) for proper operation and exhaust venting. Report any problems to the Owner's Field Representative.
2. Furnace(s) and Boiler(s)

3. Inspect furnace(s) for proper operation and exhaust venting. Report any problems to the Owner's Field Representative.
4. Inspect boiler(s) for proper operation and exhaust venting. Report any problems to the Owner's Field Representative.
5. Inspect thermostat(s) for proper operation. Report any problems to the Owner's Field Representative.
6. Vacuum clean all heating and air conditioning equipment, grills, registers, etc. Report any problems (damaged or missing items) to the Owner's Field Representative.

L. Appliances

1. Range Hood – Inspect the range hood for proper operation (fan, light and exhaust venting if required). The hood should have all of its parts and hardware such as filters, knob, etc. Report any problems to the Owner's Field Representative.
2. Range and Refrigerator – The existing ranges and refrigerators on site shall be unwrapped and installed (put in place) and made ready for use (i.e. plugged-into outlet, connected to gas supply piping, etc.). Report any problems to the Owner's Field Representative.
3. Must operate properly with all parts and hardware on it.
4. Gaskets should seal properly
5. All lights must be working

M. Exterior and Unit Entry Doors

1. All doors must open and close securely. All doors shall have proper and functioning hardware. Report any problems to the Owner's Field Representative.
2. Inspect all doors for proper door sweeps and weather stripping. Remove/replace and/or provide new door sweeps and weather stripping where required.
3. Remove/replace and/or provide new door stops throughout all units.

N. Closets

1. Inspect all closets and verify the proper installation of shelving and clothes rods. If any are damaged or missing, report the information to the Owner's Field Representative.
2. Make sure all closet poles and shelves are installed.

3. Closets shall be cleaned and free of debris.

O. Stoppers/Strainers

1. Provide a stopper or strainer in every sink.

P. Bathroom Fixtures

1. Inspect all bathrooms to ensure that they have in place a soap dish, towel bars and a medicine cabinet. If any of these items are missing, report this information to the Owner's Field Representative.

Q. Bathroom, Laundry, and Kitchen Cabinetry

1. All elements should be inspected when evaluating cabinets, including doors, drawers, hinges, knobs, drawer guides or slides, shelves, and cases or boxes.

R. Caulking / Sealing of the Unit

1. Caulk where needed on counter tops, window frames, door frames, kitchen cabinets etc.
2. In apartments caulk the base of all walls that connect two units.
3. Caulk around breaker box.
4. IPM (Integrated Pest Management) practices must be followed:
5. Seal all openings, cracks, and voids where possible including but not limited to around conduits and pipes
6. Caulk all baseboards.
7. Caulk between kitchen cabinet trim and cabinets if your I.D. badge can slide between the trim and the cabinet.
8. Secure all loose material to prevent harborages (e.g., loose trim boards, loose hinges, uncaulked trim).
9. Clear silicone must be used inside all cabinets/drawers and where cove base/baseboard meets floor.
10. Paintable caulking must be used where cabinets meet wall and where cove base/baseboard meets wall.
11. All caulking color should match surrounding surface.
12. Any voids larger than ¼" cannot be caulked, additional support is needed, examples:
    i. ¼" round wood trim

ii. Luan board
iii. Expandable foam
iv. Expanded foam must be trimmed or sanded
v. Various types of wood trim
vi. Heat tape (range hoods).

S. Painting/Preparation and Finishing

1. Remove all hangers, hooks, nails, tape, contact paper, wallpaper, borders etc.
2. Take out any obvious imperfections in wall or ceilings.
3. Take out imperfections around fixtures of any sort and outlets.
4. DO NOT PAINT electrical fixtures, switches, outlets, cover plates, sprinkler heads, and escutcheon plates.
5. Remove debris and dust from within the heater registers and ductwork.
6. Use caulk where needed on counter tops, window frames, door frames, kitchen cabinet etc.
7. Inspect entire unit before you request approval for painting.

T. Painting

1. All painted surfaces will be repainted to provide a uniform finish and shall be free from runs. Work shall be performed in accordance with all the manufacturer's recommendations. The Contractor will be responsible for correcting at his/her expense any work not accepted by the Authority Staff.
2. Contractor shall scrape off all flaking and/or loose paint from ceiling, walls and trim, interior and exterior doors, and exterior windowsill surfaces. Where chipped paint exists, sanding will be performed by use of various grades of sandpaper to featheredge chipped areas to allow a smooth flow of paint and prevent further chipping.
3. Contractor shall perform surface preparation throughout unit on all walls and surfaces requiring painting for the application of paint; surfaces shall be prepared to be consistent with the existing surface. Contractor will paint the unit in accordance with the terms of this proposal and scope of work.

4. All nails, screws, brackets, debris, etc., shall be removed. All holes in the walls, ceilings, doors, trim, etc., as well as cracks, will be properly filled, floated or caulked flush with existing surface. Finish will match all other existing finish work.
5. All doors and window trim must be painted. DO NOT PAINT BUSTED DOORS. Busted doors must be replaced, previously described. Doors include but are not limited to interior, exterior, and screen doors.
6. Each unit shall include a painted accent wall in the living room.
7. If range hoods are currently painted, and range hood paint is peeling, flaking or bubbling, paint with heat-retardant paint, or replace range hood. DO NOT paint range hoods if not currently painted. Touch up any nicks or scrapes to appliances with appliance paint.
8. DO NOT paint electric boxes, breaker boxes, or cover plates unless previously painted.
9. Properly use drop cloths. Improper use could lead to termination of the contract and you will also be held liable for costs to restore floors, stairs, hardwood floors, VCT tile, ceramic tile, etc. Properly clean paint equipment and wall repair materials. Do not clean paint equipment in units. Protect all drains from clogging. Contractor may be held accountable for plumbing costs incurred due to Contractor's actions. DO NOT dispose of paint in trash chutes.

3.3 JANITORIAL (All units expect as noted)

A. Bathroom(s)

1. Clean ceramic tile walls and grout.
2. Clean ceramic tile floors and grout where applicable.
3. Clean and disinfect all bathroom fixtures including but not limited to: faucets, sink, toilet, bathtub, grab bars, knobs, medicine cabinet.

B. VCT Floors

1. Stripping Floors:
    i. Use buffer to strip tile floors.
    ii. Clean all corners under and/or around heat registers and vents.

iii. Clean baseboards and cove base.

2. Sealing/Waxing:
    i. Provide two coats of sealer and two coats of wax to the floors.

C. Carpet

1. Contractor shall furnish necessary equipment and materials/supplies to perform any carpet cleaning.
2. Contractor shall vacuum carpets both prior to and after cleaning carpets.
3. Carpet cleaning includes, but is not limited to, cleaning the carpet, spot treatment, moving furniture (if applicable), stain removal and carpet stretching (if required due to the water).

D. Wood floor

1. Clean wood floors and apply polyurethane.

E. Light Fixtures and Globes/Shades

1. Clean all light fixtures, light globes/shades, etc.

F. Windows/Frames and Doors/Frames

1. Clean all windows and frames.
2. Clean all doors and frame.

G. Kitchen

1. Stove
    i. Clean the outside of the stove with degreasing soap or all-purpose cleaner.
    ii. Use the degreaser or all-purpose cleaner on the knobs and handles as well.
    iii. Use oven cleaner for the inside of oven door, inside of broiler, the pan and the oven interior.
    iv. Clean drip pans and vent filters
    v. Clean range hood.
2. Walls
    i. Kitchen walls must be cleaned for excessive smoke or grease damage.
    ii. The area behind the range must be cleaned as well.
3. Refrigerator

i. Contractor shall defrost, clean and dry refrigerator.
ii. Clean refrigerator using an all-purpose cleaner or any other cleaner that does not harm coating or gaskets.
iii. Clean excess dust from bottom and rear coil of refrigerator.

4. Cabinets/Sinks/Countertops
   i. Clean all cabinets inside and outside.
   ii. Clean sink and countertops.
   iii. Cabinets, drawers and hinges shall be cleaned and free of debris.
5. Miscellaneous
   i. Clean the outside of water heater.
   ii. Contractors must ensure that units with basements are cleaned.
   iii. Pressure wash garages, both interior and exterior.

3.4 PROTECTION AND CAUTIONS

1. Protect all adjacent surfaces or finishes during all work. Restore affected surfaces if damaged during construction.

2. CMHA does not furnish janitorial supplies. However, the contractor is encouraged to contact the CMHA Materials Controls Department or Field Representative to get a list of janitorial products commonly used by CMHA.

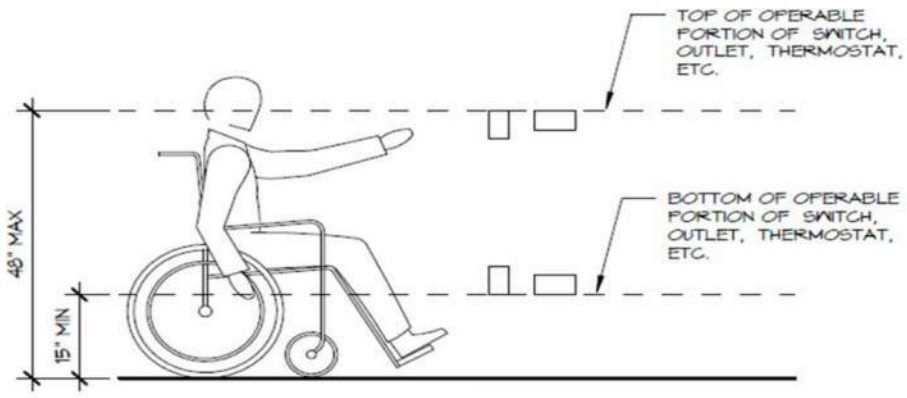
3. The contractor is responsible for all trash and debris in the units, and in the front, sides and rear yards.

PART 4 UFAS STANDARDS **X APPLY** ◯ **DO NOT APPLY.**

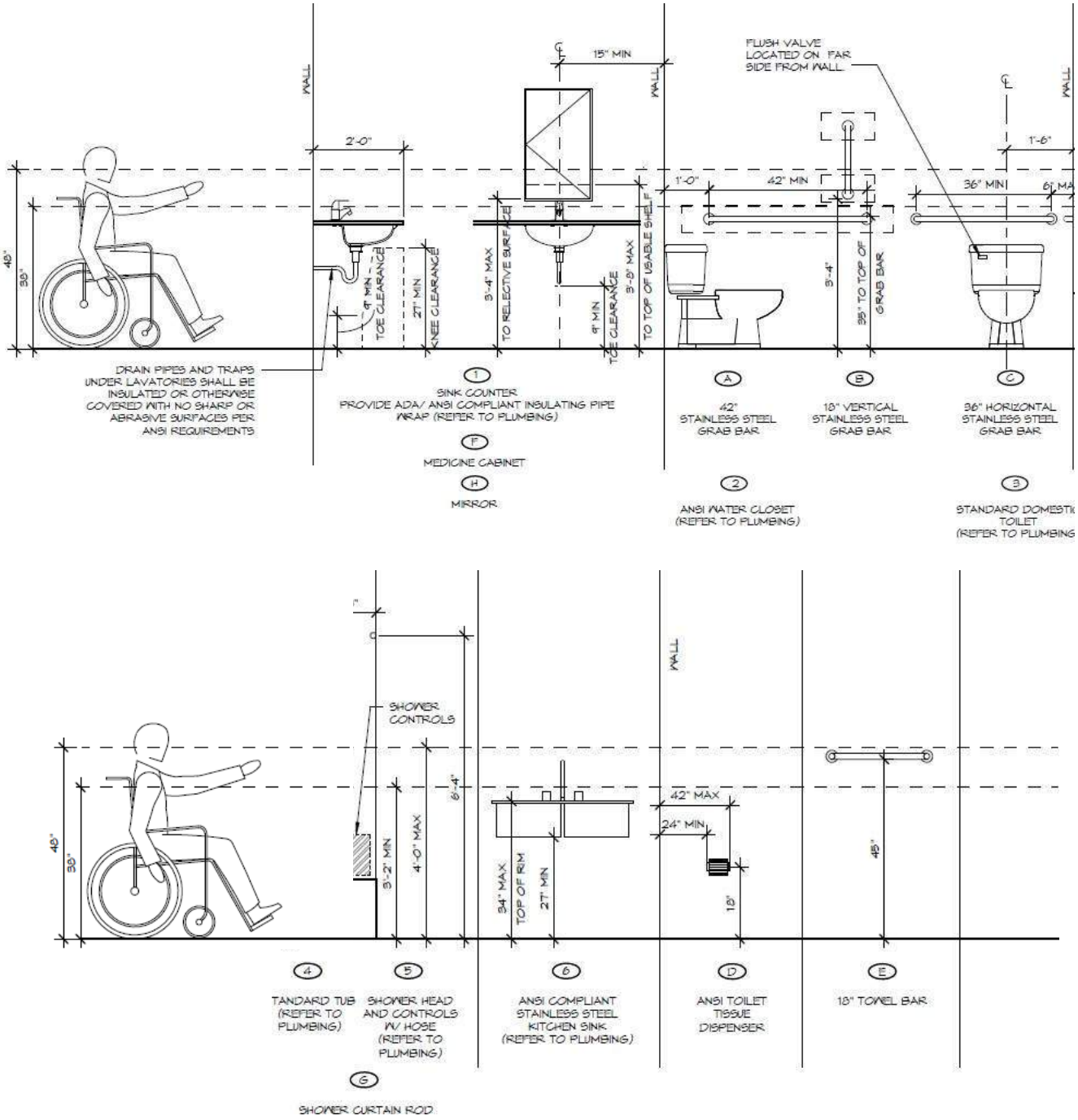
4.1 Follow all dimensions and clearances for American National Standard Institute (ANSI) ICC A117.1-2009 code compliance.

1. **Bathtub & Shower Controls:** Install controls within the space indicated.
2. **Sinks:** Install all bathroom sinks at or below, as approved, the maximum mounting heights and with floor clearances as indicated.
3. **Closets:** Install double hardware for shelving at 42” and 68”. Install shelf at 42”.

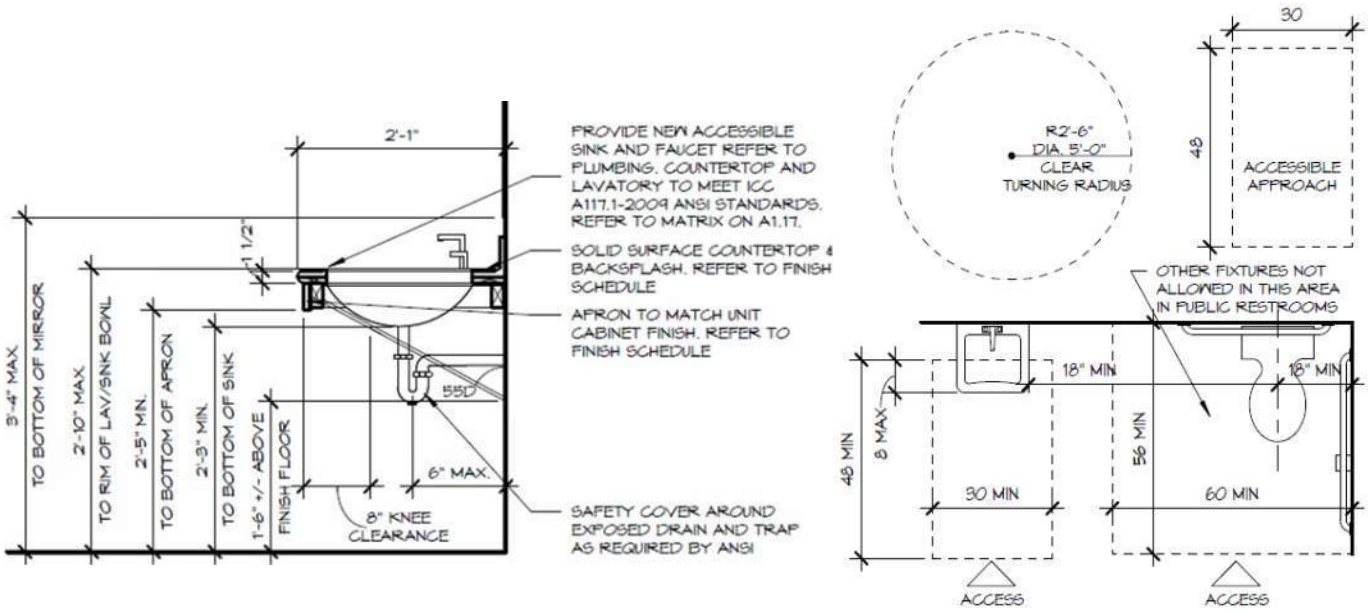
4. **Blocking for grab bar installation:** Install as indicated on detail. Blocking must be able to support 250 lb. of force applied to the grab bar.
5. **Controls outlets, switches, etc.:** Locate all controls, electrical panels, switches, receptacles and other operable equipment as indicted.
6. **Fixtures:** Mounting heights shall be as indicated.
7. **Kitchen Cabinets:** Install upper cabinets so that the lowest shelf is at a maximum of 48" A.F.F. The countertop height and the rim of the sink height shall be at a maximum of 34" A.F.F.
8. **Kitchen cabinet door pulls & handles:** Install Door pulls or handles for the upper cabinets as close as possible from the bottom of the cabinet door. Install Door pulls or handles for the lower cabinets as close as possible from the top of the cabinet door.
9. Mount all equipment's, fixtures, receptacles, outlets, switches, thermostats and controls as shown.
10. Diagrams below are not to scale.

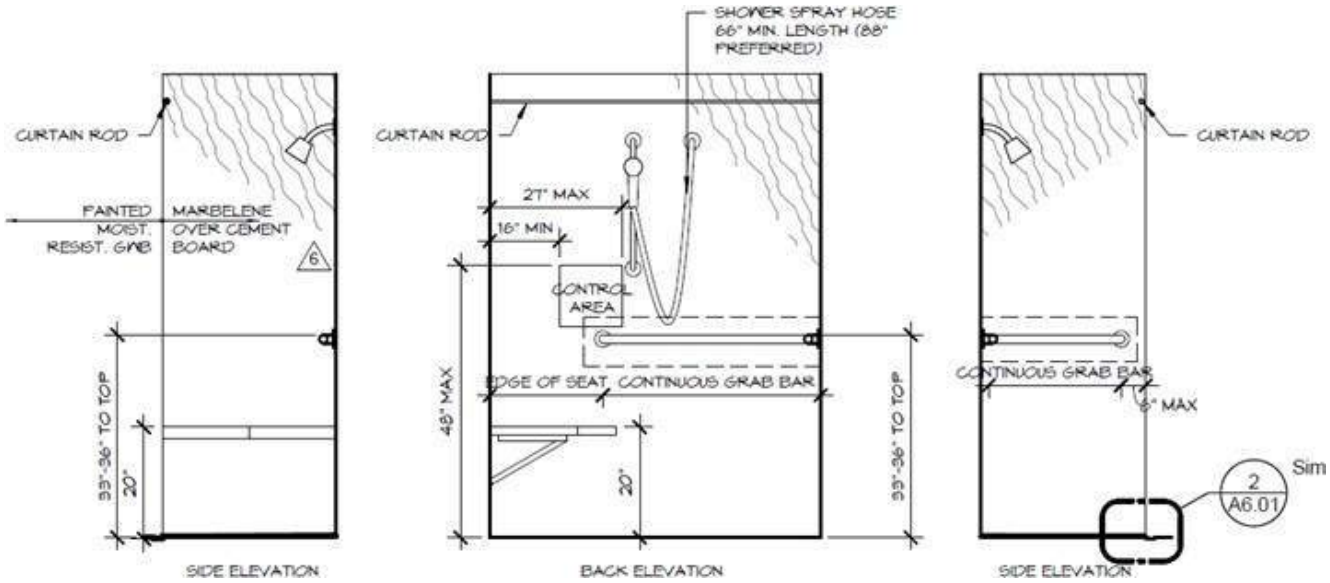


Reach Ranges

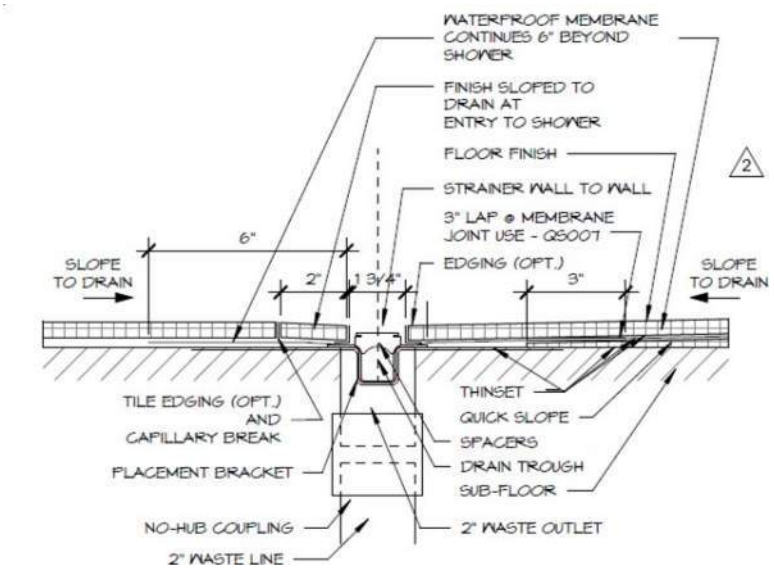


Bathroom Clearances

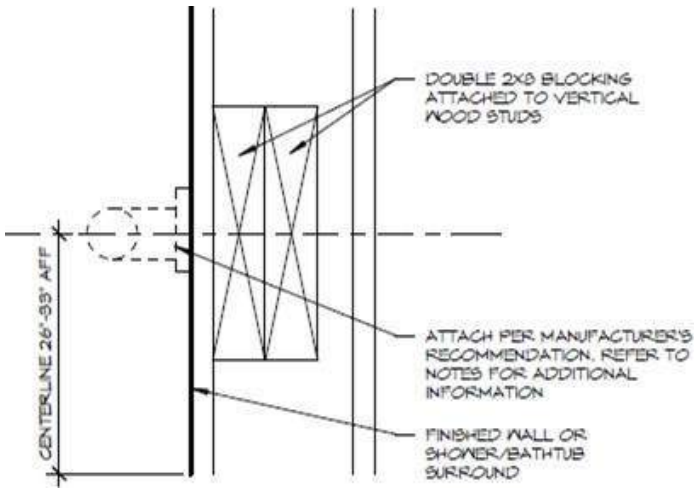




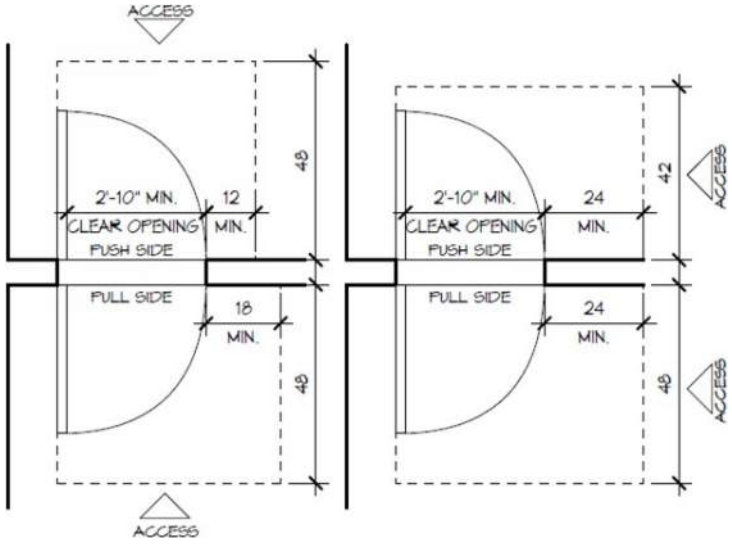
Bathroom Clearances



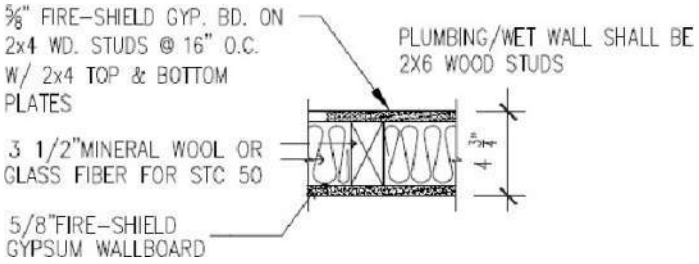
Shower Trench Detail



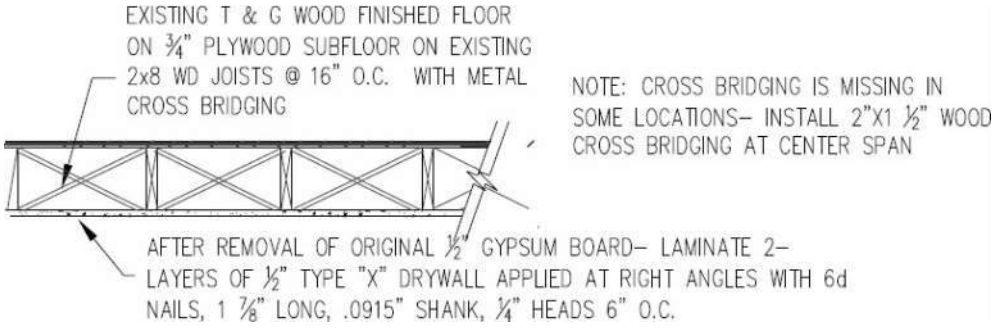
Grab Bar Blocking Detail



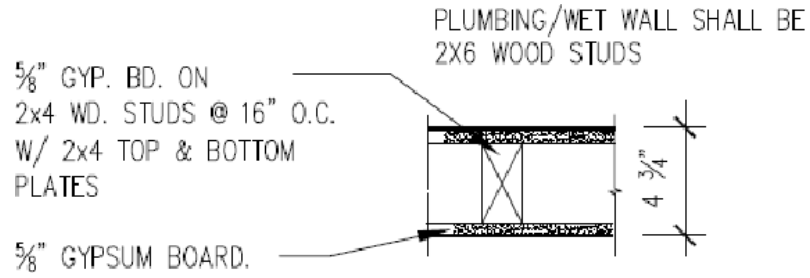
Door Clearances



WALL DETAIL 1 @ DEMISING WALLS / UL-U305 GA WP 3605 (1HR) STC35



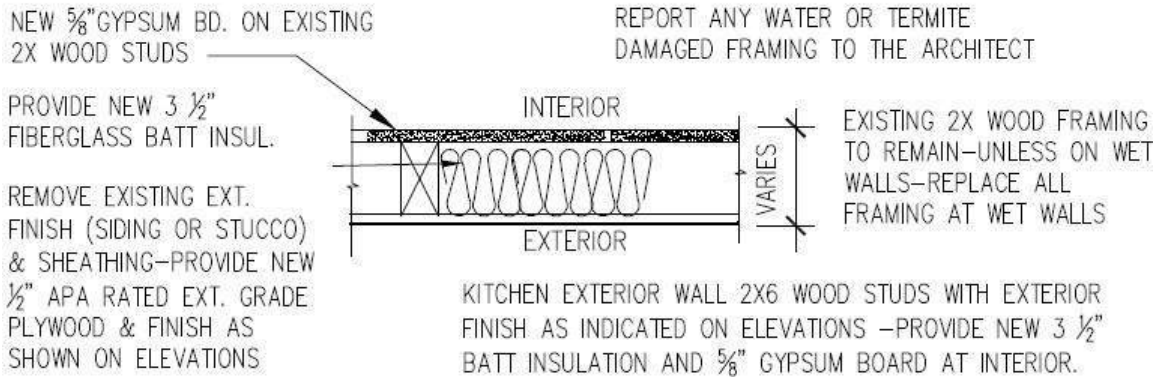
CEILING DETAIL 1



WALL DETAIL 2 @ INTERIOR WALLS

APPLY GYP. BD. EITHER HORIZONTALLY OR VERTICALLY. INNER LAYER ATTACHED TO STUDS W/ 1 7/8" NAILS @ 6" O.C.; OUTER LAYER ATTACHED TO STUDS OVER INNER LAYER W/ 2 3/8" LONG NAILS @ 8" O.C.. VERTICAL JOINTS LOCATED OVER STUDS. STAGGER ALL JOINTS IN FACE LAYER. NAILS 6 D CEMENT COATED NAILS.

NOTE: AT ALL PLUMBING WALLS- USE MOLD TOUGH FIRECORE TYPE "X" GYPSUM BOARD IN THICKNESS AS INDICATED FOR PARITION



WALL DETAIL 3 @ PERIMETER WALLS

Envisage
ARCHITECTURE

2. EXAMPLE CONTRACT

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

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

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

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

AGREEMENT made as of the 18th day of December in the year 2024
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

***Insert LLC name ***
1627 Western Ave.
Cincinnati, OH 45214

and the Contractor:
(Name, legal status, address and other information)

Insert Contractor name and address

for the following Project:
(Name, location and detailed description)

Insert Project name and address

The Architect:
(Name, legal status, address and other information)

Insert Project name and address

The Owner and Contractor agree as follows.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT

DOCUMENTS EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[X] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

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[X] Not later than 420 (Four hundred and twenty) calendar days from the date of commencement of the Work.

By the following date:

[ ]

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

See Exhibit I: Unit Delivery Schedule and Liquidated Damages

Portion of Work	Substantial Completion Date

(Row deleted)

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be _____**words**_____ ($ _____), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
None	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

Item	Price

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

See Exhibit I: Unit Delivery and Liquidated Damages

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 25th day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than forty-five (45) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- **.1** That portion of the Contract Sum properly allocable to completed Work;
- **.2** That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- **.3** That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- **.1** The aggregate of any amounts previously paid by the Owner;
- **.2** The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- **.3** Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- **.4** For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- **.5** Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Ten Percent (10.00%)

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§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

General Conditions, Builders Risk, Overhead, Profit and Bond

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

When at least Fifty Percent (50.00%) of the Work has been completed, (i) The Contractor may request that Fifty Percent (50.00%) of the amount retained on previous applications for payment be released by the Owner. 7.9.5. The Owner may, at its sole discretion, approve the request, effectively reducing the retainage from Ten Percent (10.00%) to Five Percent (5.00%) and (ii) the retainage for the balance of the work be reduced to Five Percent (5.00%). .

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. *(Insert rate of interest agreed upon, if any.)*

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

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§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[X] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

Reema Ruberg, Treasurer
Insert LLC name 1627
Western Avenue
Cincinnati, OH 45214

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

***Insert Contractor
representative information***

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§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

(Paragraphs deleted)

.4 Drawings

Number	**Exhibit**
Drawing Log	Exhibit A

.5 Specifications

Section	**Exhibit**
Specifications Log	Exhibit B

.6 Addenda, if any:

Number	**Exhibit**
Schedule of Values	Exhibit C
Construction Schedule	Exhibit D
HUD Supplementary Conditions	Exhibit E
Section 3 Requirements Prevailing	Exhibit F
Wage Decision	Exhibit G
Const Contract Sales Tax Addendum	Exhibit H
Unit Delivery/Liquidated Damages	Exhibit I

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.7 Other Exhibits:

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(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AJA Document E204Th'- 201 7, Sustainable Projects Exhibit. dated as indicated below:
(Insert the date of the £ 204-2017 incorporat4ed into this agreement)

The Sustainability Plan:

Title	Date	Pages

Supplementary and other Conditions of the Contract;

Document	Title	Date	Pages

.8 Other documents. if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreements. Any such documents should be listed here only if intended to be part of the Contract Documents.)

A201 2017

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

_____

Insert LLC name

By: _____

(Printed and title)

CONTRACTOR *(Signature)*

_____

Insert Contractor Name

By: _____

(Printed and title)

Inlt.

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User Notes: (1803057258)

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AJA Document E204Th'- 201 7, Sustainable Projects Exhibit. dated as indicated below:
(Insert the date of the £ 204-2017 incorporat4ed into this agreement)

The Sustainability Plan:

Title	Date	Pages

Supplementary and other Conditions of the Contract;

Document	Title	Date	Pages

.9 Other documents. if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreements. Any such documents should be listed here only if intended to be part of the Contract Documents.)

A201 2017

This Agreement entered into as of the day and year first written above.

OWNER *(Signature)*

_____

Insert LLC name

By: _____

(*Printed name and title)*

CONTRACTOR *(Signature)*

_____

Insert Contractor Name

By: _____

(*Printed name and title)*

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User Notes: (1803057258)

Additions and Deletions Report for
AIA® Document A101® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 15:08:41 ET on 12/11/2024.

PAGE 1

AGREEMENT made as of the _____day of _____in the year _____>

...

*** insert LLC name and address***

...

*** insert contract name and address***

...

*** insert project name and address***

...

*** insert architect name and address***

PAGE 2

[X] A date set forth in a notice to proceed issued by the Owner.

PAGE 3

[X] Not later than 420 (Four hundred and twenty) calendar days from the date of commencement of the Work.

...

See Exhibit I: Unit Delivery Schedule and Liquidated Damages

...

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...

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be _____($ _____), subject to additions and deductions as provided in the Contract Documents.

...

None

...

None

...

See Exhibit I: Unit Delivery and Liquidated Damages

PAGE 4

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of the month, the Owner shall make payment of the amount certified to the Contractor not later than the 25th day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than forty five (45) days after the Architect receives the Application for Payment.

...

Ten Percent (10.00%)

PAGE 5

General Conditions, Builders Risk, Overhead, Profit and Bond

...

When at least Fifty Percent (50.00%) of the Work has been completed, (i) The Contractor may request that Fifty Percent (50.00%) of the amount retained on previous applications for payment be released by the Owner. 7.9.5. The Owner may, at its sole discretion, approve the request, effectively reducing the retainage from Ten Percent (10.00%) to Five Percent (5.00%) and (ii) the retainage for the balance of the work be reduced to Five Percent (5.00%). .

PAGE 6

[**X**] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

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PAGE 7

§ 8.6 Notic e in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with ~~a building information modeling exhibit,~~ AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with ~~a building information modeling exhibit,~~ AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

…

~~.4~~ ~~Building information modeling exhibit, dated as indicated below:~~
~~*(Insert the date of the building information modeling exhibit incorporated into this Agreement.)*~~

~~.5~~

.4 Drawings

~~Number~~	~~Title~~	~~Date~~

Number	**Exhibit**
Drawing Log	Exhibit A

~~.6~~ **.5** Specifications

~~Section~~	~~Title~~	~~Date~~	~~Pages~~

Section	**Exhibit**
Specifications Log	Exhibit B

~~.7~~ **.6** Addenda, if any:

~~Number~~	~~Date~~	~~Pages~~

Number	**Exhibit**
Schedule of Values	Exhibit C
Construction Schedule	Exhibit D
HUD Supplementary Conditions to the Construction Contract Section 3 Requirements Prevailing Wage Decision Construction Contract Sales Tax	Exhibit E Exhibit F Exhibit G Exhibit H
Unit Delivery/Liquidated Damages	Exhibit I

…

~~.8~~ **.7** Other Exhibits:

PAGE 8

~~.9~~ **.8** Other documents, if any, listed below:

…

A201 2017

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...

OWNER *(Signature)*

_____

Insert LLC name

CONTRACTOR *(Signature)*

_____

Insert Contractor Name

Certification of Document's Authenticity

A/A® *Document D401rn - 2003*

I. ***insert contractor representative name and title*** , hereby certify to the best of my knowledge, information a11d belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at ***insert date and time*** under Order No. 2114515930 from AJA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AJA" Document A101™- 2017. Standard Fonn of Agreement between Owner and Contractor where the basis of payment is a Stipulated Sum, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

(Signed)

_____

(Titlte)

_____

(Date)

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User Holes: (l80305n58)

Bond No. 9468724

Document A312TM - 2010

Conforms with The American Institute of Architects AIA Document 312

Performance Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

Malling Address for Notices

This document has Important legal consequences. Consultation with an attorney Is encouraged with respect to Its completion or modification.

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

CONSTRUCTION CONTRACT
Date:

Amount:_____

Description:
(Project Name and location)

BOND
Date: _____

(Not earlier than Construction Contract Dale)

Amount:_____

Modifications to this Bond: ( )None ( ) Sec Section 16

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

SURETY
Company: *(Corporate Seal)*

Signature:

Name
and Title:

Signature:

Name and Title:

(Any additional signatures appear on the las/ page of this Performance Bond.) (FOR INFORMATION ONLY - Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executor. administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the O\\11er, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five *(5)* business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall a\lend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable lime to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently lo declare a Contractor Default.

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies tl1e Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract

§ 4 F11ilure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ **5** When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ **5.1** Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract.

§ **5.2** Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors.

§ **5.3** Obtain bids or negotiated proposals from qualified contractors unacceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by U1c Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner ns a result of the Contractor Default; or

§ **6.4** Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surely does not proceed as provided in Section *5* with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional, written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled lo enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surely to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surely shall not be greater than those of the Owner under the Construction Contract. Subject lo the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract.
.2 additional legal, design professional and delay cost-; resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section *5;* and
. 3 - liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ **8** If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this I3ond.

§ **9** The Surely shall not be liable lo the Owner or others for obligations of the Contractor that arc unrelated to the Construction Contract, and the Balance of thc Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on U1is Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ **10** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or wiU1in two years after the Contractor ceased working or wiU1in two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available lo sureties as a defense in the jurisdiction of the suit shall be applicable.

§ **12** Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ **13** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was lo be perfom1ed, any provision in this Bond conflicting wiU1 said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payment made to or on behalf of fll1e Contractor under the Construction Contract.

§ **14.2** Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents Wld changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ **14.4 Owner Default** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to pcrfo1m and complete or comply with the other material terms of the Construction Contract.

§ **14.6** Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ **15** If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ **16** Modifications to this bond are as follows:
Multiple Obligee Rider Attached

(Space is provided below for additio11al signatures of added parties, other than those appearing on the cover ***page.)***

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

Signan lre
Name and T-i-lle_:_____

Address

SURETY
Company: *(Corporate Seal)*

Signature: _
Name and Title:
Address

Bond No. -"-9_,_46=8 7=24 ----

MULTIPLE OBLIGEE
RIDER

WHEREAS, on or about the ____ day of _____ ,__ , _____
as Contractor, entered into a written agreement with
, as Obligee , for

the _____ herein referred to as the Contract; and

WHEREAS, the Contractor, as Principal, and the , executed and delivered to
said Contractor their joint and several Performance and Payment Bond; and

WHEREAS, the Obligee has requested the Contractor and Surety to join with the Obligee in the execution and delivery of this Rider, and the Contractor and Surety have agreed so to do upon the conditions herein stated.

NOW, THEREFORE, in consideration of One Dollar and other good and valuable considerations, receipt of which is hereby acknowledged, the undersigned hereby agree as follows:

The Performance and Payment Bond aforesaid shall be and it is hereby amended as follows :

I . The name of Allianz Life Insurance Company of North America ISAOA ATIMA; The Huntington National Bank ISAOA ATIMA; R4 Servicer LLC ISAOA ATIMA; R4 MMOH Acquisition LLC, ISAOA; R4 Capital LLC, ISAOA and Cincinnati Metropolitan Housing Authority shall be added to said Bond as a Named Obli gee.

2. There shall be no liability on the part of the Principal or Surety under this bond to the Obligees, or any of them, unless the Obligees, or any of them , shall make payments to the Principa l, or to the Surety in case it arranges for completion of the Contract upon default of the Principal, strictly in accordance with the terms of said Contract as to payments, and shall perform all the other obligations required to be performed under said Contract at the time and in the manner therein set forth.
3. Except as herein modified, said Performance and Payment Bond shall be and remain in full force and effect.

SIGNED, sealed and dated this day of

WITNESS OR ATTEST:

_____ (Seal)

Principal

_____

By _____

ZURICH AMERICAN INSURANCE COMPANY COLONIAL AMERICAN CASUALTY AND SURETY COMPANY FIDELITY AND DEPOSIT COMPANY OF MARYLAND POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That the _____, a corporation of the State of _____, the _____, a corporation of the State of _____ , and the _____ a corporation of the State of _____(herein collectively called the "Companies"), by _____, in pursuance of authority granted by Article V, Section **8**, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby ce1tified to be in full force and effect on the date hereof; do hereby nominate , constitute, and appoint_____ all of _____, its true and lawful agent and Atto rney- in-Fact , to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: any and all bonds and undertakings, and the execution of such bonds or unde1takings in pursuance of these presents , shall be as binding upon said Companies , as fully and amply , to all intents and purposes , as if they had been duly executed and acknowledged by the regularly elected officers of the _____ at its office in _____., the regularly elected officers of the _____at its office in _____, and the regularly elected officers of the _____ at its office in _____, in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8 of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said _____ , this _____ day of _____ , A.D . _____.

ATTEST:

D

_____

By:

_____

By:

On this _____ day of _____, A.D. _____, before the subscriber, a Notary Public of the State of _____ , duly commissioned and qualified, _____of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument , and acknowledged the execution of same, and being by me duly sworn, deposeth and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.

_____

Nota1)' Public

My Commission Expires _____

Authenticity of this bond can be confirmed at _____ or _____.

Exhibit A

Exhibit B

Exhibit C

Exhibit D

SUPPLEMENTARY CONDITIONS TO THE CONSTRUCTION CONTRACT

U.S. Department of Housing and Urban Development Office of Housing

OMB Approval No. 2502-0598
(Exp. 9/30/2021)

Public Reporting Burden for this collection of information is estimated to average 0.2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Response to this request for information is required in order to receive the benefits to be derived. This agency may not collect this information, and you are not required to complete this form unless it displays a currently valid OMB control number. While no assurance of confidentiality is pledged to respondents, HUD generally discloses this data only in response to a Freedom of Information Act request.

Warning: Federal law provides that anyone who knowingly or willfully submits (or causes to submit) a document containing any false, fictitious, misleading, or fraudulent statement/certification or entry may be criminally prosecuted and may incur civil administrative liability. Penalties upon conviction can include a fine and imprisonment, as provided pursuant to applicable law, which includes, but is not limited to, 18 U.S.C. 1001, 1010, 1012; 31 U.S.C. 3729, 3802, 24 C.F.R. Parts 25, 28 and 30, and 2 C.F.R. Parts
180 and 2424.

Article 1: Labor Standards

A. **Applicability.** The Project or program to which the construction work covered by this Contract pertains is being assisted or insured by the United States of America, and the following Federal Labor Standards Provisions are included in this Contract or related instrument pursuant to the provisions applicable to such Federal assistance or insurance. Any statute or regulation contained herein shall also include any subsequent amendment or successor statute or regulation. The terms of this Supplementary Conditions to the Construction Contract (HUD-92554M) takes precedence over all provisions of the "General Conditions of the Contract for Construction" (AIA Document A201) inconsistent with said Supplementary Conditions.

B. **Minimum Wages.** Pursuant to Section 212 of the National Housing Act, as amended, 12 U.S.C. 1715c, the minimum wage provisions contained in this paragraph B do not apply to those projects with Security Instruments insured under Section 221(h)(1) designed for less than 9 families and they do not apply to those projects with Security Instruments insured under either Section 220 or 233 designed for less than 12 families.

1. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project) shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1 (b)(2) of the Davis-Bacon Act (40 U.S.C. 3141(2)(B)(ii)) on behalf of laborers or mechanics are considered wages paid to such laborers or

mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii)) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics that is not listed in the wage determination and that is to be employed under this Contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, D.C. 20210 (**"Administrator"**). The Administrator, or an authorized representative, shall approve, modify, or disapprove every additional classification action within thirty (30) days of receipt and so advise HUD or its designee or shall notify HUD or its designee within the thirty (30) day period that additional time is necessary.

(c) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, shall issue a determination within thirty (30) days of receipt and so advise HUD or its

designee or shall notify HUD or its designee within the thirty (30) day period that additional time is necessary.

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs B.1.(ii)(b) or (c) of this Article, shall be paid to all workers performing work in the classification under this Contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the Contract for a class of laborers or mechanics includes a fringe benefit that is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. **Withholding.** HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis- Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the Contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project), all or part of the wages required by the Contract, HUD or its designee may, after written notice to the Contractor, sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the Contractor, disburse such amounts withheld for and on account of the Contractor or subcontractor to the respective employees to whom they are due.

3. Payrolls, records, and certifications.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the Project). Such records shall contain the name, address, and social security number of each such worker, his or her correct

classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1 (b)(2)(B) of the Davis-Bacon Act (40 U.S.C. 3141(2)(B)(ii))), daily and weekly number of hours worked, deductions made and actual wages paid.
Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1 (b)(2)(B) of the Davis- Bacon Act (40 U.S.C. 3141(2)(B)(ii)), the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(a) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the Contract, but if the agency is not such a party, the Contractor shall submit the payrolls to the applicant, sponsor, or Owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired, whether paper (Optional Form WH- 347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/whd/forms/wh347.pdf or its successor site), or electronically pursuant to Program Obligations. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the Contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant sponsor, or Owner, as the case may be, for transmission to HUD or its designee, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee.

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or

supervises the payment of the persons employed under the Contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete.
(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in
29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the Contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph B.3.(ii)(b) of this Article.

(d) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Sections 3801 et seq of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under subparagraph B.3.(i) of this Article available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the Contractor, sponsor, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) **Apprentices.** Apprentices shall be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the
U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by such Office, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the

program, but who has been certified by the Office of Apprenticeship, or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where the Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship, or a State Apprenticeship Agency recognized by such Office, withdraws approval of an apprenticeship program, the Contractor shall no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees shall not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on

the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor shall no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. **Compliance with Copeland Act Requirements.** The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

6. **Subcontracts.** The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraphs 1 through 10 of this paragraph B and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage determination, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all Contract clauses referenced in this subparagraph.

7. **Contract termination and debarment.** A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a contractor or a subcontractor as provided in 29 CFR 5.12.

8. **Compliance with Davis-Bacon and Related Act Requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this Contract.

9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act (40 U.S.C. 3144(b)(2)) or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act (40 U.S.C. 3144(b)(2)) or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1010, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Department . . . makes, passes, utters or publishes any statement, knowing the same to be false . . . shall be fined under this title or imprisoned not more than two years, or both."

C. Contract Work Hours and Safety Standards Act.

1. **Applicability and Definitions.** This paragraph C of Article 1 is applicable only if a direct form of federal assistance is involved, such as Section 8, Section 202/811 Capital Advance, grants etc., and is applicable only where the prime contract is in an amount greater than $100,000. As used in this paragraph C, the terms "laborers" and "mechanics" include watchmen and guards.

2. **Overtime requirements.** No contractor or subcontractor contracting for any part of the Contract work that may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty (40) hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty (40) hours in such workweek.

3. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the immediately preceding subparagraph C.2, the Contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, the Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of such subparagraph, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty (40) hours without payment of the overtime wages required by the clause set forth in such subparagraph.

4. **Withholding for unpaid wages and liquidated damages.** HUD or its designee shall, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract, or under any other Federal contract with the same prime contractor, or under any other Federally-assisted contract subject to the Contract Work

Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph 3 of this paragraph C.

5. **Subcontracts.** The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraphs 1 through 5 of this paragraph C and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in such subparagraphs 1 through 5.

D. Certification.

For projects with Security Instruments insured under the National Housing Act, as amended, that are subject to paragraph B of this Article 1, the Contractor is required to execute the Contractor's Prevailing Wage Certificate within HUD-92448 as a condition precedent to insurance by HUD of the Loan, or an advance thereof, made or to be made by the Lender in connection with the construction of the Project.

Article 2: Equal Employment Opportunity

A. **Applicability.** This Article 2 applies to any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee.

B. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, disability, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, disability or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided setting forth the provisions of this nondiscrimination clause.

C. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified applicants shall receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, disability, or national origin.

D. The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a

notice to be provided advising the said labor union or workers representatives of the Contractor's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

E. The Contractor shall comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

F. The Contractor shall furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and shall permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

G. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulations or order of the Secretary of Labor, or as otherwise provided by law.

H. The Contractor shall include the provisions of paragraphs A through H of this Article 2 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions shall be binding upon each subcontractor or vendor. The Contractor shall take such action with respect to any subcontract or purchase order as HUD or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance. *Provided, however,* that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by HUD or the Secretary of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

Article 3: Equal Opportunity for Businesses and Lower Income Persons Located Within the Project Area

A. This Article 3 is applicable to projects covered by Section 3, as defined in 24 CFR Part 135.

B. The work to be performed under this Contract is on a project assisted under a program providing Federal financial assistance from HUD and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given to low and very-low income residents of the unit of local government or the metropolitan area (or non-metropolitan county) as determined by HUD in which the Project is located and contracts for work in connection with the Project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the same metropolitan area (or non- metropolitan county) as the Project.

Article 4: Health and Safety

A. This Article 4 is applicable only where the prime contract is in an amount greater than $100,000.

B. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his or her health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

C. The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to 29 CFR Part 1926, and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

D. The Contractor shall include the provisions of this Article 4 in every subcontract so that such provisions shall be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as HUD or the Secretary of Labor shall direct as a means of enforcing such provisions.

Exhibit F

Section 3 requirements

Insert project name is subject to the requirements of Section 3. The Parties agree to comply with HUD's regulations in 24 C.F.R. part 75, which implement Section 3 and hereby certify to the best of their knowledge that they are under no contractual or other impediment that would prevent them from compliance. The Authority shall monitor the Contractor's compliance periodically during the Project. The Contractor will, to the greatest extend feasible, meet the benchmarks set by HUD. The Contractor agrees to require all Subcontractors to the greatest extent feasible to comply with Section 3 and the regulations promulgated in 24 C.F.R. part 75, and agrees to take appropriate action upon a finding that the Subcontractor is in violation of the regulations in 24 C.F.R. part 75. The Contractor will not contract with any Subcontractor where the Contractor has notice or knowledge that the Subcontractor has been found in violation of the regulations in 24 C.F.R. part 75.

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

C. The Contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The Contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 75, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The Contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

E. The Contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the Contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 75.9 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 75.9.

F. Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

Exhibit G

Exhibit H

SALES TAX ADDENDUM TO

_____ CONSTRUCTION CONTRACT

1. Contractor acknowledges that the Cincinnati Metropolitan Housing Authority (the "Authority") is the owner, title holder and landlord of certain property in Cincinnati, Ohio located at _____ (the "Improvements"), and _____ LLC ("_____ LLC"), the tenant, plans to develop and rehabilitate the Improvements in connection with the work included in this contract (the "Work").

2. For state law purposes and pursuant to the Lease Agreement between ____ LLC, as tenant, and Authority, as landlord, Authority is the fee title owner of the Improvements. Because the seventy-five (75)-year term of the Lease Agreement exceeds the expected useful and depreciable life of the Improvements and the benefits and burdens of ownership of the Improvements are transferred to ____ LLC, as tenant, under the terms and conditions of the Lease Agreement, the Improvements are deemed for federal, state and local income tax purposes as owned by ____ LLC under the Lease Agreement.

3. Contractor will indemnify the Authority to the same extent that it indemnifies ___ LLC. With respect to the Work, and solely to the extent necessary to effect such indemnity, Contractor hereby expressly and specifically waives any defenses it may have to the application of or liability under such indemnity by way of Section 35, Article II of the Ohio Constitution and Section 4123.74 of the Ohio Revised Code, as well as any other similar immunity provided for or by any statute, law or constitutional provision of the State of Ohio and of any other applicable state. This covenant shall survive the termination of this contract.

4. Contractor acknowledges that the Authority is not and shall not be obligated to use any money or assets in connection with the Work or to satisfy any duties, obligations, requirements or liabilities whatsoever under this contract. The Contractor irrevocably acknowledges and agrees that it will look solely to ____ LLC for the payment of any additional amounts due or allegedly due under this contract, and that it will not assert or bring any claim against the Authority with respect to any such amounts.

5. Contractor represents and warrants to ___ LLC and Authority that it is and will remain in compliance and, upon request, will provide to ___ LLC appropriate statements or affidavits (and will procure the same from all subcontractors and provide them to ___ LLC) stating that it is in compliance with all legal requirements to be eligible to contract with the Authority, and that it is not aware of any finding for recovery having been issued against it by the Auditor of the State of Ohio which is "unresolved" under Section 9.24, Ohio Revised Code.

6. Contractor shall include the provisions of paragraphs 1 through 4 in all subcontracts that it issues (or contracts for the supply of materials to be used in the Work).

7. Contractor acknowledges that the Authority may be entitled to an Ohio sales and use tax exemption pursuant to Section 5739.02(B) of the Ohio Revised Code for building and construction materials or services incorporated into the real estate being improved by the Work

and the Contractor shall not pay any such Ohio sales or use tax to the extent that exemption is applicable, but only if ___ LLC has provided the Contractor with an appropriate certification (or copy thereof) signed by the Authority, evidencing the availability of such exemption. Contractor shall, and shall require all subcontractors and vendors to, retain copies of all records required under Section 5739.03 of the Ohio Revised Code in connection with the sales or use tax exemption for at least five (5) years after completion of the Work and shall provide those records to the Tax Commissioner of the State of Ohio upon request. This covenant shall survive the termination of this contract.

8. Contractor irrevocably acknowledges and agrees that the Authority has no financial responsibility with respect to the Improvements, and ___ LLC is responsible to pay all costs to construct the Improvements in accordance with the Lease, as defined in the Agreement.

9. Contractor acknowledges that the Authority is a third-party beneficiary to this agreement.

[End of Addendum]

Exhibit I: Unit Delivery and Liquidated Damages

In addition to achieving the Project Substantial Completion Deadline set forth in Article 3.3.2 of the Construction Contract, the Contractor understands, acknowledges and agrees that the Contractor shall also achieve Substantial Completion of its Work under the Contract Documents and delivered to the Owner by Building Floor Phases, which shall consist generally of a set of apartment dwelling units in proximity to each other on the same floor, with each successive Phase being in proximity to the one scheduled for completion immediately prior to it.

The Contractor shall achieve Project Substantial Completion by _____ or _____ days after notice to proceed, whichever is later and Contractor shall achieve Final Completion by _____or days after notice to proceed, whichever is later.

NTP date:

Phase	Apartments	Construction Completion Calendar Days After Notice to Proceed	Days for GC to finish	Date Units Available for Lease	Equity delivery requirement
1					
2					
3					
4					
5					
6					
7					

Owner to provide the Contractor the following vacant units as each phase progresses: _____
when preceding floor above is turned over for construction to allow for ADA improvements.

The Contractor acknowledges that it will be responsible for the construction of each Phase, as well as the overall planning, coordination and integration of the construction Work requested of the Contractor with respect to each Phase, so that each such Phase and the overall Project is integrated, completed, and coordinated in accordance with the Contract Documents.

The Contractor acknowledges and agrees that timely completion of the Work is the essence of the Contract Documents. Specifically, the Contractor acknowledges that the Owner will incur substantial damages if the dates for Substantial Completion of each Phase of the Work, all as set forth in the table above, and Project Substantial Completion are not met. Among other things, the Contractor acknowledges that in such events the Owner will incur additional financing costs (which in turn will reduce the Owner's equity in the Project), may be required to pay additional amounts to the Architect or other consultants and the Owner's own personnel for assistance on the Project and will suffer actual economic losses in the form of lost rental income and revenues, reduced equity, and operations costs that will not be recoverable by offsetting revenues from the Project's income.

Owner acknowledges the relocation of residents is their responsibility and dates and times set forth above assume Contractor will be provided an entire floor of vacant units. The Owner will work with the Contractor in order to complete the relocation as noted in each phase. Units must be turned over to the Contractor in reasonable condition, vacant, free of belongings and pests/bed bugs. If any units on the floor are not available due to fault of the Owner, Contractor shall provide written notice of unavailability to the Owner within forty eight (48) hours, and if Owner agrees that unavailability is due to fault of the Owner, those days lost plus 1 day will be added onto the phase schedule above.

Because the exact amount of these damages cannot be readily ascertained as of the date of this Contract, and because both the Owner and Contractor desire certainty with respect to their rights and obligations in the event the Project is not completed by the aforementioned date(s), the parties agree that if the Contractor fails to achieve Substantial Completion of each Phase of the Work and/or Final Completion of the entire Work by the dates established therefor, the Contract Sum shall be reduced, as agreed and as liquidated damages, by the following amounts (which shall be cumulative and have been based on a reasonable approximation of the Owner's damages in the event of such failure by Contractor):

(1) Two Hundred Dollars ($200.00) per calendar day that each Phase of the Work is not Substantially Complete beginning with the date established for Substantial Completion of each such Phase pursuant to table above, and continuing through the earlier of the date Substantial Completion of each such Phase is achieved or thirty (30) calendar days after the date established for Substantial Completion of each such Phase of the Work, but excluding delays attributable to Excused Delays.

(2) One Thousand Dollars ($1,000.00) per calendar day that each such Phase is not Substantially Complete beginning with the date that is thirty-one (31) calendar days after the date established for Substantial Completion of each such Phase pursuant to above, and continuing through the earlier of the date Substantial Completion of each such Phase is achieved or sixty (60) calendar days after the date established for Substantial Completion of each such Phase of the Work, but excluding delays attributable to Excused Delays.

(3) Two Thousand Dollars ($2,000.00) per calendar day that each such Phase is not Substantially Complete beginning with the date that is sixty-one (61) calendar days after the date established for Substantial Completion of each such Phase pursuant to above, and continuing through the date Substantial Completion of such Phase is achieved, but excluding delays attributable to Excused Delays.

(4) Five Hundred Dollars ($500.00) per calendar day for each such day that Project Substantial Completion is not achieved. The lesser of Liquidated Damages or Actual Damages shall be applied, but only with respect to Project Substantial Completion. All delays in achieving Substantial Completion of each Phase set forth in the above table shall be governed by Liquidated Damages set forth above, and not Actual Damages.

LABOR STANDARD PROVISION

All laborers and mechanics employed under this Contract in the construction of the project(s) involved will be paid unconditionally and not less weekly, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act, the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

The Contractor shall be fully responsible for the acts or omissions of its subcontractors and of the persons either directly or indirectly employed by them as for the acts or omissions of persons directly employed by Contractor. At all times throughout the Project, the Contractor is fully responsible for assuring each and every subcontractor performing work under this Contract pay its respective laborers and mechanics for such work the full amount of wages and bona fide fringe benefits under the correct prevailing wage rate for the work performed. The Contractor agrees to immediately notify the Owner if the Contractor or any subcontractor has not paid its respective laborers and mechanics for work under this Contract the full amount of wages and bona fide fringe benefits under the correct prevailing wage rate for the work performed. The Contractor further agrees to immediately notify the Owner if Contractor or subcontractor believes a general wage determination issued pursuant to 29 C.F.R. §1.5 is not available for work performed under this Contract. The Contractor shall insert the appropriate clause in all subcontracts to bind subcontractors to the terms and conditions of this contract insofar as they are applicable to the work of subcontractors.

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3. MATERIAL & EQUIPMENT SCHEDULE BASIS OF DESIGN

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

MATERIAL & EQUIPMENT SCHEDULE - BASIS OF DESIGN

Material	Company	Product/Model #	Collection	Name	Color	Rep Contact	Comments
DOORS							
Interior Doors				Composite, painted			6 Panel - Match Ex'g
Wood Door Frame				Wood, painted			Match Ex'g
Door Hardware					Bright Brass	Blair Walsh M: 513.490.9672 Blair.Walsh@laforceinc.com	Refer to Hardware Schedule
Door Knob Wall Guard Protection	Inpro		Palladium		Gala 0380	www.inprocorp.com	
WINDOWS							
Window Sills/Trim							Match Existing
Window Hardware	Pickens Window Service Inc.					www.pickenswindowparts.com	
Window Blinds	Home Decorators Collection			Cordless Faux Wood Blinds	White	Home Depot	
FLOORING							
LVT	Tarkett	11220	Event+	Heritage Plank PEHP	Hiroki Oak 2129	Greg Weldon 513-909-9033	
LVT to New Tile Transition Strip	Schluter			Reno-U	Aluminum	Kayla Malone 513-206-7557	New tile installation
LVT to Ex'g Tile Transition Strip	Roppe	#172		Tile Reducer	676 Caribou	Scott Greiner 513-316-9800	Existing tile to new or ex'g lvt
Wall Base - Rubber	Roppe		700 Series	Wall Base Pinnacle Type TS	676 Caribou	Scott Greiner 513-316-9800	Kitchen Cabinets & Vanity
Stair Tread	Roppe	#60/#61	Rubber Tread with Riser		M676 Caribou	Scott Greiner 513-316-9800	w/ High Contrast Nosing
High Contrast Nosing	Roppe	193	Rubber Inserts		TT Brown	Scott Greiner 513-316-9800	
Porcelain Floor Tile	Louisville Tile	WCX900052E-12X24	Wilcox 55	Flax	Beige	Kayla Malone 513-206-7557	
Thinset	TEC			TEC Ultimate 6 Plus		Kayla Malone 513-206-7557	
Grout	TEC			TEC Power	909 Sterling	Kayla Malone 513-206-7557	
Wood Wall Base				Painted			Match Ex'g
PAINT							
Ceiling Paint	Sherwin Williams		Flat Finish		TBD		
Unit Wall Paint	Sherwin Williams		Promar 200 Interior Latex Eggshell		Repose Gray SW 7015		
Bathroom Wall Paint	Sherwin Williams		Promar 200 Interior Latex Semi-Gloss		Repose Gray SW 7015		
Stairwell Wall Paint	Sherwin Williams		Eggshell Finish		TBD		
Unit Entry Doors	Sherwin Williams		Semi-Gloss Finish		TBD		4 Accent Colors, Selection TBD
Interior Doors	Sherwin Williams		Semi-Gloss Finish		TBD		
Exterior Metal Doors	Sherwin Williams		Semi-Gloss Finish		TBD		4 Accent Colors, Selection TBD
Wood Trim	Sherwin Williams		Semi-Gloss Finish		TBD		
PLUMBING							
Toilet Seat	Kohler			Quiet Close Toilet Seat			Match style to toilet
Toilet Tank Lid							Match Existing
Tub	Sterling	71171710-0		60in x 30in Soaking Bathtub with Left(Right) Drain in White	White		
Tub Surround	Corian						Whipped Cream, 96"H
Shower Pan	Kohler	K8642		Rely 60" x 30" Alcove Shower Base	White		
Shower Surround	Futrus	FEXPANZ_S				Brian Fortin Ohio Valley Supply 513-582-2528	Whipped Cream, 96"H
Vanity Cabinetry	Smart Cabinetry	VS2D27		Vanity 2 Drawer Base Cabinets			Size varies, refer to plans
Shower Head	American Standard	FloWise 1.5 gpm	Flowise	Shower	Chrome		Anti-Scald; Water Sense Required; Max. 1.5 GPM
ADA Shower Wand	American Standard		Colony				1.5 gpm max
Lavatory Faucet	American Standard		Colony Pro	Single Control Lavatory Faucet			1.2 gpm max, ADA
Kitchen Faucet	American Standard		Colony Pro	Single Control Pull Down Faucet	Stainless Steel		
Water Closet	American Standard		Colony				1.2 gpf (1.6 gpf max), ADA
BATH ACCESSORIES							
Bathroom Mirror	Bradley	No. 781		Channel Frame Mirror 18" x 36"			
Medicine Cabinet	Bradley	9664					Verify size in field
Towel Bar 24"	Franklin Brass	D2424PC	Futura	Futura 24in Wall Mount Towel Bar Bath Hardware Accessory in Polished Chrome	Polished Chrome		
Towel Bar 18"	Franklin Brass	D2418PC	Futura	Futura 24in Wall Mount Towel Bar Bath Hardware Accessory in Polished Chrome	Polished Chrome		
Toilet Paper Holder	Franklin Brass	D2408PC	Futura	Futura 24in Wall Mount Towel Bar Bath Hardware Accessory in Polished Chrome	Polished Chrome		
Robe Hook	Bradley	9B1-1100	Elvari	Elvari Coat/Robe Hook	Satin Stainless P15-601		
Shower Curtain Rod	Bradley	9531					
Grab Bars 18"	Bradley	812					
Grab Bars 36"	Bradley	812					
Grab Bars 42"	Bradley	812					
Vanity			Dover	Veneer Flat Panel, Slab Drawer	Oak, Stain TBD		Two Drawer Base Cabinet, refer to dwgs for size
ADA Vanity - Type A only			Dover	Veneer Flat Panel, Slab Drawer	Oak, Stain TBD		Hanging Sink Cabinet
Type B Vanity			Dover	Veneer Flat Panel, Slab Drawer	Oak, Stain TBD		Provide 9" toe kick, 34" Max Height
Vanity sink	Corian	Whipped Cream					
SHOWER							
Shower Pan							
ADA Zero Entry Shower	Schluter Systems		Kerdi-Shower	Prefabricated Shower Ramp			See Details
Linear Drain	Schluter Systems		Kerdi-Line				
CLOSET							
Shelving	Closet Maid			Shelf Kit with Closet Shelf Kit, Brackets and End Caps	White	Home Depot	
KITCHEN							
Kitchen Cabinetry	Smart Cabinetry		Dover	Veneer Flat Panel, Slab Drawer	Oak, Stain TBD		New kitchens, Plywood Upgrade,
ADA Kitchen Cabinetry	Smart Cabinetry		Dover	Veneer Flat Panel, Slab Drawer	Oak, Stain TBD		Universal Access Cabinets, Type A & B units
ADA Kitchen Cabinet Hardware	Hickory Hardware	HH075328-SS	Skylight	Modern Stainless Steel Bar Pull Handle for Kitchen, Bathroom, Furniture	Stainless Steel		For ADA and Semi-Ambulatory Units Only (Type A & Type B Units)
Kitchen Cabinet Shelves				1/2" Melamine Cabinet Shelf w/ PVC Edge Banding + Support Pins	White		Replace ex'g
Countertops - Solid Surface	Livingstone	L805		Solid Surface	Caldera		Base Bid
Countertops - Laminate	Wilsonart	5044-60	Standard Laminate	Beachwalk, Fine Velvet Finish	Beachwalk		See Deducts
Pantry Shelving	Closet Maid		ShelfTrack		White	Home Depot	(4) 12" Deep shelves
APPLIANCES							
Range	Amana	ACR4303MMS		4.8 cu.ft. 4 Burner Element Electric Range in white	Stainless Steel		
ADA Range	Whirlpool	W11508843A		Front Control Electric Range			Type A & B units
Dishwasher	GE	GDF460PGTSS		24in Buit-In Tall Tub Front Control White dishwasher w/ 60dba, Energy Star	Stainless Steel		Energy Star Rated
ADA Dishwasher	Whirlpool	W11562389A		Undercounter Dishwasher	Stainless Steel		Energy Star Rated, Type A & B Units
Range Hood	GE	JVX3300SJSS		Over the Range Convertible Hood	Stainless Steel		Recirculating, Hardwired, 50 CFM Min.
ADA Refrigerator	GE	GBE21DYKFS		Bottom-Freezer Refrigerator	Stainless Steel		Energy Star Rated, Type A & B Units
Refrigerator	GE	GBE17HYRFS		Bottom-Freezer Refrigerator	Stainless Steel		Energy Star Rated
Disposal	Moen	GXP50C		Prep Series 1/2 HP Continuous Feed Garbage Disposal w/ Power Cord and Universal Mount			
EXTERIOR & STAIRWELL							
Mailbox/Parcel Box	Salsbury	3504SSU	3500 Series	Vertical Mailbox - 4 Doors - Surface Mounted	Sandstone		
Awnings	Serge Ferrari	502 Proof	Soltis	Queen City Awning	TBD	Andrew Angelo 513-530-9660 andrew@queencityawning.com	Address number to be on awning front, Aluminum frame for new locations
Signage	Inpro		Savannah	Architectural Signage, Acrylic	Back: Black 0152; Face: Pebble Gray 0387; Text: Black 29920		Font: ADA Arial, Size: 6"H x 8"W

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4. PRODUCT INFO CUT SHEETS

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

SCS Global Services *does hereby certify that an independent assessment has been conducted on behalf of:*

Tarkett

30000 Aurora Road, Solon, Ohio 44139, United States

For the following product(s):

Vinyl Tile:
Arterra, Aura, Carrera, Color Play, Contour Abstract Series, Contour Wood Series, Contour Stone Series, Drop Cloth, Entwine, Factor, Fiber Effect, Hued, ID Latitude, Indigenous Earth , Intelocked, Melange, Meshwork, Mindset, Mirage, More Than a Wood, Parisian, Piemonte, Riot Flora Rio, Riot Flora Static, Square Flow, Transmatera, Digital Print Contour, True to Form Wood, True to Form Stone, Mindful Maker, Collaborative LVT, PM Square, Method, Victory Series, Ambienta, Solare, Injoy, Essence 30, Event Stone Series, Event Wood Series

floor score
CERTIFIED BY SCS Global Services

The product(s) meet(s) all of the necessary qualifications to be certified for the following claim(s):

FloorScore®

Indoor Air Quality Certified to SCS-105 v4.2-2023.

Conforms to the CDPH/EHLB Standard Method v1.2-2017 (California Section 01350), effective April 1, 2017, for the school classroom and private office parameters when modeled as Flooring.

Measured Concentration of Total Volatile Organic Compounds (TVOC): Less than/equal to 0.5 mg/m3 (in compliance with CDPH/EHLB Standard Method v1.2-2017)

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17065
PRODUCT CERTIFICATION BODY

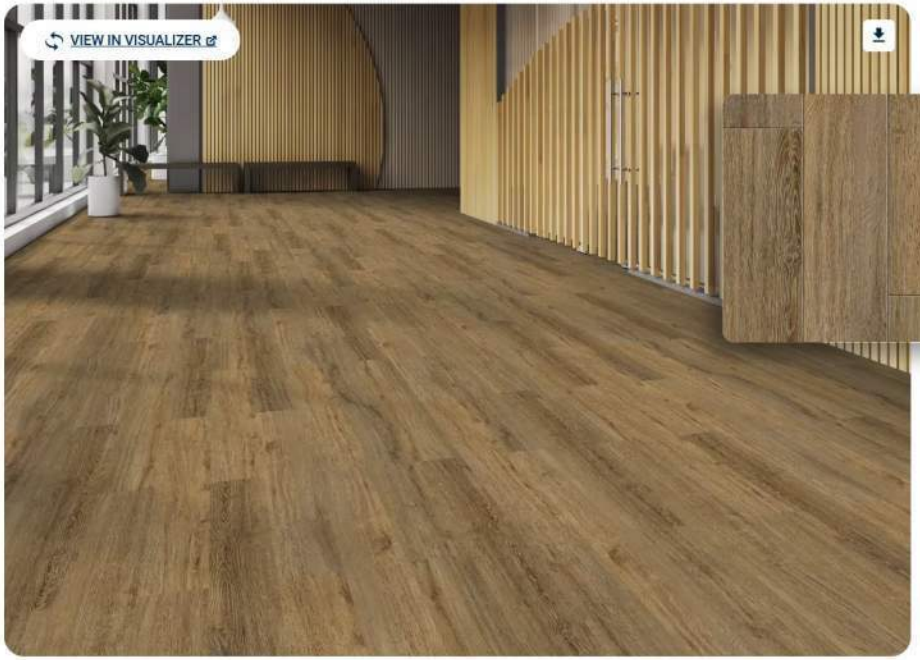
Registration # SCS-FS-01626

Valid from: July 01, 2024 to September 30, 2025

SCS Global Services is currently the only certification body approved by the Resilient Floor Covering Institute (RFCI) to provide FloorScore® product certification; certified products are only listed on the SCS Green Products Guide, http://www.scsglobalservices.com/certified-green-products-guide.

SCSglobal SERVICES

Diana Kirsanova Phillips, Chief Assurance Officer,
SCS Global Services



Event+ Wood

COLORS (30)

HIROKI OAK 2129

ORDER SAMPLES

CHECK INVENTORY

VIEW FORMATS, SIZES & THICKNESS

Plank (1)

COORDINATING STYLES (4)

Crafted Plank HIROKI OAK 2129

With a variety of grains and finishes in three style groupings—Classic, Crafted and Heritage—Event+ brings natural warmth and weathered character to commercial spaces. The Classic Plank style offers timeless, enduring visuals with rich, warm color and graining. Crafted Planks brings the look and feel of handcrafted artistry to a space. Heritage Planks feature the timeworn marks and aged patinas that add depth and historical character to weathered materials. Event+ Woods make beautiful statements on their own, or can be coordinated with the Stones and Abstracts in the rest of this versatile collection.

KEY FEATURES

- Choose from 30 Event+ Wood visuals
- 30 mil wear layer is suitable for areas with heavy traffic
- Best-in-class Techtonic™ protection against scratch, scuff, stain and abrasion

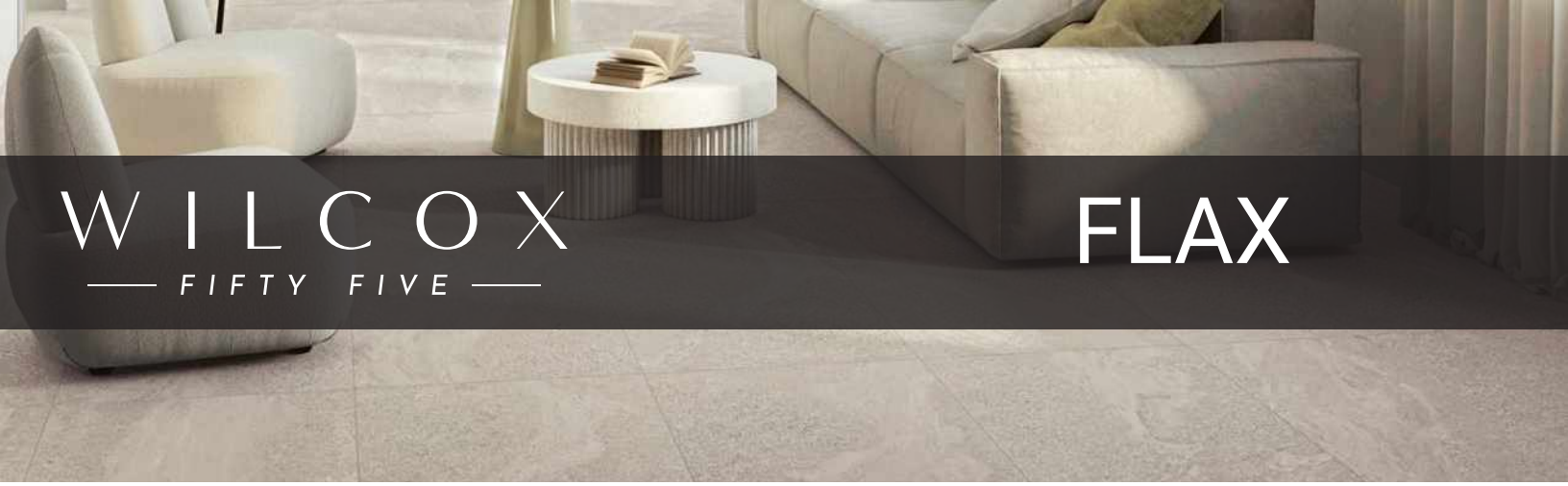
SUSTAINABILITY

SPECIFICATIONS

VIEW FULL SPECS

INSTALLATION & PACKAGING

TECHNICAL DOCUMENTS & IMAGES



WILCOX
FIFTY FIVE

FLAX

White | V2

12x24 Matte
WCXST36-12X24
WCXST36-12X24DEC

Beige | V2

12x24 Matte
WCXST37-12X24
WCXST37-12X24DEC

Light Grey | V2

12x24 Matte
WCXST38-12X24
WCXST38-12X24DEC

Dark Grey | V2

12x24 Matte
WCXST39-12X24
WCXST39-12X24DEC

Product Info

Size	Thickness	Product Type	PCS/ Carton	SF/ Carton	Cartons/ Pallet
12x24	8.5mm	Glazed Color Body Porcelain	9	17.01	32
12x24 Deco	8.5mm	Glazed Color Body Porcelain	9	17.01	32

Tech & Usage Info

DCOF	Scratch Hardness	Rectified	Residential	Commerical
≥ 0.50*	8 MOHS	Yes	Yes	Yes

**Matte Only*

**Ask your LTD sales rep for information on additional sizes and trim that may be available by special order.*

MADE IN THE USA

Ultimate 6 Plus Mortar

Updated February 2024

1. PRODUCT NAME

TEC® Ultimate 6 Plus Mortar
(487)

2. MANUFACTURER

H.B. Fuller Construction Products Inc.
1105 South Frontenac Street
Aurora, IL 60504-6451 U.S.A.
800.552.6225 Office
800.832.9023 Technical Support
800.952.2368 Fax
tecspecialty.com

3. DESCRIPTION

TEC Ultimate 6 Plus is a high performance, polymer-modified mortar designed for the installation of ceramic, porcelain and natural stone tile. Unlike other mortars, Ultimate 6 Plus has a unique combination of features that allow grouting in 6 hours while providing extended open time. It is ideal for all gauged porcelain tile panels/slabs and large heavy tile (LHT) installations. Ultimate 6 plus significantly reduces the need for back buttering and has exceptional non-sag / non-slump characteristics for wall and floor applications.

Key Features and Benefits

- Approved for all sizes of porcelain, ceramic and natural stone tiles
- Ideal for all gauged porcelain tile panels/slabs and LHT installations
- Approved for indoor glass applications with intermittent water exposure (see page 2)
- Approved for setting and tiling under and over uncoupling membranes
- Extended open time and pot life
- Accelerated set – grout in as little as 6 hours
- Superior transfer – full coverage with minimum effort
- Non-sag for wall applications and non-slump for floor applications
- Mixes to an extremely smooth, creamy consistency providing superior handling
- Exceeds ANSI A118.4HTE and A118.11 specifications
- Interior/exterior use
- Zero VOC

Packaging

40 lb. (18.14 kg) moisture-resistant bags	Product #15036116
40 lb. (18.14 kg) plastic bags	Product #15030010

Coverage

Coverage will vary with condition of substrate. Required trowel size will vary with the tile size, type and substrate uniformity. Select the trowel size that will ensure 100% coverage. Figures below are presented only as guidelines.

Trowel Size	Approximate Coverage per 40 lbs. (18.14 kg)
¼" x 3/16" (6 x 4.7 mm) V-notch trowel	182-204 sq. ft. (16.9-19.0 m²)
¼" x ¼" x ¼" (6 x 6 x 6 mm) square-notch trowel	91-102 sq. ft. (8.4-9.5 m²)
¼" x ⅜" x ¼" (6 x 9 x 6 mm) square-notch trowel	75-85 sq. ft. (7.0-7.9 m²)
⅜" x ⅜" x ⅜" (9 x 9 x 9 mm) square-notch trowel	60-68 sq. ft. (5.6-6.3 m²)
⅜" slant notch trowel	45-51 sq. ft. (4.2-4.7 m²)

In an effort to improve coverage achieved by installers, H.B. Fuller is not recommending the use of a ½" x ½" notch trowel due to the challenges in fully collapsing the ridges. In place, a ⅜" slant notch can be used. If using a ½" x ½" notch trowel, the coverage for a ⅜" slant notch is similar for material calculations.

Trowel Size	Approximate Coverage per 40 lbs. (18.14 kg)
¾" x 9/16" x ⅜" (19 x 14 x 9 mm) rounded-notch trowel	30-34 sq. ft. (2.8-3.2 m²)
Euro-notch trowel	26-33.5 sq. ft. (2.4-3.1 m²)*
¼" (6 mm) slant-notch trowel	25-30 sq. ft. (2.3-2.8 m²)*

*Based on application to both the substrate and tile back

Suitable Substrates

When properly prepared per TCNA guidelines, suitable substrates include:

- Cured concrete, cured mortar beds, brick and masonry (interior and exterior installations)
- APA Grade Trademarked Exposure 1 Plywood underlayment grade or better
- Gypsum wallboard (dry interior wall areas only)
- Water resistant gypsum wallboard (i.e.: greenboard, interior walls only, dry to intermittent water exposure only)
- Cementitious backer units (CBU) or glass mat backerboard
- Existing ceramic tile and natural stone, provided existing flooring is well-bonded to an approved substrate
- Vinyl composition tile, asphalt tile, linoleum or non-cushioned vinyl sheetgoods provided such surfaces are single layered, well-bonded to an approved substrate and properly prepared
- Adhesive residue (except tacky or pressure-sensitive adhesive). Mechanically remove the adhesive to expose at least 80% of the concrete surface. Random specks of adhesive and the appearance of a brown surface stain are acceptable
- Extruded foam waterproof tile board
- Uncoupling membranes

H.B. Fuller Construction Products Inc. ("HBF-CP") will warrant Ultimate 6 Plus with the use of ¾" floor-rated underlayment OSB as an approved substrate for the installation of uncoupling membranes.

For gypsum underlayments, TEC® Multipurpose Primer must be applied directly to the gypsum underlayments prior to application of Ultimate 6 Plus for bonding of the uncoupling membrane. Please see the Multipurpose Primer product data sheet for dilution ratios and application instructions.

Substrate Preparation

All substrates must be dry, structurally sound with maximum deflection per industry standards of L/360 for ceramic tile installations and L/720 for natural stone installations; and free from oil, grease, dust, paint, sealers or concrete curing compounds. All contaminants must be removed prior to installation of tile. Surface protrusions and tile glazes shall be removed by sanding, scraping or scarifying. After preparation, remove all dust by vacuuming.

For Gauged Porcelain Tile Panels/Slabs installation, reference the TEC® Thin Porcelain Panel Installation Guide on tecspecialty.com.

Notes: Vinyl asbestos tile or any substrate containing asbestos must not be sanded, scored or scarified because of the potential health hazard of breathing dust. Any substrate containing asbestos must be handled in accordance with existing EPA regulations. Contact your local EPA office.

Expansion joints must be provided in the tile work over all construction, control and expansion joints in the backing and where backing materials change. Follow ANSI A108.01 Section 3.7 Requirements for Expansion Joints.

Maximum variations in all substrates **must not exceed** 1/4" in 10 ft. (6 mm in 3 m) and 1/16" in 1 ft. (1.6 mm in 0.3 m) from the required plane for tile less than 15" (381 mm) on all sides. Maximum variations in all substrates **must not exceed** 1/8" in 10 ft. (3 mm in 3 m) and 1/16" in 2 ft. (1.6 mm in 0.6 m) from the required plane for tile 15" (381 mm) or greater on any one side. For large non-level, interior floors use an appropriate TEC Self-Leveling Underlayment.

For best results over plywood and other suitable porous substrates, wipe the surface clean with a damp sponge just prior to application of mortar.

The information in this product data sheet is valid for 90 days from the date listed above. Please visit www.tecspecialty.com/product-support to view or download the most current information.

Glass Tile Installation

Ultimate 6 plus, with its proprietary formulation, has been tested and approved to be used with glass tile for the following applications:

1. Indoor applications only
2. Wall applications only
3. Intermittent water exposure (not for use with submerged applications). Example such as:
   a. Kitchen Backsplash
   b. Shower wall

Note: When installing clear glass tile over waterproof membranes, visible mortar shadowing may occur.

The materials approved are as follow

1. Clear Glass tiles with no backing with maximum surface area of 16 in^2
2. Matted Mosaic Tiles with clear or painted Mesh backing
3. Matted Subway Tiles with Mesh backing
4. Glass tiles with painted backing up to 16 in^2

NOTE: Not all coatings used to colorize the back of glass tile are compatible with Portland cement based mortars. Please check with the manufacturer to determine if it will be compatible. For any questions on this, please call our Technical Support Hotline at 1-800-832-9023 for additional support.

Also, if you are looking to install a specific tile not listed in the above material list and would like to use Ultimate 6 Plus Mortar, please contact our Technical Support Hotline at 800-832-9023 for additional support.

In specifying a setting system for the bonding of glass tile, the following issues must be taken into consideration:

Glass Tile Type: Glass tile can be manufactured in a number of different ways such as clear, translucent with a colored body, or translucent with a colored backing. Each type has a different aesthetic appearance. The color and composition of the mortar can have an effect on the final appearance, especially with clear or translucent tile

Storage

Store in cool, dry location. Do not store open bags.

Shelf Life

Maximum 1 year from date of manufacture in properly stored, unopened package.

Limitations

- Only install when the ambient temperature is between 50-90ºF (10-32ºC).
- Not for installing green marble or other moisture-sensitive stone tile; use TEC® AccuColor EFX® Epoxy Grout and Mortar.
- For resin-backed marble see the TEC Technical Bulletin “Installation Of Resin Backed Stone Tiles” at tecspecialty.com.
- Not for use over rubber, strip wood floors, oriented strand board*, particle board, lauan plywood or tempered hardboard (e.g. Masonite).
- For CDX plywood, use TEC® Super Flex™ mortar or TEC® XtraFlex™ acrylic mortar additive with TEC® Full Set Plus® thin set mortar.
- Only approved for use over single layer wood floors when using uncoupling membranes per the manufacturer's requirements.
- Temperature of area to be tiled must remain above 50°F (10°C) for 72 hours.
- Certain natural stone tiles may be affected by mortar shadowing or staining. Test a small area prior to use to determine suitability.

*Can be used over OSB with the use of ¾" floor-rated underlayment OSB as an approved substrate for the installation of uncoupling membranes

Cautions

Read complete cautionary information printed on product container prior to use.
For medical emergency information, call 1-888-853-1758.

This Product Data Sheet has been prepared in good faith on the basis of information available at the time of publication. It is intended to provide users with information about and guidelines for the proper use and application of the covered TEC brand product(s) under normal environmental and working conditions. Because each project is different, H.B. Fuller Construction Products Inc. cannot be responsible for the consequences of variations in such conditions, or for unforeseen conditions.

4. TECHNICAL DATA

Applicable Standard

Exceeds ANSI A118.4HTE and A118.11 specifications

ISO 13007: Classification C2TEP1

TEC Ultimate 6 Plus (487)

Description	ANSI Requirement	Typical Results
28 Day Shear Strength Porcelain Quarry Tile	 > 200 psi (1.4 MPa) > 150 psi (1.0 MPa)	 480 psi (3.31 MPa) 400 psi (2.75 MPa)
7 Day Shear Strength Glazed Wall Tile	 > 300 psi (2.1 MPa)	 545 psi (3.75 MPa)
Sag on Vertical Surfaces	≤ 1/16" (1.6 mm)	0-1/32" (0-0.8 mm)
Open Time at Room Temperature	20 minutes	50-60 minutes
Adjustability at Room Temperature		30 minutes
Final Set		5-7 hours
Tested in accordance with ANSI A118.11 Specifications for Latex-Modified Dry Set Mortars over Exterior Grade Plywood		
28 Day Shear Strength Quarry Tile	 150 psi (1.0 MPa)	 205 psi (1.41 MPa)

Greater than: > Greater than or equal to: ≥ Less than: < Less than or equal to: ≤

Physical Properties

Description	
Physical State	Dry powder
Color	White
Pot Life	2-3 hours*
Initial Cure [at 72°F (22°C)]	6 hours*
Final Cure	21 days
Foot Traffic Rating (ASTM C627)	Residential to Extra Heavy Commercial (depending on substrate)
Storage	Store in cool, dry location. Do not store open bags.
Shelf Life	Maximum 1 year from date of manufacture in properly stored, unopened package.

*Temperature and humidity will affect pot life and cure time

5. INSTALLATION INSTRUCTIONS

Mixing

For best results, maintain all tiling materials, substrates, room and mortars at 50°-70°F (10-21°C) for 24 hours before and 48 hours after installation. In a clean mixing container, add TEC Ultimate 6 Plus to clean, cool water as specified in the chart.

Application	Water
LHT, Gauged Porcelain Tile Panels/Slabs or Wall Applications	6 to 6½ quarts (5.6 to 6.1 L)
Thin Set Floor Applications	6½ to 6¾ quarts (6.1 to 6.4 L)

Add 2/3 bag of TEC Ultimate 6 Plus and mix until all powder is consumed. Add final 1/3 bag and mix until powder is consumed. Be cautious not to over-water. Consistency will loosen during mixing process. Mix material for two (2) minutes to a smooth and creamy consistency. Avoid breathing dust and contact with eyes and skin. Allow the mortar to stand for 10 minutes. Remix and apply. Avoid using high speed mixing, not to exceed 300 rpm, to prevent entraining air.

Application

Key in mortar using flat side of trowel to promote better substrate contact, then comb in one direction with the notched side of the trowel. Spread only an area that can be tiled while surface is still tacky (typically 20-30 minutes). Press tiles into setting bed, then push in a direction perpendicular to the notched trowel ridges to achieve optimum coverage. Apply mortar in a heavy enough layer so that complete contact (no voids) between mortar

and tile is accomplished when tile is positioned. Irregularities in substrate may require "back-buttering" of large tiles to achieve complete coverage and firm support. Periodically remove and check a tile to assure proper coverage. Keep a minimum of ⅔ of the joint depth between tiles for grouting. Open time and tile hand adjustability may vary with job site conditions. Stir occasionally during use to maintain the smooth, creamy consistency of the product. **Do not add additional water.**

For Gauged Porcelain Tile Panels/Slabs installation, reference the TEC Thin Porcelain Panel Installation Guide on tecspecialty.com.

For resin backed tiles, use full strength TEC Multipurpose Primer on the back of the tile, let dry, then press the tile into the setting bed.

Note: It is the sole responsibility of the installer to determine the suitability and compatibility of the product for the intended application.

Clean-up

Clean tools, hands, and excess materials from face of tile, while mortar is still fresh, with warm soapy water.

Grouting/Curing

Grouting may be accomplished when tiles are held firmly in place, typically 6 hours after installation is completed. No traffic is permitted over the tiles prior to grouting. Cold temperatures or high humidity may extend curing time, working time, and pot life. Hot temperatures or low humidity may decrease curing time, working time, and pot life. Unglazed tiles may require sealing prior to grouting so discolorations will not occur. The use of TEC brand grouts is highly recommended.

6. AVAILABILITY

TEC premium surface preparation, tile, stone, carpet, wood and resilient floor covering installation products are available nationwide. To locate TEC products in your area, please contact:

Phone: 800-832-9002
Website: tecspecialty.com

7. LIMITED WARRANTY

The product(s) covered by this Product Data Sheet are sold subject to a Limited Warranty and related terms. **H.B. Fuller Construction Products disclaims the implied warranties of merchantability and fitness for a particular purpose and all incidental and consequential damages arising out of the sale, purchase or use of this product.** For Limited Warranty details visit tecspecialty.com. To obtain a hard copy of the Limited Warranty call H.B. Fuller Construction Products at 800-832-9023 or mail a written request to the address in Section 2 of this Product Data Sheet.

8. MAINTENANCE

Not applicable

9. TECHNICAL SERVICES

Technical and safety literature

To acquire technical and safety literature, please visit our website at tecspecialty.com.

10. FILING SYSTEM

Division 9

Conforms with LEED v4 low emitting interiors.
Compliant with (CDPH) Standard Method v1.2 VOC Emissions.

To learn more, visit TECspecialty.com

H.B. Fuller

H.B. Fuller Construction Products Inc. | 1105 South Frontenac Street Aurora, IL 60504-6451

@TECInstallationSystems tecinstallationsystems TECInstallationSystems TEC Installation Systems

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Power Grout®

Updated October 2023

1. PRODUCT NAME

TEC® Power Grout®
(550)

2. MANUFACTURER

H.B. Fuller Construction Products Inc.
1105 South Frontenac Street
Aurora, IL 60504-6451 U.S.A.
800.552.6225 Office
800.832.9023 Technical Support
800.952.2368 Fax
tecspecialty.com

3. DESCRIPTION

Power Grout is a unique breakthrough in grout technology. It maximizes performance while providing ease of use. Its unique formulation is stain proof* and provides strong, color consistent joints free of efflorescence that is resistant to shrinking and cracking.

Power Grout provides excellent performance in virtually any environment, including high traffic and wet conditions, and in residential and commercial applications.

Key Features and Benefits

- Stain proof* - never needs sealing
- Color uniformity and zero efflorescence
- Fast setting; open to traffic in 4 hours
- For grout joints from 1/16" to 1/2" wide (1.6 mm to 12 mm)
- Residential to Extra Heavy Commercial Applications
- Crack and shrink resistant
- Exceeds ANSI A118.7 specifications
- Interior/exterior use
- Mold and mildew resistant
- Contributes to LEED® project points
- Zero VOC

*Power Grout is stain proof to most common water based stains when cleaned immediately. The prolonged exposure of any stain will increase the likelihood of permanent staining or discoloration of grout surface.

Packaging

25 lb. plastic bags (11.34 kg)

10 lb. plastic bags (4.54 kg)

7 lb. plastic bags (3.18 kg)

Color

Visit tecspecialty.com for up-to-date color availability.

Substrate Preparation

Proper preparation of the tile and joint surfaces is important and will help promote a quality installation. The joints between the tiles should be free from foreign materials, and be at least 2/3 of the thickness of the tile in depth. High ridges of adhesive or mortar should be raked out. Any spacers used should be removed. Tiles should be held firmly in place according to manufacturer's instructions before grouting.

Power Grout is a highly pigmented product and it is critical to protect surrounding areas from exposure to pigment. Be sure to protect cabinets, countertops, and other surrounding areas which might become stained by the pigment present in the grout. This is especially important with dark colors which include black pigment.

Due to rough surface texture or high porosity, some tiles require sealing prior to grouting. Consult the tile manufacturer's/fabricator's literature for advice regarding this point. For removing any remaining grout residue, use a grout haze remover.

Notes: Power Grout never needs sealing, however, if the tile or stone is to be sealed after grout is installed, use a compatible solvent based sealer. Test a small area of the tile/stone and grout to ensure you achieve the desired results. If a water-based sealer is required, consult Technical Support for a list of approved sealers or pre-seal the tile/stone. When pre-sealing, do not apply sealer to tile/stone edges as this may prevent proper grout bond.

May scratch polished marble, polished porcelain, glass and/or metal tile or glazed tiles. Follow tile manufacturer/ fabricator recommendations or test a small area prior to use to determine suitability.

For industrial and commercial installations where chemical resistance is required, use TEC® AccuColor EFX® Epoxy Grout and Mortar in accordance with ANSI A118.3 recommendations.

Coverage

Figures shown in the chart are presented only as guidelines.

Approximate Coverage per Pound

Tile Size	Joint Width				
	1/16"	1/8"	1/4"	3/8"	1/2"
1" x 1" x 1/4"	3.64 ft²	1.82 ft²			
2" x 2" x 1/4"	7.29 ft²	3.64 ft²			
3" x 6" x 1/4"	14.58 ft²	7.29 ft²	3.64 ft²	2.43 ft²	1.82 ft²
4 1/4" x 4 1/4" x 1/4"	15.48 ft²	7.74 ft²	3.87 ft²	2.58 ft²	1.94 ft²
6" x 6" x 1/4"	21.88 ft²	10.93 ft²	5.46 ft²	3.64 ft²	2.73 ft²
6" x 24" x 3/8"	23.31 ft²	11.66 ft²	5.83 ft²	3.89 ft²	2.91 ft²
6" x 36" x 3/8"	25.00 ft²	12.48 ft²	6.25 ft²	4.16 ft²	3.12 ft²
8" x 8" x 3/8"	19.42 ft²	9.72 ft²	4.86 ft²	3.24 ft²	2.43 ft²
10" x 10" x 3/8"	24.27 ft²	12.15 ft²	6.07 ft²	4.05 ft²	3.04 ft²
12" x 12" x 3/8"	29.15 ft²	14.58 ft²	7.29 ft²	4.86 ft²	3.64 ft²
12" x 24" x 3/8"	38.91 ft²	19.42 ft²	9.72 ft²	6.48 ft²	4.86 ft²
18" x 18" x 3/8"	43.67 ft²	21.88 ft²	10.93 ft²	7.29 ft²	5.46 ft²
20" x 20" x 3/8"	48.54 ft²	24.27 ft²	12.15 ft²	8.10 ft²	6.07 ft²
24" x 24" x 3/8"	58.14 ft²	29.15 ft²	14.58 ft²	9.72 ft²	7.29 ft²

Approximate Coverage per Kilogram

Tile Size	Joint Width				
	1.6 mm	3 mm	6 mm	9 mm	12 mm
25 x 25 x 6 mm	0.75 m²	0.37 m²			
50 x 50 x 6 mm	1.49 m²	0.75 m²			
75 x 150 x 6 mm	2.99 m²	1.49 m²	0.75 m²	0.50 m²	0.37 m²
108 x 108 x 6 mm	3.17 m²	1.59 m²	0.79 m²	0.53 m²	0.40 m²
150 x 150 x 6 mm	4.48 m²	2.24 m²	1.12 m²	0.75 m²	0.56 m²
150 x 600 x 9 mm	4.77 m²	2.39 m²	1.19 m²	0.80 m²	0.60 m²
150 x 900 x 9 mm	5.12 m²	2.56 m²	1.28 m²	0.85 m²	0.64 m²
200 x 200 x 9 mm	3.98 m²	1.99 m²	0.99 m²	0.66 m²	0.50 m²
250 x 250 x 9 mm	4.97 m²	2.49 m²	1.24 m²	0.83 m²	0.62 m²
300 x 300 x 9 mm	5.97 m²	2.99 m²	1.49 m²	0.99 m²	0.75 m²
300 x 600 x 9 mm	7.97 m²	3.98 m²	1.99 m²	1.33 m²	0.99 m²
450 x 450 x 9 mm	8.94 m²	4.48 m²	2.24 m²	1.49 m²	1.12 m²
500 x 500 x 9 mm	9.94 m²	4.97 m²	2.49 m²	1.66 m²	1.24 m²
600 x 600 x 9 mm	11.91 m²	5.97 m²	2.99 m²	1.99 m²	1.49 m²

Storage

Store in cool, dry location. Do not store open containers.

Shelf Life

Maximum of 18 months from date of manufacture in unopened package.

The information in this product data sheet is valid for 90 days from the date listed above. Please visit www.tecspecialty.com/product-support to view or download the most current information.

Limitations

- Jobsite and grout temperature should be 50º-80ºF (10º-27ºC) for optimal installation.
- Do not install during temperatures below 50°F (10°C).
- Steam cleaning not recommended

Cautions

Read complete cautionary information printed on product container prior to use. For medical emergency information, call 1-888-853-1758.

This Product Data Sheet has been prepared in good faith on the basis of information available at the time of publication. It is intended to provide users with information about and guidelines for the proper use and application of the covered TEC brand product(s) under normal environmental and working conditions. Because each project is different, H.B. Fuller Construction Products Inc. cannot be responsible for the consequences of variations in such conditions, or for unforeseen conditions.

4. TECHNICAL DATA

Applicable Standard

When mixed with water and tested, Power Grout exceeds ANSI A118.7 Specifications for Ceramic Tile Grouts, Polymer-modified Cement Grout and meets the listed ANSI A118.3 Specifications for Epoxy Grouts.

ISO 13007: Classification CG2WAF

Power Grout (550)		
Description	**ANSI A118.7 Requirement**	**Typical Results**
28 Day Compressive Strength	≥ 3000 psi (20.7 MPa)	10,300 psi (71 MPa)
28 Day Tensile Strength	≥ 500 psi (3.4 MPa)	700 psi (4.8 MPa)
28 Day Flexural Strength	≥ 1000 psi (6.9 MPa)	1350 psi (9.3 MPa)
27 Day Linear Shrinkage	< 0.20% shrinkage	0.082% shrinkage
28 Day Water Absorption	< 5% absorption	1.1% absorption
Description	**ANSI A118.3 Requirement**	**Typical Results**
7 Day Linear Shrinkage	<.25% shrinkage	0.10-0.11% shrinkage
7 Day Compressive Strength	≥ 3500 psi (24.2 MPa)	7000-8000 psi (48.3-55.2 MPa)
Sag in Vertical Joints	Pass	Pass

Greater than: > Greater than or equal to: ≥ Less than: < Less than or equal to: ≤

Physical Properties

Description	
Physical State	Dry powder
Color	Available in multiple colors
Pot Life	35-55 minutes
Stain Resistance	Allow to cure for 7 days to achieve maximum stain resistance.
Initial Cure [at 72°F (22°C)]	3 to 4 hours
Final Cure	21 days
Foot Traffic Rating (ASTM C627)	Residential to Extra Heavy Commercial
Storage	Store in cool, dry location. Do not store open bags. Use full bags for installation.
Shelf Life	Maximum 18 months from date of manufacture in unopened package

5. INSTALLATION INSTRUCTIONS

Mixing

For best results pour water in a bucket and then add powder. In a clean mixing container, add Power Grout to clean, cold water as specified below:

Size	Water
25 lbs. (11.34 kg)	2.25-2.75 quarts [72-88 fl. oz.] (2.13-2.60 L)
10 lbs. (4.54 kg)	3.6-4.4 cups [28.8-35.2 fl.oz] (0.85-1.04 L)
7 lbs. (3.18 kg)	2.6-3.1 cups [20.2-24.6 fl. oz.] (596-729 mL)

1. Start with the low-end water range. Add water per instructions. Do not over water.
2. Mix with a drill (350 rpm max.) and mixing paddle attachment for a minimum of 2 minutes. Drill mixing is preferred and provides optimal results – hand mixing will yield acceptable results.
   - Do not add more water until mixture has been mixed for 2 minutes. Product consistency will loosen with mixing. Add water with care not to exceed recommended range. Under conditions that can result a shorter pot life, (i.e. hot weather), mix at the top end of the water range to provide more working time.
3. Allow to slake in bucket for 3-5 minutes
4. Remix with drill and mixing paddle for a minimum of 1 minute

Note: HBF-CP recommends that a full container of Power Grout be mixed and used at one time. However, if less than a full container of grout or multiple containers from different lot numbers are used, pre-mix the entire contents of the container(s) prior to mixing with water. (The fine pigment particles may settle during shipment and color variance can occur in the finished joint unless you first dry blend in this fashion.)

To ensure color consistency across the installation, use the same water to grout proportions when using multiple containers for the same job.

Application

Fully pack the joints between the tiles by spreading Power Grout with a clean, hard rubber float. Work only a small area at one time [5-10 sq. ft. (0.5-1 m^2)]. Apply in a diagonal direction across the joint lines to prevent the grout from being dragged out of the joints. Go over each area several times from all directions to make sure that the grout is fully packed in. Remove any excess grout from the surface of the tile by holding the float at a 90° angle to the surface and moving it diagonally across the joints. Repeat the entire process until all joints are grouted.

When grouting very absorptive tiles e.g. bisque tile and/or for thin grout lines, mix Power Grout to the highest water ratio. Additionally, pre-moistening the tile edges by spraying or wiping with a damp sponge or towel will help ensure that the grout retains water needed to properly cure.

Clean-up

Allow grout to firm up 15-30 minutes under normal conditions before final cleanup. Check for firmness by touching the grout with your finger. If there is transfer, wait 5 minutes and test again.

Wet a grout sponge in a pail containing cool, fresh water and wring out. Loosen the grout on the tile surface by moving the sponge in a circular motion across the tiles. Then use the sponge to smooth the joints. Completely rinse and wring out the sponge. Wipe diagonally across the tiles to remove grout residue. Use each side of the sponge once, then rinse, completely wring out and repeat. Change the water frequently.

Allow the grout to dry 30 to 60 minutes and remove all remaining grout residue from the tiles with a damp sponge or terrycloth towel.

Protection

Protect the finished installation from foot traffic or impact for at least 4 hours. Wait 24 hours before mopping, routine cleaning or shower use. Do not expose to stains, complete water immersion or freezing for 7 days.

No need to seal grout. If tile or stone is to be sealed after grout is installed, use a compatible solvent based sealer. Test a small area of the tile/stone and grout to ensure you achieve the desired results.

If a water-based sealer is required, consult Technical Support for a list of approved sealers. Allow grout to cure for 72 hours before sealing.

6. AVAILABILITY

TEC Premium Tile and Stone Installation Products are available nationwide. To locate TEC products in your area, please contact:

Phone: 800-832-9002
Website: tecspecialty.com

7. LIMITED WARRANTY

The product(s) covered by this Product Data Sheet are sold subject to a Limited Warranty and related terms. **H.B. Fuller Construction Products disclaims the implied warranties of merchantability and fitness for a particular purpose and all incidental and consequential damages arising out of the sale, purchase or use of this product.** For Limited Warranty details visit tecspecialty.com. To obtain a hard copy

of the Limited Warranty call H.B. Fuller Construction Products at 800-832-9023 or mail a written request to the address in Section 2 of this Product Data Sheet.

8. MAINTENANCE

Not applicable

9. TECHNICAL SERVICES

Technical and safety literature

To acquire technical and safety literature, please visit our website at tecspecialty.com.

10. FILING SYSTEM

Division 9

Conforms with LEED v4 low emitting interiors.
Compliant with (CDPH) Standard Method v1.2 VOC Emissions.

To learn more, visit TECspecialty.com

H.B. Fuller

H.B. Fuller Construction Products Inc. | 1105 South Frontenac Street Aurora, IL 60504-6451

@TECInstallationSystems tecinstallationsystems TECInstallationSystems TEC Installation Systems

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700 Series (TPR) Rubber Wall Base

TECHNICAL DATA

PRODUCT DESCRIPTION

Finish & Appearance	Traditional Cove & No Toe Base Available in all Sizes
Nominal Dimensions [1]	2 1/2" (6.35 cm) x 48" (1.22 m) or 120' (36.58 m) x 0.125" (3.2 mm) 4" (10.2 cm) x 48" (1.22 m) or 120' (36.58 m) x 0.125" (3.2 mm) 4 1/2" (11.4 cm) x 48" (1.22 m) or 120' (36.58 m) x 0.125" (3.2 mm) 6" (15.2 cm) x 48" (1.22 m) or 120' (36.58 m) x 0.125" (3.2 mm)
Available Corner Options	***All available corners have 2 1/4" returns*** Cove Outside Corners are available in all sizes Cove Inside Corners are available in all sizes No Toe Outside Corners are available in 2 1/2", 4", & 4 1/2" sizes
Non-Available Corner Options	No Toe Outside Corners are not available in 6" sizes No Toe Inside Corners are not available in any sizes

PRODUCT PERFORMANCE PROPERTIES

ASTM F1861 – Resilient Wall Base	Type TP, Group 2, Styles A & B
ASTM E648 (NFPA 253) – Critical Radiant Flux	Class I, ≥ 0.45 W/cm^2
ASTM E662 (NFPA 258) – Smoke Density	Passes, ≤ 450
ASTM E84 – Flammability	Class A
CAN/ULC-S102.2 – Surface Burning	10 Flame Spread Rating 60 Smoke Development Classification
ASTM F925 – Chemical Resistance [2]	Excellent, Additional Chemical List available via chart
ASTM F137 – Flexibility	Excellent, No Crack or Break 1/4" Mandrel
ASTM F1515 – Light Stability	$\Delta E \leq 8$

PRODUCT INSTALLATION & WARRANTY INFORMATION

Lot Controlled	No
Suitable for In Floor Radiant Heat	Yes
Heat Weldable / Required	No
Indoor / Outdoor Suitability	Indoor Use Only
Service & Storage Temperature Range [3]	60° - 85° F
Recommended Adhesives [4]	Excelsior WB-600 Wall Base Adhesive Excelsior C-631 Contact Adhesive
Product Warranty [5]	5 Year Limited Commercial Warranty

ATTRIBUTES, CERTIFICATIONS, & REGULATORY INFORMATION

- Manufactured in Miami, Florida
- Health Product Declaration (HOD) Available
- Contributes to LEED v4/4.1 Requirements
- Achieved NSF/ANSI 332 Level 1 Certification
- Achieved FloorScore Certification
- Achieved USDA Biopreferred Certification for 51% Biobased Content
- Meets California Department of Public Health V1.2 (CA Section 01350) requirements
- Meets Collaborative for High Performance Schools (CHPS) requirements
- Qualifies for American Made Products Acts and/or Requirements

SUPPORT & ADDITIONAL DOCUMENTATION

Product Support Phone & Email	(800) 537 – 9527 / sales@roppe.com
Technical Support Phone & Email	(844) 393 – 4044 / solutions@rhctechnical.com
Product Technical Documentation	www.roppe.com
Associated or Related Documentation	Excelsior WB-600 Wall Base Adhesive Excelsior C-631 Contact Adhesive 700 Series Wall Base Installation Wall Base Care & Maintenance Roppe Products Warranty Referenced Standards within Technical Documents Technical Bulletin

[1] Nominal Dimensions are the marketed dimensions of the product, tolerances are allowed in the manufacturing process and our tolerance range is what is allowed by the ASTM documentation overseeing the product construction.

[2] ASTM F925 testing is utilized to ensure flooring materials will stand up to certain household standard chemistries. Additional chemical resistance testing performed using this test method is for informational and guidance purposes only. Proper maintenance will influence chemical resistance, but the best defense against a negative effect is to clean the drop/spill from the flooring surface immediately.

[3] See installation documents for full installation details regarding approved substrates, job site conditions and acclimation procedures.

[4] Recommended adhesives listed are recommended to be used to obtain the full listed system warranty that includes a bond performance warranty. Material installed with adhesives other than those listed here or an approved option in writing will only have a product manufacturing and wear warranty, no performance or bond warranty.

[5] See product warranty for full details regarding limitations and warranty coverage.

The contents contained within this Technical Data Sheet (TDS) may be utilized or copied into another projected related document, but this original document will remain in effect at the time of product installation, this TDS shall not be supplemented or replaced by the resulting project documentation. **Any alterations to the wording or requirements contained in or derived from this document shall void all related warranties.**

See installation information and documents for full installation details regarding substrates, job site conditions, & acclimation procedures. The intent of this document is to provide technical and performance properties of the mentioned adhesive as well as define the intended method of installation for the products in which the adhesive is approved for use. Any installation guidelines are to be considered as a starting point at a minimum for a successful installation. We rely on the expertise and professionals that are installing the products to adjust based on site conditions. Anything that appears to be a link, is and leads to additional information if necessary or provides a means of contact in the event there are any additional questions. Prior to acceptance of this document refer to the product website to confirm that you have the most current revision.

These products are intended for installation by professionals, prior to use the user must determine the suitability of our products for the intended use, and the user alone assumes all risks and liability.

Vinyl Stair Tread

TECHNICAL DATA

PRODUCT DESCRIPTION

Finish & Appearance	Ribbed
Nominal Dimensions [1]	42”, 48”, & 72”
Nose Configuration	Round Bull Nose, Square Nose, and/or Square Adjustable Nose
Available Abrasive Strip Colors	Safety Yellow, Black, Pebble White, Ocean Gray, Teak Brown, Beige, Galley Red, & Glow Strip
Available Ribbed/Smooth Rubber Insert Colors	Safety Yellow, Almond, Dark Gray, Brown, & Black

PRODUCT PERFORMANCE PROPERTIES

ASTM F2169 – Resilient Stair Treads	Type TP, Class 2, Group 1 and/or 2, Grade 1
ASTM E648 (NFPA 253) – Critical Radiant Flux	Class I, ≥ 0.45 W/cm^2
ASTM E662 (NFPA 258) – Smoke Density	Passes, ≤ 450
ASTM D2047 – Static Coefficient of Friction [2]	≥ 0.50
ASTM F925 – Chemical Resistance [3]	Excellent, Additional Chemical List available via chart
ASTM F1514 – Heat Stability	ΔE ≤ 8
ASTM F1515 – Light Stability	ΔE ≤ 8
ASTM D2240 – Hardness	≥ 85 Shore A

PRODUCT INSTALLATION & WARRANTY INFORMATION

Lot Controlled	No
Suitable for In Floor Radiant Heat	Yes
Heat Weldable / Required	Not Recommended
Indoor / Outdoor Suitability	Indoor Use Only
Service & Storage Temperature Range [4]	60° - 85° F
Recommended Adhesives [5]	Excelsior TP-620 Pressure Sensitive Tread Tape Excelsior PS-525 Modified Pressure Sensitive Adhesive Excelsior AW-510 Acrylic Wet-Set Adhesive Excelsior C-631 Contact Adhesive Excelsior U-705 Urethane Adhesive Excelsior EW-710 Urethane Enhanced Two-Part Epoxy Adhesive
Recommended Installation Accessories	Excelsior EN-610 Epoxy Nose Filler is required on all installations.
Product Warranty [6]	3 Year Limited Commercial Warranty for Light Duty Treads 5 Year Limited Commercial Warranty for Heavy Duty Treads
Product Limitations	Wider stairwells and stairwells that require pattern alignment will require additional planning and dry fitting prior to installation. We recommend ordering treads the next size up to achieve these layouts and installations. Our treads are manufactured to be trimmed on each end of the length and the depth of the tread.

ATTRIBUTES, CERTIFICATIONS, & REGULATORY INFORMATION

- Manufactured in Tuscumbia, Alabama
- Contributes to LEED v4/4.1 Requirements
- Achieved NSF/ANSI 332 Level 1 Certification
- Achieved FloorScore Certification
- Achieved USDA Biopreferred Certification for 41% Biobased Content
- Meets California Department of Public Health V1.2 (CA Section 01350) requirements
- Meets Collaborative for High Performance Schools (CHPS) requirements
- Qualifies for American Made Products Acts and/or Requirements

SUPPORT & ADDITIONAL DOCUMENTATION

Product Support Phone & Email	(800) 537 – 9527 / sales@roppe.com
Technical Support Phone & Email	(844) 393 – 4044 / solutions@rhctechnical.com
Product Technical Documentation	www.roppe.com
Associated or Related Documentation	Excelsior TP-620 Pressure Sensitive Tread Tape Adhesive Excelsior EN-610 Epoxy Nose Filler Excelsior AW-510 Acrylic Wet-Set Adhesive Excelsior PS-525 Modified Pressure Sensitive Adhesive Excelsior C-631 Contact Adhesive Excelsior U-705 Urethane Adhesive Excelsior EW-710 Urethane Enhanced Two-Part Epoxy Adhesive Referenced Standards within Technical Documents Technical Bulletin Vinyl Stair Tread Installation Vinyl Stair Tread Care & Maintenance Roppe Products Warranty

[1] Nominal Dimensions are the marketed dimensions of the product, tolerances are allowed in the manufacturing process and our tolerance range is what is allowed by the ASTM documentation overseeing the product construction.

[2] ADA Standards for Accessible Design states the floor surface shall be stable, firm and slip resistant. Our test results utilize the James Machine as described in ASTM D2047 and as described in UL410 for floor covering materials (FCM) utilizing a leather foot under dry conditions. Maintenance processes and commonly utilized site applied finishes, polishes, and other sealers to maintain resilient flooring products will change the walking surface and ultimately the Static Coefficient of Friction.

[3] ASTM F925 testing is utilized to ensure flooring materials will stand up to certain household standard chemistries. Additional chemical resistance testing performed using this test method is for informational and guidance purposes only. Proper maintenance will influence chemical resistance, but the best defense against a negative effect is to clean the drop/spill from the flooring surface immediately.

[4] See installation documents for full installation details regarding approved substrates, job site conditions and acclimation procedures.

[5] Recommended listed adhesives are recommended to be used to obtain the full listed system warranty that includes a bond performance warranty. Material installed with adhesives other than those listed here or an approved option in writing will only have a product manufacturing and wear warranty, no performance or bond warranty.

[6] See product warranty for full details regarding limitations and warranty coverage.

The contents contained within this Technical Data Sheet (TDS) may be utilized or copied into another projected related document, but this original document will remain in effect at the time of product installation, this TDS shall not be supplemented or replaced by the resulting project documentation. **Any alterations to the wording or requirements contained in or derived from this document shall void all related warranties.**

See installation information and documents for full installation details regarding substrates, job site conditions, & acclimation procedures. The intent of this document is to provide technical and performance properties of the mentioned adhesive as well as define the intended method of installation for the products in which the adhesive is approved for use. Any installation guidelines are to be considered as a starting point at a minimum for a successful installation. We rely on the expertise and professionals that are installing the products to adjust based on site conditions. Anything that appears to be a link, is and leads to additional information if necessary or provides a means of contact in the event there are any additional questions. Prior to acceptance of this document refer to the product website to confirm that you have the most current revision.

These products are intended for installation by professionals, prior to use the user must determine the suitability of our products for the intended use, and the user alone assumes all risks and liability.

#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

Home / Bath / Toilets / Toilet Seats

Internet # 317418758 Model # K-R25781-A-0 Store SKU # 1006585726

KOHLER

Cachet Elongated Antimicrobial, Soft Close Front Toilet Seat in White

(2252) Questions & Answers (82)

Hover Image to Zoom

Share Print

Colony® Chair Height Elongated One-Piece Toilet With Seat

VITREOUS CHINA

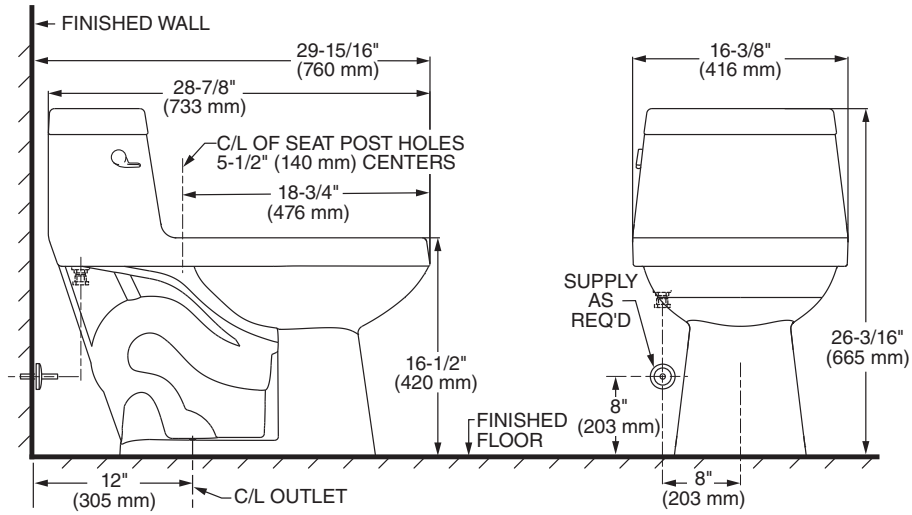
Colony® Chair Height Elongated
One-Piece Toilet With Seat

❑ **2961A104SC**

- One-piece construction eliminates crevices for easy cleaning
- Low profile fits where space is limited
- Vitreous china made High Efficiency Toilet (HET), ultra-low consumption (1.28 gpf/4.8 Lpf), utilizes 20% less water and meets EPA WaterSense® Criteria
- 3" flush valve with fully-glazed 2" trapway for optimal performance
- 12" rough-in toilet with 16-1/2" rim chair height for accessible applications
- Includes sturdy, slow-close seat that never slams
- Includes polished chrome, side-mounted trip lever
- Industry-leading lifetime warranty on chinaware, 2 year warranty on all mechanical parts and 1 year warranty on seat

Nominal Dimensions:
29-15/16" x 16-3/8" x 26-3/16"
(760 x 416 x 665 mm)

Fixture only, supply by others



Compliance Certifications -
Meets or Exceeds the Following Specifications:

- ASME A112.19.2M for Vitreous China Fixtures
- US EPA WaterSense® Specification for HETs

NOTES:
THIS TOILET IS DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 12" (305mm) FROM FINISHED WALL TO C/L OF OUTLET.
SUPPLY NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY.
* DIMENSION SHOWN FOR LOCATION OF SUPPLY IS SUGGESTED.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerance established by ANSI Standard A112.19.2
These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

To Be Specified:
❑ Color:
❑ White
❑ Supply with Stop:

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ICC ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES-CHECK LOCAL CODES.

EPA WATERSENSE® CERTIFIED | WATER EFFICIENT

© 2021 AS America Inc.

PART OF LIXIL

60 in. x 30 in. Soaking Bathtub with Left Drain in White

$329

STERLING (975) 1.5k

Product Details | Specifications | Questions & Answers | Customer Reviews

- Shop more Bathtubs at The Home Depot to find the best option for your home
- Click here to shop for more Kohler products
- Return Policy

Product Information

Internet # 302568786
Model # 71171710-0
Store SKU # 1002637722

Specifications

Dimensions

Basin Length (in.)	53	**Basin Width (in.)**	23
Overall Height (in.)	16	**Overall Length (in.)**	60
Overall Width (in.)	30	**Soaking Depth (in.)**	11.25

Details

Bath Therapy Type	Soaking	**Color Family**	White
Color/Finish	White	**Drain Location**	Left
Exterior bath shape	Rectangular	**Faucet mount**	Wall
Included	No additional components or accessories are included	**Material**	Acrylic
Maximum Number of Occupants	1 Person	**Product Weight (lb.)**	68 lb
Returnable	90-Day	**Style**	Minimalist, Modern
Tub/Shower Features	No additional features	**Water capacity (gallons)**	44

Warranty / Certifications

Certifications and Listings	No Certifications or Listings	**Manufacturer Warranty**	10-Year Residential/3-Year Commercial Limited Warranty

How can we improve our product information? Provide feedback.

Pro-Series 60 in. W x 57 in. H Five Piece Glue Up Bathtub Surrounds in High Gloss White

$109.00

Delta ★★★★☆ (649) ♡ 7.1k

Product Details | Specifications | Questions & Answers | Customer Reviews

draining soap dishes and the panels are easy to trim to accommodate a window. The walls have a high-gloss finish and the glue-up installation design enables hassle-free setup.

Highlights

- 5-piece bathtub wall set fits alcoves up to 60 in. wide x 32 in. deep
- 5-piece design for ease of transportation and installation
- 4 shelves with integrated soap dishes for convenient storage
- Back panel can be cut for a window opening
- Install to 1/2 in. (13 mm) drywall or water-resistant drywall, do not install panels over existing ceramic tile or plywood
- Install surface must be free of dirt, film, waxes, wallpaper, or any other residues, painted surfaces must be sanded
- Recommended adhesive: DAP 3.0, RD 3000, and ECO-BOND
- Click here to shop more Delta products
- Return Policy

Product Information

Internet # 204338479
Model # 40154
Store SKU # 288112

From the Manufacturer

- Specification
- Warranty
- Installation Guide
- Return Policy

GE Advanced Silicone 2 Caulk 10.1 oz Kitchen and...

★★★★★ (6.4 / 1600)

$10.00

Buy 24 or more $9.88

Shop Now

Sponsored

Specifications

Dimensions

Product Depth (in.)	32 in	Wall Height (in.)	57
Wall Width (in.)	60		

Details

Caulkless	No	Color Family	White
Color/Finish	High Gloss White	Construction	Five piece
Material	Composite	Product Weight (lb.)	16 lb
Returnable	90-Day	Shower Type	Tub
Style	Modern	Surface Type	Smooth
Wall Installation Type	Glue Up		

Warranty / Certifications

Certifications and Listings	No Certifications or Listings	Manufacturer Warranty	Limited 1-year warranty

Rely®

60" x 30" alcove shower base, right drain

K-8642

Features

- Low-threshold design for easy entry and exit
- Molded-in textured floor
- Water containment bead incorporated into threshold design provides an optimum barrier, preventing water from escaping from shower space
- Single threshold for alcove installation
- Coordinates with Choreograph® shower walls and other KOHLER® collections

Material

- Acrylic

Installation

- Right drain

Recommended Products/Accessories

K-23726 Drain treatment
K-9132 Shower Drain

Codes/Standards

CSA B45.5/IAPMO Z124
ASTM E162
ASTM E662

KOHLER® Plastic Baths and Shower Bases Lifetime Limited Warranty

See website for detailed warranty information.

Available Colors/Finishes

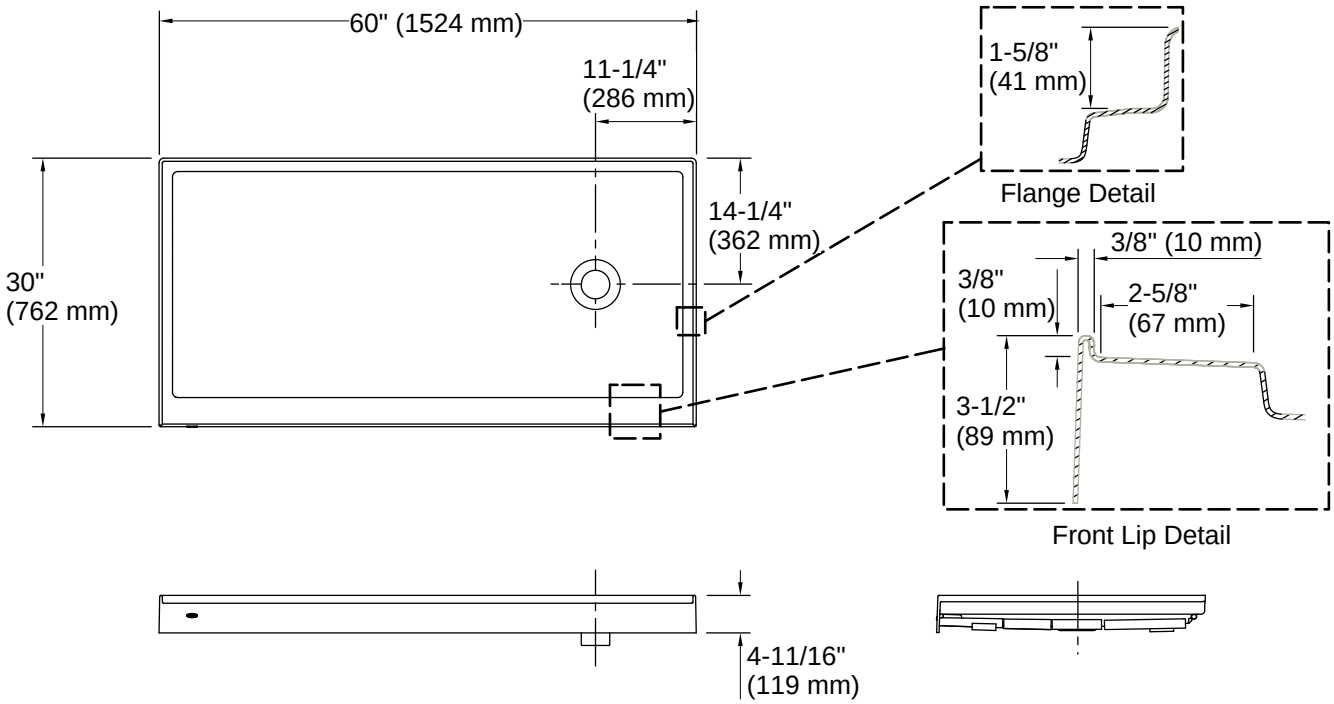
Color tiles intended for reference only.

Color	Code	Description
	0	White
	96	Biscuit
	NY	Dune
	95	Ice™ Grey

Rely®

60" x 30" alcove shower base, right drain

K-8642



Technical Information

All product dimensions are nominal.

Drain location:	Right
Weight:	59 lbs (26.8 kg)
Minimum flat for door:	2-5/8" (67 mm)

Notes

Measure your actual product for rough-in details.

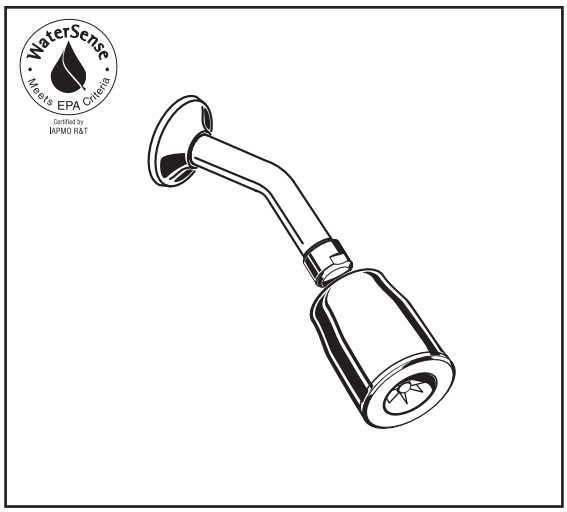
Install this product according to the installation instructions.

Subfloor must be within 1/2" (13 mm) of level.

This receptor has a front lip. This should be taken into account when installing a shower door.

American Standard
Style That Works Better

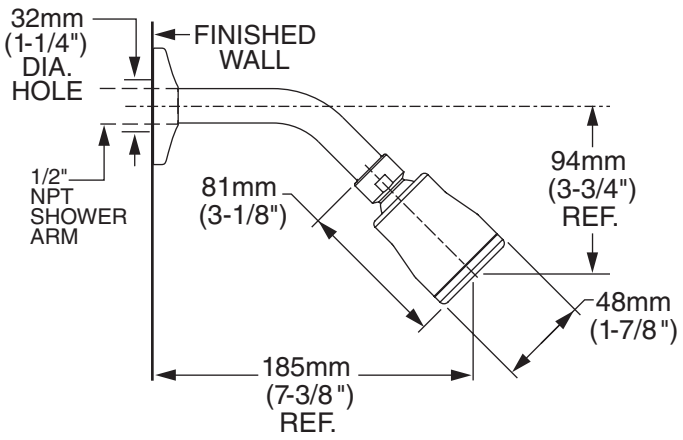
FLOWISE®
SINGLE FUNCTION WATER SAVING SHOWERHEAD



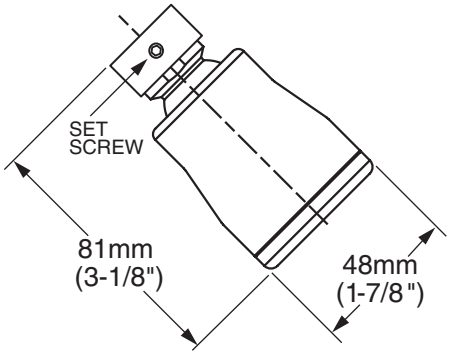
1660.731 Shown

MODEL NUMBER:

- ❑ **1660.731 FloWise® Water Saving Showerhead** with Shower Arm & Flange
- ❑ **1660.710 FloWise® Water Saving Showerhead Only**
- ❑ **1660.711 FloWise® Vandal Resistant Water Saving Showerhead Only**



VANDAL RESISTANT VERSION
1660.711



GENERAL DESCRIPTION:

Showerhead uses 40% less water than standard 2.5gpm showerheads. Showerhead rated at 1.5gpm/5.7L/min. maximum flow rate. Showerhead has single spray function using Turbine Technology. Pressure compensating flow control device. Vandal Resistant model includes tamper-proof metal sleeve with set screw to lock showerhead in place.

PRODUCT FEATURES:

Water Saving: Saves up to 40% in water usage.

Pressure Compensating Flow Control Device: Provides consistent flow over a wide pressure range.

Single Function: Showerhead provides drenching spray for full coverage of the user.

SUGGESTED SPECIFICATION

Showerhead shall save 40% in water usage. Showerhead shall always start at 1.5gpm/5.7L/min. Showerhead shall have a pressure compensating control device. Fitting shall be American Standard Model # 1660.7___.

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Revised 2/12

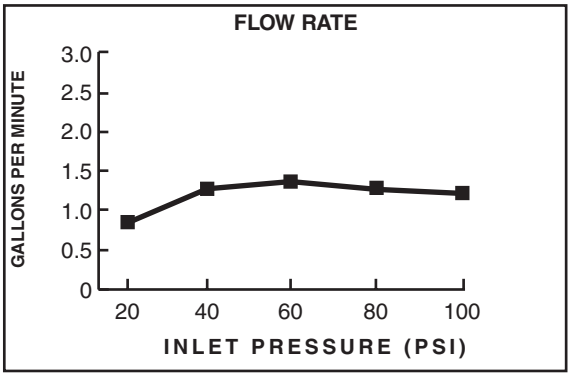
FLOWISE®
SINGLE FUNCTION WATER SAVING SHOWERHEAD

CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ASME A112.18.1
CSA 125.1

GREEN
UPC
C ®



Product Number	Description	Finish: Polished Chrome 002
1660.731	FloWise® Water Saving Showerhead. With Shower Arm & Flange.	☐
1660.710	FloWise® Water Saving Showerhead Only.	☐
1660.711	FloWise® Vandal Resistant Water Saving Showerhead Only.	☐

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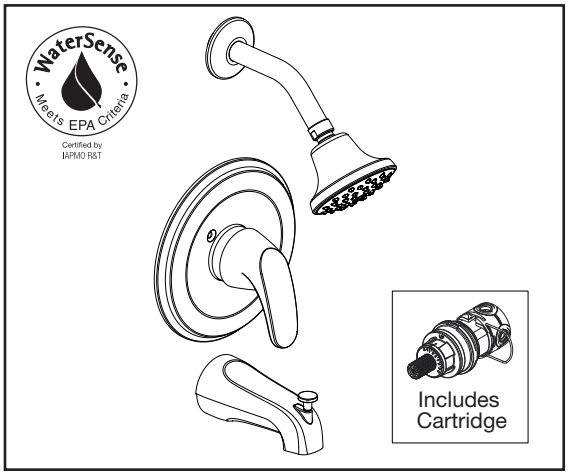
NO SHOWER HEAD

American Standard

Colony® Pro

Water-Saving Pressure Balance Bath/Shower Trim

with Double Ceramic Pressure Balance Cartridge



TU075508 Bath/Shower Trim Shown

GENERAL DESCRIPTION:

Double Ceramic Pressure Balance Cartridge: Features one-piece design with ceramic discs and ceramic balancing spool. Includes integrated check valves and hot limit safety stop. Cartridge capable of back to back capability. Ceramic balancing spool maintains constant output temperature in response to changes in relative hot and cold supply pressure. Washerless ceramic discs provide smooth handle movement and are unaffected by harsh water conditions.

Trim: Features water-saving showerhead with a maximum 1.75 gpm/6.6 L/min. flow rate. Metal slip-on diverter spout. Metal wall valve trim with metal lever with RED/BLUE indicator ring.

PRODUCT FEATURES

One-Piece Cartridge: Simplifies installation and maintenance.

Double Ceramic Pressure Balance Cartridge: Combination of Ceramic Disc Mixing Valve and a Ceramic Balancing Spool in a one-piece cartridge.

Ceramic Disc Mixing Valve: Assures a lifetime of drip-free performance and smooth handle operation.

Ceramic Balancing Spool: Maintains a constant output temperature in response to changes in relative hot and cold supply pressure. Ceramic material is unaffected by mineral deposits and harsh water conditions.

Integrated Check Valves: Engineered to eliminate cross flow.

Adjustable Hot Limit Safety Stop: Limits the amount of hot water allowed to mix with cold. Reduces the risk of accidental scalding.

Comfort Zone: Offers a wider shower range to fine tune the desired temperature within the useful temperature zone

Back-to-Back Capability: Hot and cold can be reversed quickly and easily.

Water Saving: Saves 30% water usage.

MODEL NUMBER:

TRIM KITS:

❑ **TU075508 Colony Pro Bath/Shower Trim Kit with Pressure Balance Cartridge**
Lever handle. Water-saving showerhead. LESS valve body.

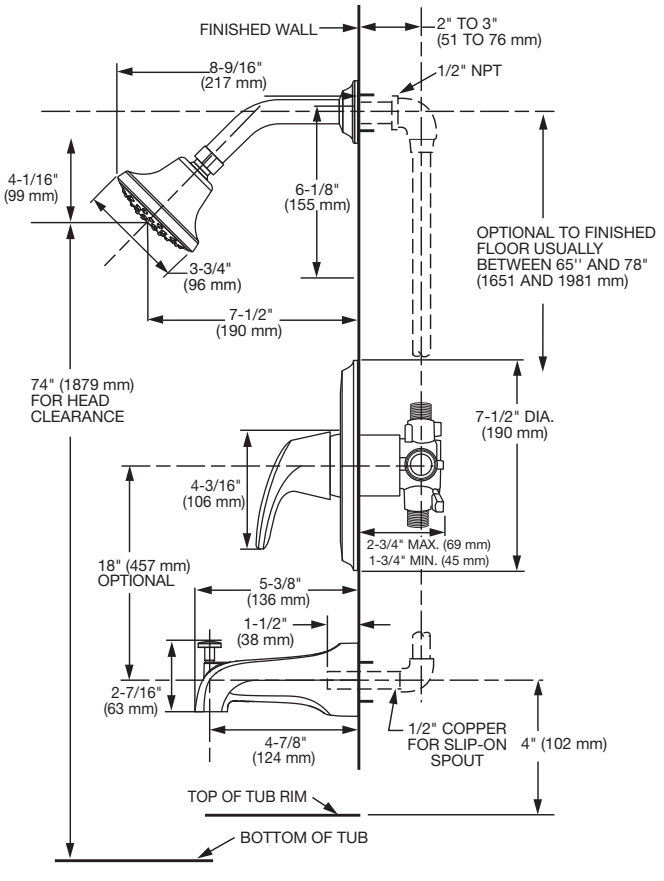
❑ **TU075507 Colony Pro Shower ONLY Trim Kit with Pressure Balance Cartridge**
Lever handle. Water-saving showerhead. LESS valve body.

❑ **TU075500 Colony Pro Bath/Shower Trim Kit with Pressure Balance Cartridge**
Lever handle. LESS valve body.

❑ **TU075508XH Colony Pro Bath/Shower Trim Kit with Pressure Balance Cartridge**
LESS showerhead. Lever handle. LESS valve body.

❑ **TU075507XH Colony Pro Shower ONLY Trim Kit with Pressure Balance Cartridge**
LESS showerhead. Lever handle. LESS valve body.

For use with Flash™ Rough Valve Bodies



SUGGESTED SPECIFICATION

Bath/shower fitting shall feature water saving showerhead with Max. 1.75 gpm/6.6 L/min. flow rate. Shall feature double ceramic pressure balance cartridge. Cartridge is capable of back to back installation and shall feature integrated check valves to eliminate cross flow. Capable of meeting ASSE1016 @1.3gpm. Cartridge shall also feature hot limit safety stop. Fitting shall be: American Standard - Trim Kit Model # TU07550_.___ and Flash Valve Body Model # RU10___.

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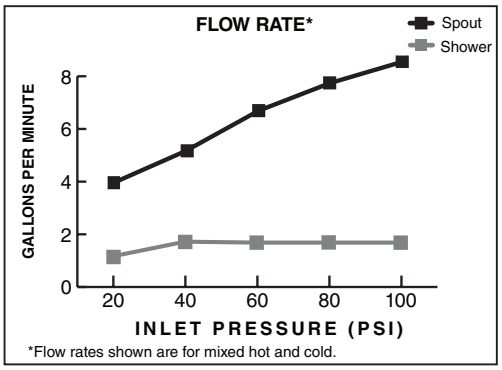
Colony® Pro
Water-Saving Pressure Balance Bath/Shower Trim
with Double Ceramic Pressure Balance Cartridge

CODES AND STANDARDS

These Products meet or exceed the following codes and standards:

ASSE 1016 / ASME A112.18.1016 / CSA B125.16
ASME A112.18.1 / CSA B125.1
Rated to meet ASSE 1016 @ 1.3gpm



TRIM KITS *	Product Number	Description	Finish Options			
			Polished Chrome	Legacy Bronze	Brushed Nickel	Matte Black
			002	278	295	243
	TU075508	Bath/Shower Trim Kit. Metal lever handle. Water-saving showerhead. Includes cartridge. LESS valve body.	✓	✓	✓	✓
	TU075507	Shower Only Trim Kit. Metal lever handle. Water-saving showerhead. Includes cartridge. LESS valve body. ADA	✓	✓	✓	✓
	TU075500	Valve Only Trim Kit. Metal lever handle. Includes cartridge. LESS valve body. ADA	✓	✓	✓	✓
	TU075508XH	Bath/Shower Trim Kit. Metal lever handle. LESS showerhead. Includes cartridge. LESS valve body.	✓	✓		
	TU075507XH	Shower Only Trim Kit. Metal lever handle. LESS showerhead. Includes cartridge. LESS valve body. ADA	✓			

*** TRIM & ROUGH MUST BE ORDERED SEPARATELY.**

Flash™ ROUGH VALVE BODIES	Product Description	Without Screwdriver Stops	With Screwdriver Stops
	Rough Valve Body. Universal* inlets/outlets.	RU101	RU101SS
	Rough Valve Body. Stub-out inlets/outlets for Press-Fit Fittings.	RU102	RU102SS
	Rough Valve Body. PEX inlets/Universal outlets for Crimp Ring PEX system (ASTM F1807).	RU107	RU107SS
	Rough Valve Body. PEX Elbow inlets/Universal outlets for Crimp Ring PEX system (ASTM F1807).	RU107E	RU107ESS
	Rough Valve Body. PEX inlets/Universal outlets for Cold Expansion PEX system (ASTM F1960).	RU108	RU108SS
	Rough Valve Body. PEX Elbow inlets/Universal outlets for Cold Expansion PEX system (ASTM F1960).	RU108E	RU108ESS
	Rough Valve Body. CPVC inlets/Universal outlets.	RU109	RU109SS

OPTIONAL ACCESSORY	Product Number	Product Description
	M970649-YYY0A	Deep Rough-In Kit

ADA Meets the American Disabilities Act Guidelines and **ANSI A117.1** Requirements for the physically challenged.

PART OF LIXIL

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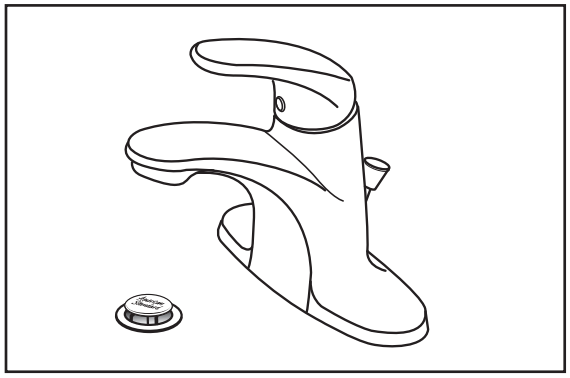
COLONY® PRO
SINGLE CONTROL LAVATORY FAUCET



7075000 Shown

MODEL NUMBER:

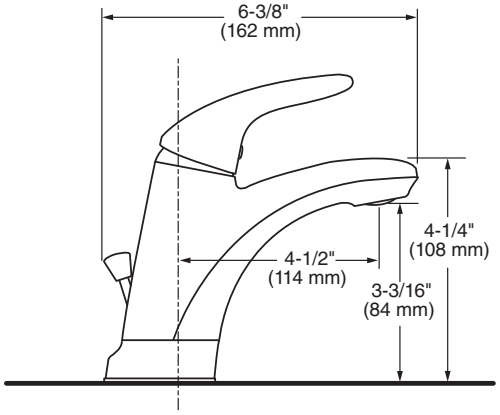
❑ **7075000 Single Control Centerset**
Metal lever handle. Metal pop-up drain.

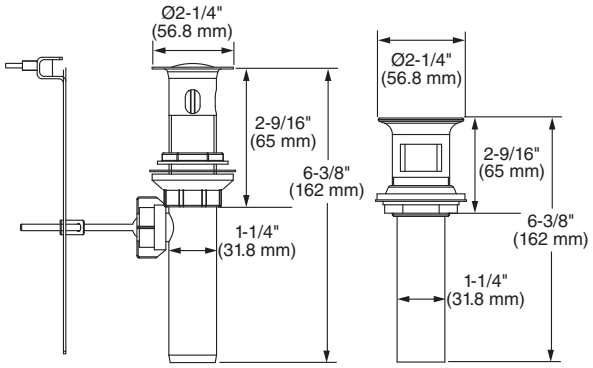
❑ **7075002 Single Control Centerset**
Metal lever handle. 50/50 pop-up drain.

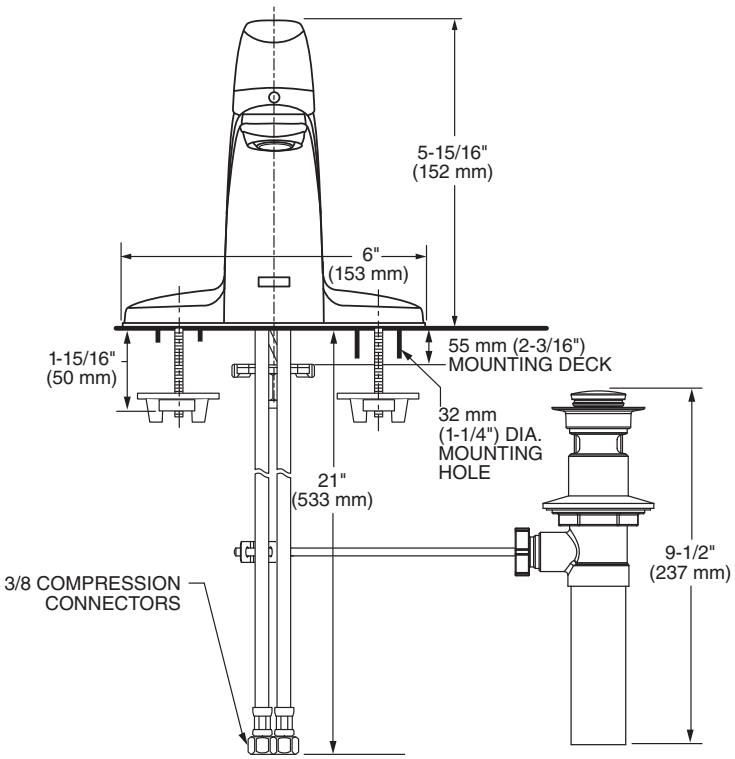
❑ **7075004 Single Control Centerset**
Metal lever handle. Less drain, less pop-up hole & rod.

❑ **7075005 Single Control Centerset**
Metal lever handle. Less drain. With pop-up hole & rod.

❑ **7075006 Single Control Centerset**
Metal lever handle. Grid drain. Less pop-up rod and hole.







GENERAL DESCRIPTION:

Metal body with metal lever handle. Washerless 35 mm ceramic disc valve cartridge with integral hot limit safety stop. 24" Color-coded braided flexible supply hoses with 3/8" compression connections. 1.2 gpm/4.5 L/min. maximum flow rate.

PRODUCT FEATURES:

Ceramic Disc Valve Cartridge: Assures smooth, precise valve control and a lifetime of drip-free, maintenance-free performance.

Adjustable Hot Limit Safety Stop: Limits the amount of hot water allowed to mix with cold. Reduces the risk of accidental scalding.

Lead Free: Faucet contains ≤ 0.25% total lead content byweighted average.

EPA WATERSENSE® CERTIFIED

SUGGESTED SPECIFICATION

Single control lavatory fitting shall feature a metal body with metal lever handle. Shall feature flexible hose connections. Shall also feature a washerless ceramic disc valve cartridge with integral hot limit safety stop. Fitting shall be American Standard Model # 707500X.___.

© 2023 AS America, Inc.

American Standard

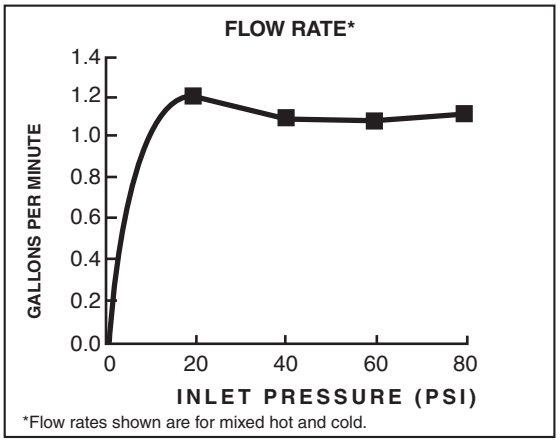
COLONY® PRO
SINGLE CONTROL LAVATORY FAUCET

CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ANSI A117.1
ASME A112.18.1
CSA B125.1
NSF/ANSI/CAN 61: Q≤1
NSF/ANSI/CAN 372

CEC



*Flow rates shown are for mixed hot and cold.

Product Number	Description	Finish Options			
		Polished Chrome	Legacy Bronze	Brushed Nickel	Matte Black
		002	278	295	243
7075000	Colony PRO Single Control Centerset. Metal lever handle. Metal pop-up drain. ADA	✓	✓	✓	✓
7075002	Colony PRO Single Control Centerset. Metal lever handle. 50/50 pop-up drain. ADA	✓	✓	✓	✓
7075004	Colony PRO Single Control Centerset. Metal lever handle. LESS drain, less pop-up hole & rod. ADA	✓		✓	✓
7075005	Colony PRO Single Control Centerset. Less drain. Metal lever handle. With pop-up hole & rod. ADA	✓	✓	✓	✓
7075006	Colony PRO Single Control Centerset. Metal lever handle. Grid drain. Less pop-up rod and hole. ADA	✓			

ADA Meets the American Disabilities Act Guidelines and **ANSI A117.1** Requirements for the physically challenged.

PART OF LIXIL

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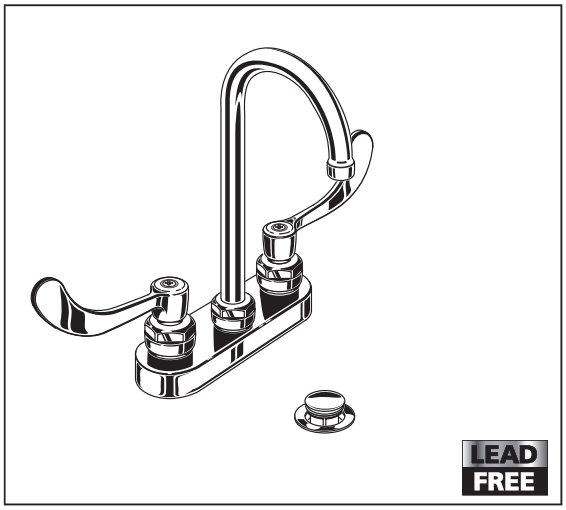
MONTERREY™
TWO-HANDLE CENTERSET LAVATORY FAUCET
WITH GOOSENECK SPOUT



7500.170 Shown

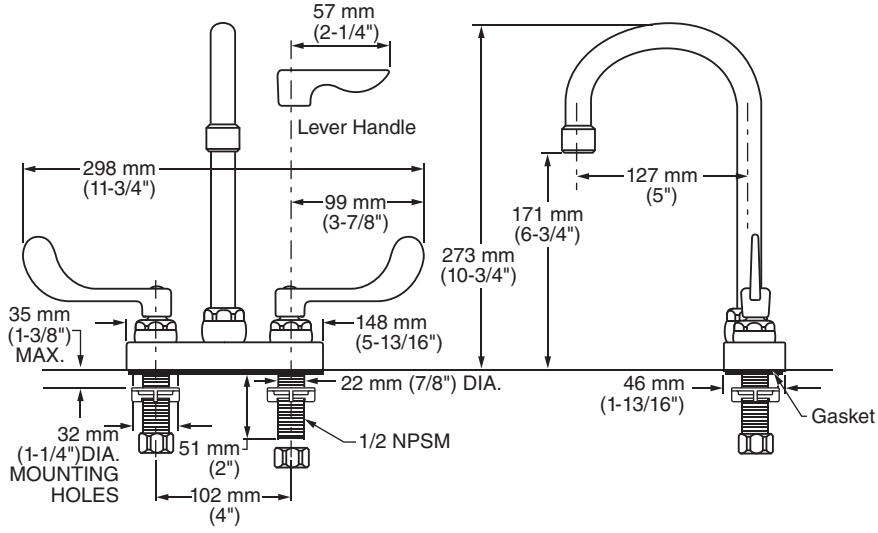
MODEL NUMBER:*

❑ **7500.170 Centerset Lavatory**
1.5 gpm Pressure Compensating Aerator. Rigid/swivel gooseneck spout. Vandal-Resistant Wrist Blade handles. Less drain and pop-up hole.

❑ **7502.170 Centerset Lavatory**
1.5 gpm Pressure Compensating Aerator. Rigid/swivel gooseneck spout. Vandal-Resistant Wrist Blade handles. Grid strainer drain.

❑ **7500.140 Centerset Lavatory**
1.5 gpm Pressure Compensating Aerator. Rigid/swivel gooseneck spout. Vandal-Resistant Lever handles. Less drain and pop-up hole.

❑ **7502.140 Centerset Lavatory**
1.5 gpm Pressure Compensating Aerator. Rigid/swivel gooseneck spout. Vandal-Resistant Lever handles. Grid strainer drain.



GENERAL DESCRIPTION:

Durable cast brass construction. 1/2" male threaded inlet shanks with shank nuts and brass coupling nuts. 1/4 turn ceramic disc valve cartridges. Field-convertible swivel/rigid spout. Choice of Vandal-Resistant Wrist Blade or Lever handles with blue & red color indexes. All brass drain body with 1 1/4" (32mm) tailpiece (on applicable models). 1.5 gpm/5.7L/min. maximum flow rate.

PRODUCT FEATURES:

Pressure Compensating Aerator: Provides a constant water flow of 1.5 gpm throughout the pressure range

Solid Brass Construction: Durable - Excellent in high use applications. Ideal for prolonged contact with water.

Ceramic Disc Valve Cartridge: Assures a lifetime of drip-free performance.

Field-Convertible Swivel/Rigid Spout: Easily adjusted in the field.

Lead-Free: Faucet contains ≤ 0.25% total lead content by weighted average.

SUGGESTED SPECIFICATION:

4" centerset lavatory faucet shall be cast brass construction with all brass shank nuts and coupling nuts. Shall feature water-conserving 1.5 gpm/5.7L/min. pressure compensating aerator. Vandal-Resistant handles. Shall also feature 1/4 turn washerless ceramic disc valve cartridges. Fitting shall be American Standard Model # 750_.___.002.

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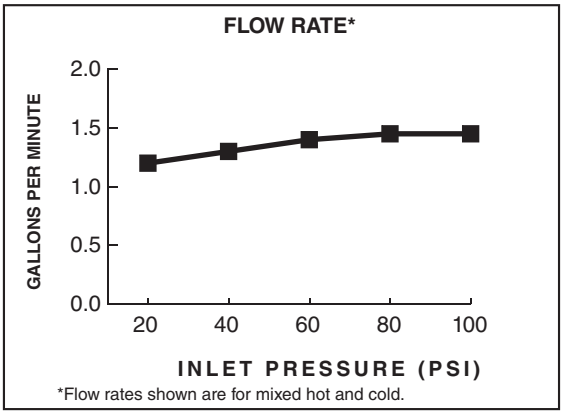
CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ASME A112.18.1
CSA B 125
NSF 372



Product Number	Description	Finish: Polished Chrome 002
7500.170	Centerset Lavatory with rigid/swivel gooseneck spout. 1.5 gpm/5.7L/min pressure compensating aerator. Vandal-Resistant Wrist Blade Handles. Less drain and pop-up hole.	
7502.170	Centerset Lavatory with rigid/swivel gooseneck spout. 1.5 gpm/5.7L/min pressure compensating aerator. Vandal-Resistant Wrist Blade Handles. Grid strainer drain.	
7500.140	Centerset Lavatory with rigid/swivel gooseneck spout. 1.5 gpm/5.7L/min pressure compensating aerator. Vandal-Resistant Lever Handles. Less drain and pop-up hole.	
7502.140	Centerset Lavatory with rigid/swivel gooseneck spout. 1.5 gpm/5.7L/min pressure compensating aerator. Vandal-Resistant Lever Handles. Grid strainer drain.	

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES-CHECK LOCAL CODES

Other Aerators Available:

Part Suffix	Description
LV15	1.5 gpm (5.7 Lpm) PCA Vandal-Resistant Non-Aerated Laminar Flow Outlet
V15	.5 gpm (5.7 Lpm) PCA Vandal-Resistant Aerator
LV10	1.0 gpm (3.8 Lpm) PCA Vandal-Resistant Non-Aerated Laminar Flow Outlet
V10	1.0 gpm (3.8 Lpm) PCA Vandal-Resistant Aerator
V05	0.5 gpm (1.9 Lpm) PCA Vandal-Resistant Non-Aerated Spray
V035**	0.35 gpm (1.3 Lpm) PCA Vandal-Resistant Non-Aerated Spray

*PCA - Pressure Compensating
**Meets Cal Green Code

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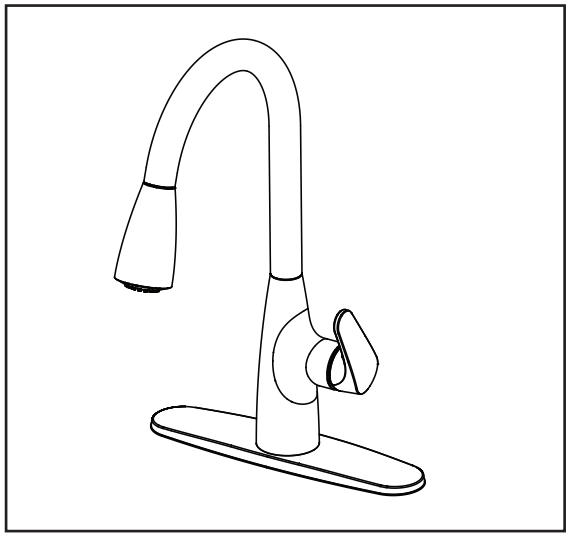
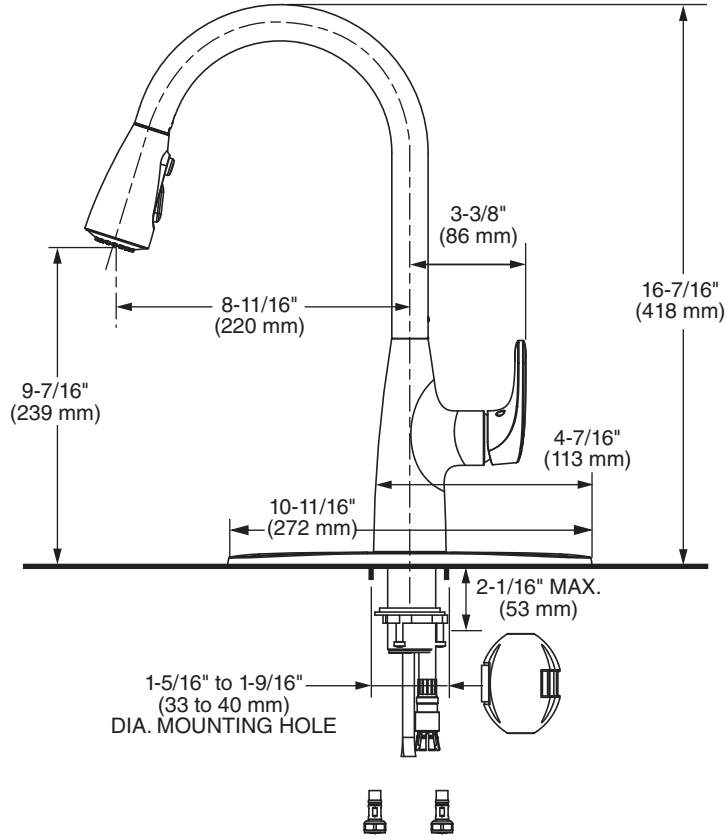
Colony® Pro
Single Control Kitchen Faucet
With Pull-Down Spray



MODEL NUMBER:

❑ **7077300 Pull-Down Faucet**



GENERAL DESCRIPTION:

Metal body and handle with metal swivel spout. Pull-down spray with adjustable spray pattern and pause feature. Nylon braided pull out hose complete with two integral check valves. Washerless 28 mm ceramic disc valve cartridge. 35" Flexible, color coded braided stainless steel supply hoses with 3/8" compression connections. Mounting shank with brass fixation ring. 1.5 gpm/5.7 L/min. maximum flow rate. Fitting can be mounted with or without deck plate.

ADA COMPLIANT

PRODUCT FEATURES:

Ceramic Disc Valve Cartridge: Assures a lifetime of smooth handle operation and drip-free performance.

Metal Construction: Quality materials for durability & tlong life.

Memory Position Valving: Allows user to turn valve on and off at preferred temperature setting without readjusting handle position each time.

Lead Free: Faucet contains ≤ 0.25% total lead content by weighted average.

Pull-down Spray: Adjustable spray pattern-stream to spray and pause feature.

Integral Check Valves: Prevents back flow.

Choice of Finishes: Choice of Polished Chrome, Stainless Steel (PVD) or Matte Black.

SUGGESTED SPECIFICATION

Single control kitchen faucet shall feature a metal body with pull-down spray. Shall also feature washerless ceramic disc valve cartridge, flexible stainless steel supply hoses and two integral check valves. Fitting shall be American Standard Model # 7077300.___.

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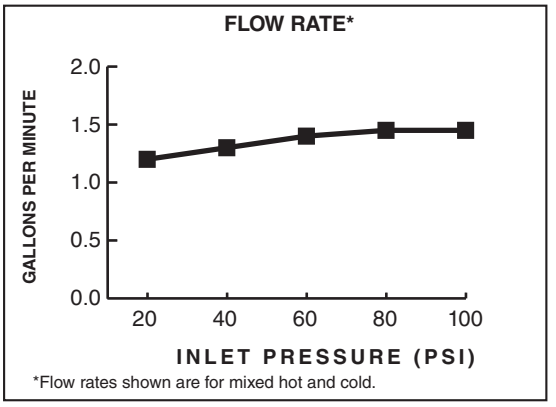
Colony® Pro
Single Control Kitchen Faucet
With Pull-Down Spray

CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ANSI A117.1
ASME A112.18.1
CSA B125.1
NSF/ANSI/CAN 61: Q<1
NSF/ANSI/CAN 372



1.5 gpm/5.7 L/min. FLOW RATE

Product Number	Description	Finish Options		
		Polished Chrome	PVD Stainless Steel	Matte Black
		002	075	243
7077300	Pull-Down Kitchen Faucet			

ADA Meets the American Disabilities Act Guidelines and **ANSI A117.1** Requirements for the physically challenged.

PART OF LIXIL

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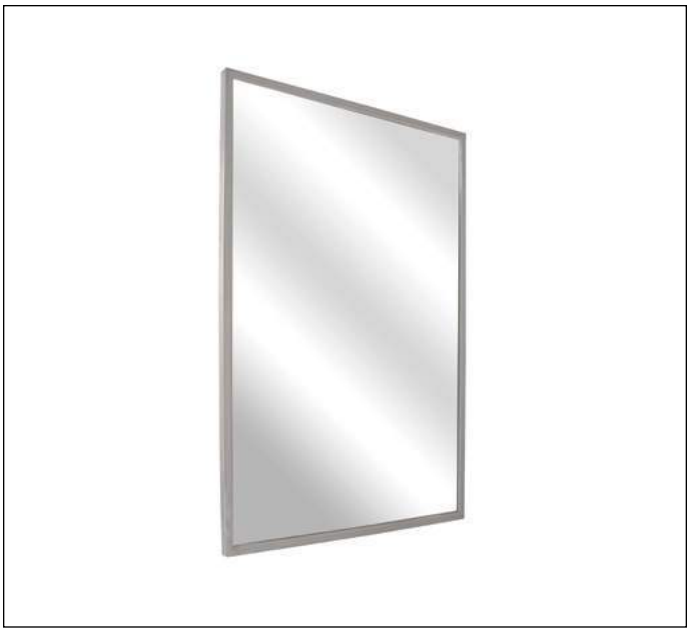
781
Channel-Frame Mirror

- ○ **Standard Model 781-1824 (18" x 24") *BradEX®***
- ○ **Standard Model 781-1830 (18" x 30") *BradEX®***
- ○ **Standard Model 781-1836 (18" x 36") *BradEX®***
- ○ **Standard Model 781-18362 (18" x 36", tempered glass) *BradEX®***
- ○ **Standard Model 781-2430 (24" x 30") *BradEX®***
- ○ **Standard Model 781-2436 (24" x 36") *BradEX®***
- ○ **Standard Model 781-24362 (24" x 36", tempered glass) *BradEX®***
- ○ **Standard Model 781-2448 (24" x 48") *BradEX®***
- ○ **Standard Model 781-2460 (24" x 60") *BradEX®***
- ○ **Standard Model 781-XXX (Specify width and height)**



Product Materials

FRAME: One-piece, roll-formed stainless steel with bright annealed finish. Channel is 3/4" x 3/4" x 7/16" with 90° mitered corners. Double strength continuous integral stiffener on all sides for added strength.

BACK: Galvanized steel.

MIRROR: First quality ¼" float glass, thermosetting infrared cured paint backing with Poly-Glaze protective finish. Manufactured in accordance with ASTM C 1036 and ASTM C 1503. All edges protected by shock-absorbing, neoprene tubing. The back of the mirror is protected by a sheet of 1/4" extruded polystyrene, which is placed between the mirror and the galvanized steel.

MOUNTING BRACKETS: 18 gauge cold rolled steel.

Installation

Verify all rough-in dimensions prior to installation. Secure concealed mounting bracket to wall with screws (not included) at holes provided. Mounting kits available through Bradley (ref. #899-026). For more information, visit bradleycorp.com. Provide in-wall backing at mounting screw locations. Position mirror over mounting bracket to engage hanger tabs Slide mirror down and lock into position.

Guide Specification

Mirror shall be framed with one-piece, roll-formed stainless steel with 3/4" face and neatly mitered corners. Double -strength continuous integral stiffener on all sides. Back of unit shall be galvanized steel. Separate brackets for concealed mounting. Mirror shall be of first quality 1/4" polished float glass, guaranteed for 15 years against silver spoilage and protected by shock-absorbing, neoprene tubing with Poly-Glaze protective finish.

Framed Mirror shall be Bradley Model 781-_____" W x_____" H (specify width and height).

ADA Compliant

- ☑ Consult local and national accessibility codes for proper installation guidelines.
- ☑ Conformity and compliance to local and national codes is the responsibility of the installer.

Optional Features

Features		Suffix
○	¼" tempered glass mirror in lieu of polished float glass mirror*	-2
○	Highly polished No. 8 architectural finish, 20 gauge stainless steel in lieu of polished float glass mirror	-4

*Either the Length (L) or the Width (W) must be greater than 25".

- ☑ An inherent characteristic of a manufacturing process for tempered glass is distortion which may vary from mirror to mirror.
- ☑ Stainless steel mirrors will differ in optic quality from glass mirrors.
- ☑ In larger sizes, stainless mirrors are subject to distortion and/or "oil canning" for which Bradley Corporation cannot accept responsibility.
- ☑ Bradley mirrors are not field interchangeable from horizontal to vertical or vice versa. Always specify width first.

Orders composed of products indicated as ***BradEX®*** will be available to ship in three days after receipt of order at the factory. There is no pricing penalty for this service from Bradley.

This information is subject to change without notice.

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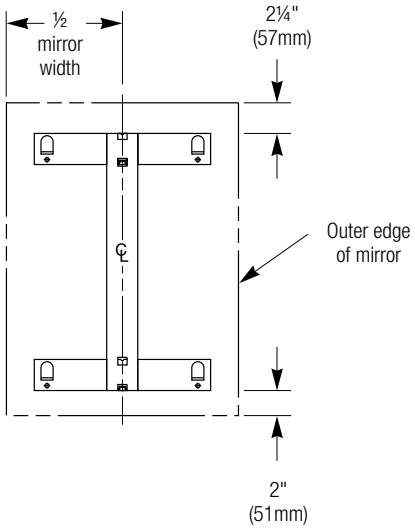
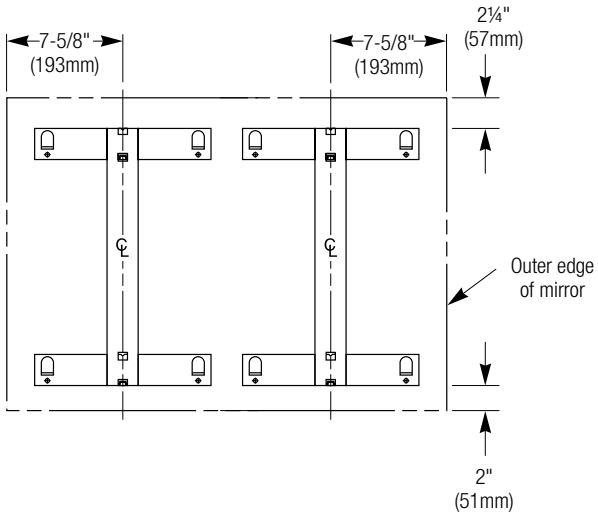
P.O. Box 309, Menomonee Falls, WI 53052-0309
800 BRADLEY (800 272 3539) +1 262 251 6000
bradleycorp.com

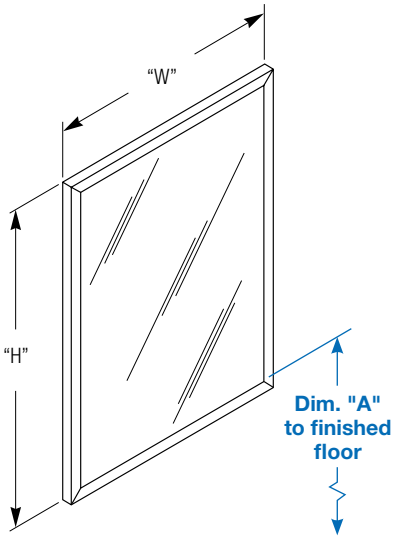
Dimensions

MIRRORS 30" WIDE AND UNDER



MIRRORS OVER 30" WIDE





Dim. "A" Key Surface:	For Dim. "A"	Bottom of Unit
Mirror's bottom edge of the reflecting surface to finished floor	40" (1016mm)	39¼" (997mm)
	37" (940mm)	36¼" (921mm)
	34" (864mm)	33¼" (845mm)
Rough wall opening:		
Surface Mount:	No rough wall opening, see overall dimensions	

BradEX® Models

Width (Inches) W	Height (Inches) H	Overall Dimension (Inches)	Overall Dimensions (Millimeters)	Standard Model Number
18"	24"	18 x 24	457 x 610	781-1824
18"	30"	18 x 30	457 x 762	781-1830
18"	36"	18 x 36	457 x 914	781-1836
18"	36"	18 x 36	457 x 914	781-18362
24"	30"	24 x 30	610 x 762	781-2430
24"	36"	24 x 36	610 x 914	781-2436
24"	36"	24 x 36	610 x 914	781-24362
24"	60"	24 x 60	610 x 1524	781-2460
24"	48"	24 x 48	610 x 1219	781-2448
36"	36"	36 x 36	914 x 914	781-3636
Model 781 series channel-framed mirrors can be fabricated to fit a maximum size of 120"W x 72"H.				

Orders composed of products indicated as ***BradEX***® will be available to ship in three days after receipt of order at the factory. There is no pricing penalty for this service from Bradley.

View Latest Version

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800 BRADLEY (800 272 3539) +1 262 251 6000
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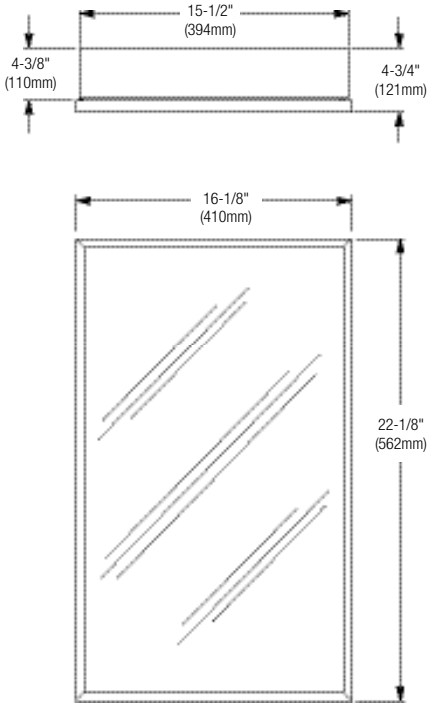
9664

Medicine Cabinet

- ☑ Surface-Mounted
- ☑ Two Adjustable Shelves
- ☑ Reversible
- ☑ ***Bradex®***



Product Materials

CABINET: heavy-duty steel construction, finished with rust-resistant, baked-on enamel after welding. Adjustable shelf supports.

DOOR: heavy-duty steel, finished with rust-resistant, baked-on enamel to match cabinet, equipped with full-length piano hinge with built-in door stop, protective door bumpers, and a magnetic catch.

MIRROR: 2mm thick float glass, electrolytically copper-backed, with full surround stainless steel frame with positive screw closure. One-year warranty.

SHELVES: (2) pre-painted metal. Adjustable.

Operation

Cabinet is reversible for left or right hand door swing.

Installation

Verify all rough-in dimensions prior to installation. Cabinet to be secured to wall with mounting screws (included) through holes provided.

Guide Specification

Surface-mounted medicine cabinet shall be fabricated of heavy-duty steel construction finished with baked-on enamel. Swing door shall have mirror with full surround stainless steel channel frame with screw enclosure. Cabinet shall be equipped with two fixed shelves, full-length piano hinge, and magnetic catch. Cabinet shall be reversible for left or right hand door swing.

Orders composed of products indicated as ***Bradex®*** will be available to ship in three days after receipt of order at the factory. There is no pricing penalty for this service from Bradley.

This information is subject to change without notice.

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bradleycorp.com

Exclusive

1.2k

Franklin Brass

Futura 24 in. Wall Mount Towel Bar Bath Hardware Accessory in Polished Chrome

(1079) Questions & Answers (42)

Hover Image to Zoom

Share Print

SHOP FATHER'S DAY GIFTS

$15.98

- Franklin Brass 24 in. bathroom towel bar in polished chrome
- Bathroom accessory made from zinc to resist rust and tarnishing
- Towel holder features concealed mounting hardware
- View More Details

Pleasant Ridge Store

✓ 4 in stock Aisle 32, Bay 014

Color/Finish: **Polished Chrome**

Bar Length (in.): **24**

18 **24** 30

Pack Size: **1**

1 2

Bath Accessory Type: **Towel Bar**

Toilet Paper Holder **Towel Bar** Towel Ring

Pickup at Pleasant Ridge Delivering to 45213

Pickup
Today
4 in stock
FREE

Delivery
Tomorrow
128 available
FREE

Get it delivered Today for $2.99. Schedule your delivery in checkout.

Internet # 100046939 Model # D2408PC Store SKU # 107011

Exclusive

1.1k

Franklin Brass

Futura Wall Mount Spring Loaded Toilet Paper Holder Bath Hardware Accessory in Polished Chrome

4.5 (567) Questions & Answers (18)

Hover image to Zoom

Share Print

SHOP FATHER'S DAY GIFTS

$10.98

- Franklin Brass spring toilet paper holder in polished chrome
- Bathroom accessory made from zinc to resist rust and tarnishing
- Toilet paper holder features concealed mounting hardware
- View More Details

Pleasant Ridge Store

✓ 9 in stock Aisle 32, Bay 014

Color/Finish: **Polished Chrome**

Pack Size: 1

1 2

Bath Accessory Type: **Toilet Paper Holder**

Toilet Paper Holder Towel Bar Towel Ring

Pickup at Pleasant Ridge Delivering to 45213

Pickup
Today
9 in stock
FREE

Delivery
Tomorrow
141 available
FREE

Get it delivered Today for $2.99. Schedule your delivery in checkout.

Need a Pro? We Can Help!

Get Referred to a Local Pro

9B1 Series
Elvari™ Coat/Robe Hook

Key Features

- High quality and modern style complements other Elvari™ products
- Robust 14-gauge design
- 50 lb load rating
- No visible welds or mounting hardware
- Common mounting, interchangeable hardware between single and double hooks

Guide Specification

Surface-mounted hook shall be fabricated of 14-gauge, 300 series stainless steel in a brushed #3 satin finish or optional electrocoat finishes. Fasteners, set screws, and hex key included.

Overall Dimensions - Single Hook:
2-3/4" H x 1-3/16" W x 1-11/16" D (69mm x 30mm x 42mm)

Overall Dimensions - Double Hook:
5-3/8" H x 1-3/16" W x 1-3/4" D (136mm x 30mm x 44mm)

MasterFormat Title: Commercial Toilet Accessories
MasterFormat Number: 10 28 13.13

OmniClass Title: Toilet and Bath Specialties
OmniClass Code: 23.31.25.00

Complementary Bradley Products

- Euro Style Partitions – Highrise Series
- Euro Style Partitions – Skyline Series
- Euro Style Partitions – Float Series
- Euro Style Partitions – Lucent Series
- Euro Style Partitions – Loft Series

9B1-1100
Single Hook

9B1-1102
Double Hook

Finishes

☑ *Click on any color swatch to view as a larger image.*

- Brushed Black*
- Brushed Brass*
- Brushed Bronze*
- Brushed Nickel*
- Brushed Stainless*
- Satin Stainless

*Electrocoat Finishes, see Optional Electrocoat Finishes section on page 2.

Product Compliance

Listed by UL Environment to

- GreenGuard Gold

For information on Warranties, Maintenance and BAA/ARRA Compliance, visit our website at: bradleycorp.com/washroom-accessories-products

Orders composed of products indicated as ***BradEX***® will be available to ship in three days after receipt of order at the factory. There is no pricing penalty for this service from Bradley.

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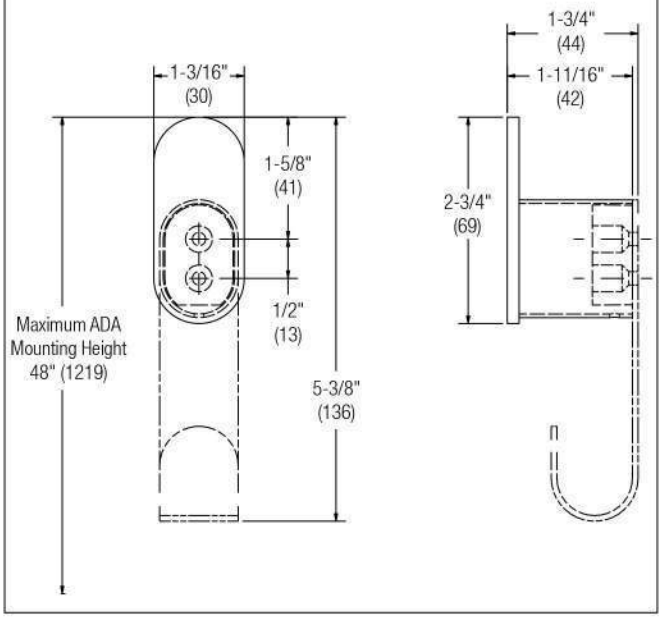
bradleycorp.com

9B1 Series
Elvari™ Coat/Robe Hook

Dimensions (mm)



Models (Must select one)

○ **9B1**	Elvari Coat/Robe Hook

Standard Selections (Must select one from each category)

Mounting (select one)

○ **11**	Surface Mounted

Hooks (select one)

○ **00**	Single Hook
○ **02**	Double Hook

Hook Finish Type (Must select one)

○ **BB**	Brushed Black
○ **BR**	Brushed Brass
○ **BZ**	Brushed Bronze
○ **BN**	Brushed Nickel
○ **BS**	Brushed Stainless
○ **SS**	Satin Stainless [1]

[1] Models with Hook Finish Type SS are available with ***BradEX®*** expedited shipping.

Optional Electrocoat Finishes

Bradley offers an exclusive, proprietary electrocoat color process on the Elvari coat/robe hook models. Unlike powder coating, color is applied to the entire stainless steel part using a submersion process with electrically charged particles. This process results in a precise film thickness across all surfaces, allowing the grain of the stainless steel to show through.

Electrocoat provides complete coverage to the part and has environmental advantages such as no or low-VOC and HAPs (Hazardous Air Pollutants), heavy metal-free products, and minimum waste discharge. Bradley's electrocoat is durable and easy to clean as well as fingerprint, stain and corrosion resistant. A UV light stabilizer additive enhances resistance to weathering and color fade.

Products are performance tested for adhesion following ASTM D3359-22 and impact resistance following ASTM D2794.

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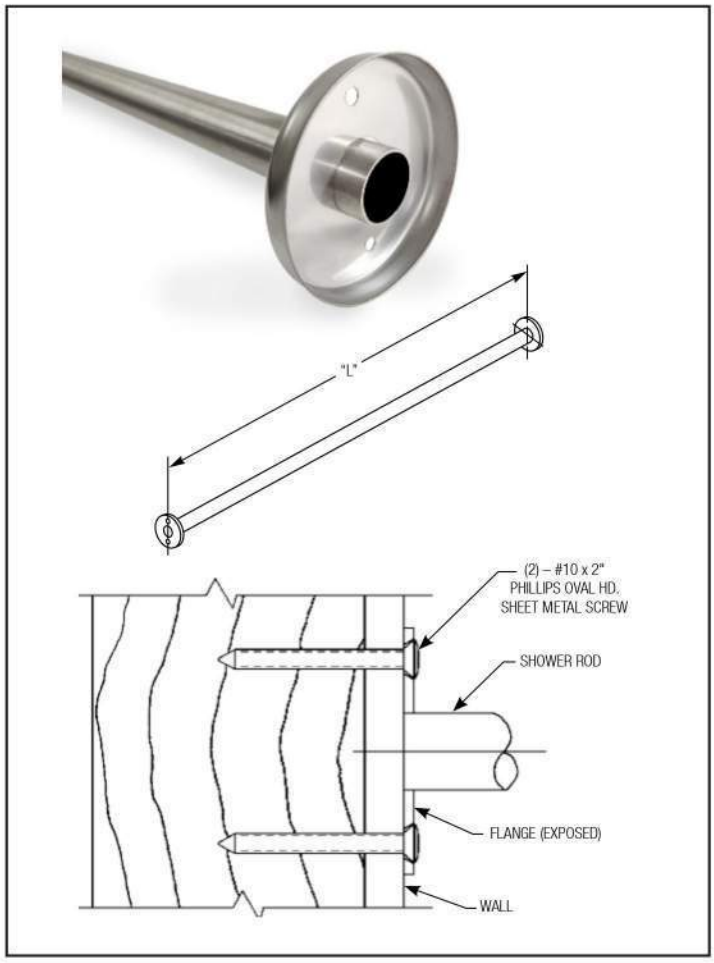
953, 9531

Shower Curtain Rod

- ☑ Exposed Mounting
- ☑ Model 953 – 1" O.D.
  - ○ 36" ***Bradex***®
  - ○ 42"
  - ○ 48" ***Bradex***®
  - ○ 60" ***Bradex***®
  - ○ 72" ***Bradex***®
- ☑ Model 9531 – 1¼" O.D.
  - ○ 36" ***Bradex***®
  - ○ 42" ***Bradex***®
  - ○ 48" ***Bradex***®
  - ○ 60" ***Bradex***®
  - ○ 72"



Product Materials

FLANGES: 22 gauge stainless steel. One-piece drawn construction with exposed surfaces in architectural satin finish.

TUBING: 18 gauge stainless steel, seamless construction with exposed surfaces in architectural satin finish.

Installation

Verify all rough-in dimensions prior to installation. To properly engage rod in support flanges, rod length must be no less than approximately ¼" shorter than wall opening. Secure one flange to wall with mounting screws (included) at holes provided. Align mounting holes vertically. Slip opposite flange over rod and secure to opposite wall with rod in place.

Guide Specification

Shower curtain rod shall be fabricated of 18 gauge stainless steel in satin finish. Flanges shall be of 22 gauge stainless steel.

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View Latest Version

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Product Materials

FLANGES: 3" dia. 12-gauge stainless steel.

ESCUTCHEONS: 14-gauge stainless steel. One-piece drawn construction with exposed surfaces in architectural satin finish. Snap over flanges to conceal mounting screws.

TUBING: 1½" O.D. 18-gauge stainless steel, seamless construction with exposed surfaces in architectural satin finish. Bent ends of tubing pass thru the flanges and are welded for maximum strength. Intermediate supports are contour cut and joined by welding to form an integral part of the grab bar. All exposed welds ground and polished to blend. Mandrel bending process maintains uniform bar diameter. Return provides 1½" standard safety clearance between wall and bar.

Strength

When properly mounted, all Bradley heavy-duty grab bar systems meet or exceed the requirements of ANSI Standard A117.1, the ADA and ABA Accessibility Guidelines for Buildings and Facilities (ADAAG), and the Uniform Federal Accessibility Standard (UFAS). All 812 grab bars are rated to support up to 250 pounds. Wall must be reinforced in the area of the grab bar in order to support the load it is intended to support.

Guide Specification

Grab bar shall be fabricated of stain finish stainless steel with concealed mounting flanges in sizes and configurations as indicated. Partition mounting kits are available.

Installation

For instructions on installation, warnings, and maintenance, please visit www.bradleycorp.com.

General-purpose mounting screws are provided; however, installers are advised to use the appropriate fasteners based on the specific substrate to ensure secure mounting.

Product Compliance

Complies with

- ADA
- ADAAG
- ICC ANSI A117.1
- UFAS

☑ Consult local and national accessibility codes for proper installation guidelines.

☑ Conformity and compliance to local and national codes is the responsibility of the installer.

Optional Features

Features		Suffix
○	Peened Finish	-2

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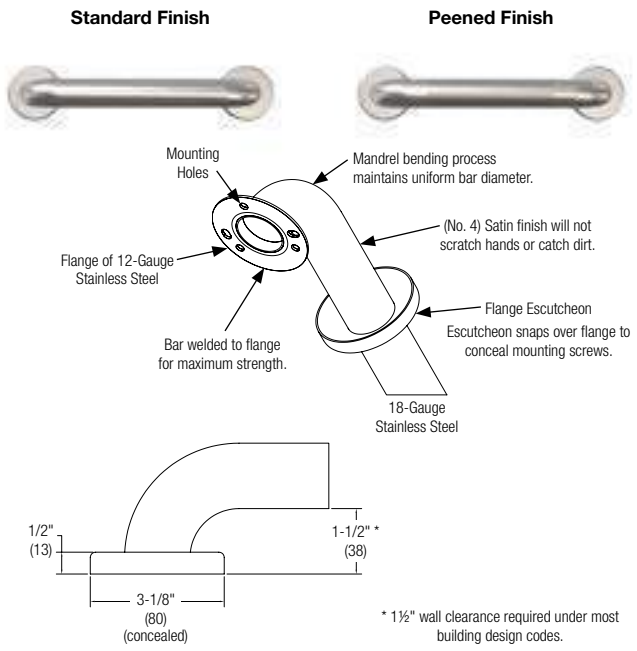

Bradex® Models

Configuration Number	Shipping Data		Finish Options	
	Cu. Ft.	Wt. Lb.	Satin	Peened
001-12"	0.13	2	X	X
001-18"	0.14	2	X	X
001-24"	0.14	3	X	X
001-30"	0.15	3	X	X
001-36"	0.15	3	X	X
001-42"	0.15	4	X	X
001-48"	0.25	4	X	X
001-54"	0.54	6	X	X
Models **not listed** in the chart require an additional lead time of 3–4 weeks.				

Standard Models

Configuration Number	Shipping Data		Finish Options	
	Cu. Ft.	Wt. Lb.	Satin	Peened
054 (30" X 30")	2.50	5	X	
056 (18" X 33")	1.30	5	X	
057 (30" x 30")	2.10	5	X	
058 (18" x 30")	1.40	5	X	
058 (24" x 36")	2.10	6	X	
058 (42" x 54") *	8.40	10	X	
NOTE: These units must ship via common carrier. * 058 (42" x 54")				

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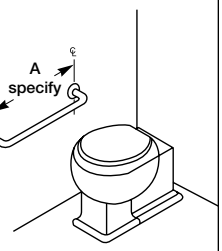
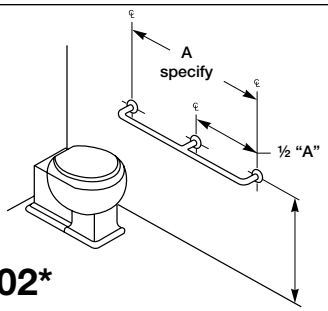
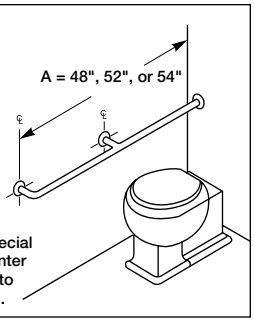
Typical Water Closet Applications



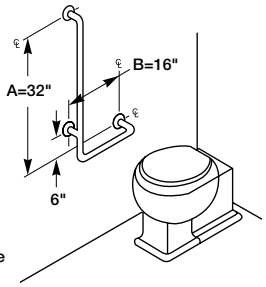
001*
Specify length desired. See **048** and **049** for 45° mounting. **001** over 54" requires a center support and becomes **002**.



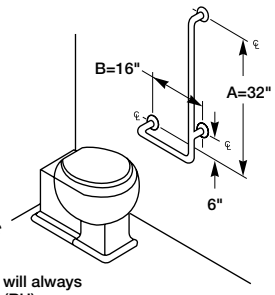
002*



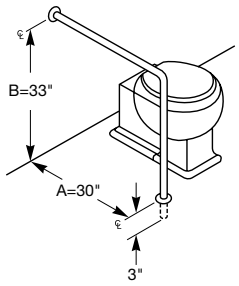
003*
Only one end return. Special size "A" dimensions; center post will only be added to models greater than 24".



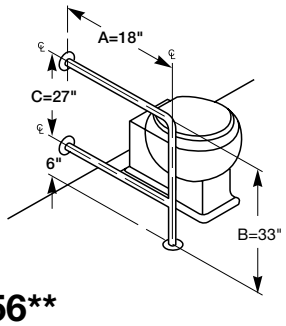
005*
"A" dimension will always have stand-off (LH).



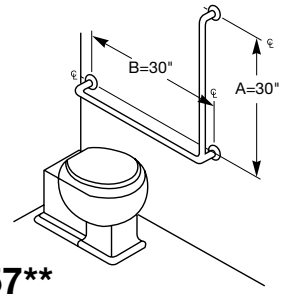
006*
Opposite **005**.
"A" dimension will always have stand-off (RH).



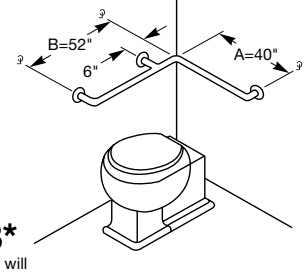
054*
30" x 33"
NOTE: 1" not available for this application.



056**
24" x 24"



057**
30" x 30"
NOTE: Not available with 817 Series grab bars.



058*
(LH) "B" side will have stand-off.
LH & RH

* Customizable

** Non-customizable

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○ Model 259 — Surface-Mounted

☑ Roll Paper Towels

Product Materials

BRACKET: die-cast aluminum.

SPINDLE: die-cast aluminum with stainless steel spring.

Capacity

One roll standard core paper towels to 6" diameter.

Operation

Remove tissue roll core to access special locking mechanism for servicing. Stops on spindle control paper delivery. Spindle revolves only one-half turn for each dispensing operation and returns to original position.

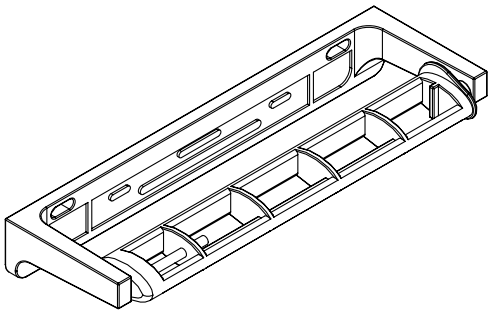
Installation

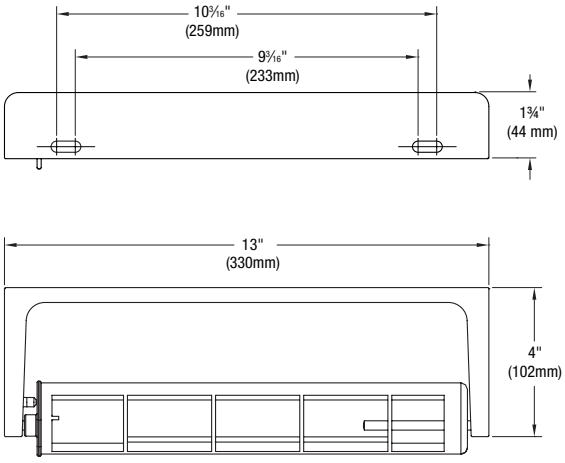
Verify all rough-in dimensions prior to installation. Secure to wall with mounting screws (included) at holes provided.

Guide Specification

Surface-mounted roll paper towel dispenser shall be die-cast aluminum with satin finish, accommodate one standard core paper towel roll and include a controlled delivery mechanism.

Overall dimensions: 13"W x 1¾"H x 4"D.





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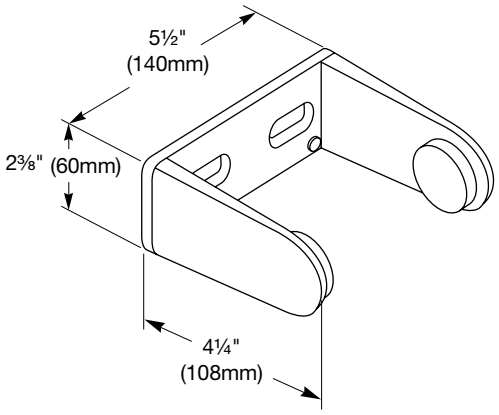
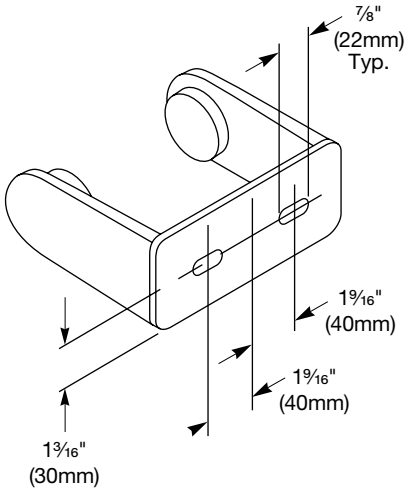
○ Model 505 — *Bradex*®

- ☑ Controlled Delivery
- ☑ Single Roll (For Dual Roll see Model 522)





Product Materials

UNIT: diecast zinc. Copper and nickel polished chrome-plated finish.

Capacity

One standard core toilet tissue roll through 5" in diameter and 4½" wide.

Operation

Push button unlocks support arms to permit servicing of unit. Tension spring on stationary arm controls paper delivery.

Installation

Verify all rough-in dimensions prior to installation. Secure to wall with mounting screws (included) at holes provided.

Guide Specification

Surface-mounted toilet tissue dispenser shall be chrome-plated diecast zinc and hold one standard core toilet tissue roll. Tension spring controls paper delivery.

Overall dimensions: 5½"W x 2⅜"H x 4¼"D.

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Your Product

GOJO TFX Automatic Wall Mounted Hand Soap Dispenser, Dove Gray (2740-12)

★★★★☆ 35

$56.09

Selected

+

Clearance

Brighton Professional Foaming Hand Soap Refill for TFX Dispenser, Cranberry Scent, 40.6 oz., 2/Carton...

★★★☆☆ 3

$67.66 ~~$107.39~~

Selected

+

Duracell Coppertop C Alkaline Batteries, 4/Pack (MN1400R4ZX)

★★★★½ 309

$10.39

Selected

+

Scott Essential High Capacity Hardwound Paper Towels, 1-Ply, 950 ft./Roll, 6 Rolls/Carton (02000)

★★★★½ 18

$97.99

Selected

Add 4 to cart

Details | Specifications | Reviews | Q&A

About this product

Create a healthier environment for the people in your facility with the GOJO TFX Touch-Free Dispenser for GOJO TFX Foam Soap Refills

Built on over 65 years of dispenser engineering experience, the durable GOJO TFX Touch-Free Dispenser helps you keep your restrooms clean and shows you care about the well-being of people in your facility. With millions of units installed, TFX dispensers and refills are designed to be easy to maintain and are guaranteed to be reliable. Simply place your hand under the dispenser, and the perfect amount of foam soap appears. The window shows when it is time for a new refill. The TFX dispenser works with GOJO TFX foam soap refills. Each 1200 mL refill holds up to 2000 uses of soap, which minimizes change outs. Refills are SANITARY SEALED with a fresh dispensing valve to lock out germs. GOJO self-lathering foam soap rinses cleaner than liquid soap without leaving drips or messes in the sink, reducing the time to clean sink areas.

- Built on 65 years of dispenser engineering experience, the GOJO TFX Touch-Free Dispenser helps you keep your restrooms clean and shows you care about the well-being of the people in your facility
- Simply place your hand under the dispenser, and the perfect amount of foam soap appears. The convenient window shows when it is time for a new refill
- With millions of units installed, across billions of uses, TFX dispensers and refills are designed to be easy to maintain and are guaranteed to be reliable
- The TFX Soap Dispenser works with GOJO TFX Foam Soap Refills. Each 1200 mL refill holds up to 2000 uses of soap, which minimizes changeouts. Refills are SANITARY SEALED to lock out germs
- Includes: 1 - GOJO TFX Touch-Free Soap Dispenser, Dove Grey, for 1200 mL GOJO TFX Foam Soap Refills, adhesive mounting tape. Dispenser requires 3 "C" Alkaline batteries that are not included
- This product is manufactured by a certified WBE (Women Owned Business)
- Holds a large, 1200 ml refill
- Dispenser features a skylight with an extra-large site window that makes it easy to see when it's time to reload
- Fully ADA compliant
- Gray
- Batteries Not Included
- Compatible refill model numbers: 5361-02, 5665-02, 5665-02, 5362-02, 5369-02

Show you care about the well-being of the people in your facility with the GOJO TFX Touch-Free Dispenser for GOJO TFX Foam Soap Refills. Built on over 65 years of dispenser engineering experience, the durable GOJO TFX Touch-Free Dispenser helps you keep your restrooms clean. With millions of units installed, across billions of uses, TFX dispensers and refills are designed to be easy to maintain and are proven reliable. Simply place your hand under the dispenser, and the perfect amount of foam soap appears. The convenient window shows when it is time for a new refill. The TFX Soap Dispenser works with GOJO TFX Foam Soap Refills. Each 1200 mL refill holds up to 2000 uses of soap, which minimizes changeouts. Refills are SANITARY SEALED with a fresh dispensing valve to lock out germs. GOJO self-lathering foam soap rinses cleaner than liquid soap without leaving drips or messes in the sink, reducing the time to clean sink areas. GOJO soap varieties include: GOJO Premium Foam Handwash with Skin Conditioners (5361-02), GOJO Green Certified Foam Hand Cleaner (5665-02), GOJO Premium Foam Antibacterial Hand Wash (5362-02), GOJO E2 Foam Sanitizing Soap (5364-02) and GOJO E2 Foam Handwash with PCMX (5369-02). Case Includes: 1 - GOJO TFX Touch-Free Soap Dispenser, Dove Grey, adhesive mounting tape. Dispenser requires 3 "C" Alkaline batteries that are not included. Dispenser dimensions are: 10.58 h x 4.09 w x 6.0 l. TFX Soap refills are sold separately (5361-02, 5665-02, 5362-02, 5364-02, 5369-02). GOJO Industries is a purpose-driven Family Enterprise committed to making easier, more effective and gentle for us to clean our hands.

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The Industry Leader in Quality Mailboxes!
SALSBURY INDUSTRIES
Manufacturing Since 1936

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10% OFF & FREE
Web Specials!

View all products

Salsbury Vertical Mailbox - 4 Doors - Sandstone - Surface Mounted - USPS Access

Model # 3504SSU

IN STOCK
Usually ships within 1-2 days

~~$500.00~~

$450.00
Sale Price!

Free Shipping on all orders over $5,000!

Color: Sandstone

Volume Discounts	
Quantity	**Price**
2 - 5	$405.00
6 +	$385.00
› Contact Us for Bulk Pricing	

Size: 24.25" W x 19" H x 7.5" D

Weight: 30 lbs

Quantity: 1 Add To Cart

4B+ Vertical Mailboxes are USPS approved for replacement installations. For new construction, see Cluster Box Units and 4C Horizontal Mailboxes.

Related Items

Custom Engraved Self Adhesive Placard - for Vertical Mailbox Door (Model # 3567)

Outgoing Mail Slot Option - On Far Left Door of Vertical Mailbox (Model # 3569)

Standard L Replaceme Salsbury V Mailbox Do 2 Keys per I Pack (Model # 3

More Information

Salsbury 3500 Series 4B Vertical Mailboxes - Surface Mounted - U.S.P.S. Access

Features:

- 4B Vertical mailboxes are U.S.P.S. approved for replacement and/or retrofit installations
- Manufactured by Salsbury Industries to USPS-STD-4B Specifications
- Ideal for apartments, condominiums and commercial buildings
- Made entirely of aluminum
- Feature a durable powder coated finish available in aluminum, bronze and sandstone
- Mount directly to a wall and are secured with mounting hardware (not included)
- Individual compartment size is 5-1/2" W x 16-1/4" H x 6-3/4" D
- Doors and trim are striated to resist scratching
- Doors include a 5 pin cylinder cam lock (with 2 keys)
- Mailboxes are available with 3 to 7 compartments
- Salsbury Industries is an ISO 9001:2015 certified company and has excelled in the field of manufacturing since 1936

Options:

- Custom engraved placards
- Outgoing 4-3/4'' W x 1/2'' H mail slot
- Replacement locks
- Additional keys
- Key blanks

Downloads:

More Product Information

Installation Instructions

Technical Drawing

Specifications

Videos:

Vertical Mailbox Video

ARCHITECTURAL SIGNAGE

Savannah™ Collection

(Sign shown uses ¾" H text size)

Collection: Savannah™ Collection

Face Plate: Pebble Gray 0387

Back Plate: Black 0152

Accent: N/A

Font: ADA Arial

Text Color: Black 29920

Sign Material: Acrylic

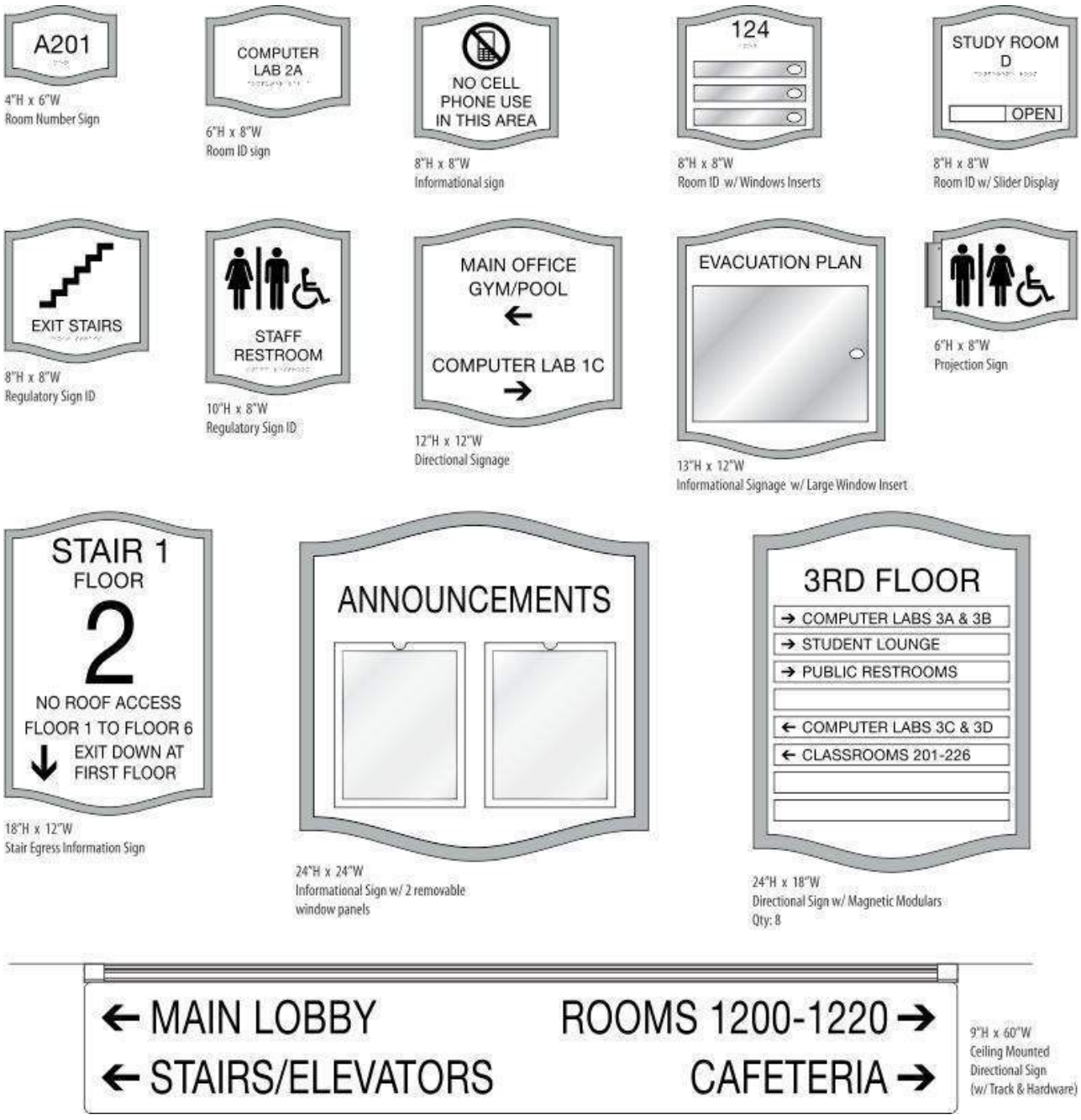
Sign Size: 6" H X 8" W

inpro.

World Headquarters, S80 W18766 Apollo Drive, Muskego, WI 53150. Ph 800.222.5556

ARCHITECTURAL SIGNAGE

Additional Signs available in the Collection



Other sign sizes and colors are available. Please contact your sales representative for more information.
Disclaimer: To ensure color matching, please order a color sample from
https://www.inprocorp.com/colors-and-fabrics/

inpro.
World Headquarters, S80 W18766 Apollo Drive, Muskego, WI 53150. Ph 800.222.5556

#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

... / Window Treatments / Blinds / Mini Blinds / Aluminum Mini Blinds

Internet # 303200062 Model # 10793478518944 Store SKU # 1002779184

White Cordless Aluminum Mini Blinds for Windows with 1 in. Slats - 35 in. W x 72 in. L(Actual Size 34.5 in. W x 72 in.L)

45

Feedback

(1551) Questions & Answers (149)

Hover Image to Zoom

Share Print

VANITY 2 DRAWER BASE CABINETS

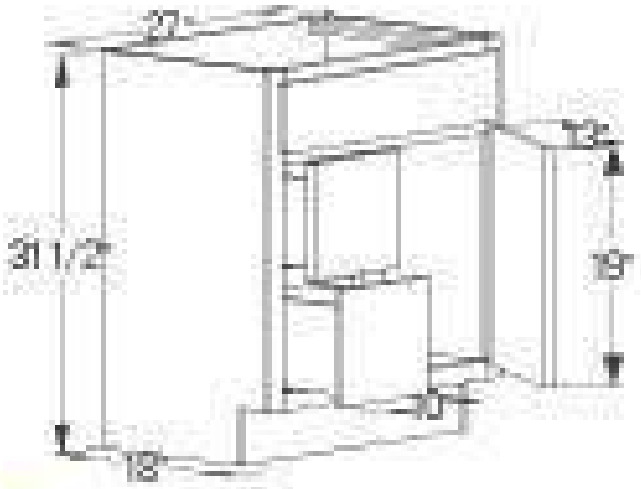
- Includes two hinges per door.
- Shelf not included; cabinet not drilled for shelves.
- 18" altered depth modification available.
- 34½" height modification available.

18" Deep, 31½" High

SINGLE DOOR

2 Drawers

VS2D2418	L or R
VS2D2718	L or R
VS2D3018	L or R
VS2D3318	L or R
VS2D3618	L or R



BUTT DI

2 Drawers

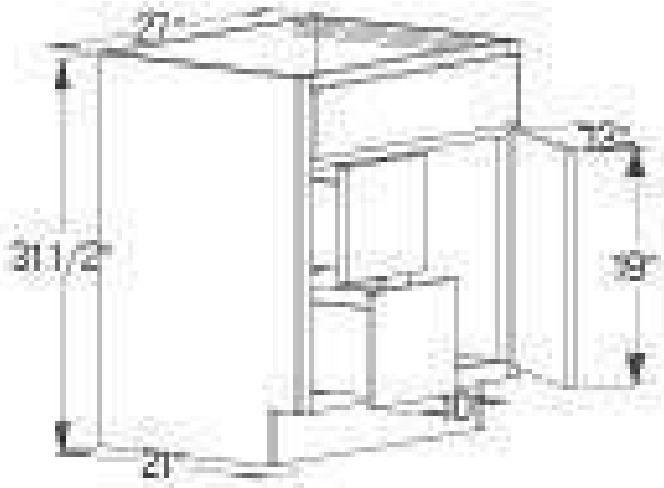
VS2D4218B	
VS2D4518B	
(2 False Fronts	
VS2D4818B	
(2 False Fronts	

21" Deep, 31½" High

SINGLE DOOR

2 Drawers

VS2D24	L or R
VS2D27	L or R
VS2D30	L or R
VS2D33	L or R
VS2D36	L or R



BUTT DO

2 Drawers

VS2D42B	
VS2D45B	
(2 False Fronts	
VS2D48B	
(2 False Fronts	

Add to Board

LivingStone

Caldera

Assigned Rep
Troy Lyons

Contact

Add to Cart

Usage	Delivery	Price Range	SKU
Commercial, Residential	✓ FedEx Priority Overnight	$	L805

Materials: Surfaces/Resin; Surfaces/Solid Surface

Collection Name: Elements

Sample Size: 3.9 in x 1.55 in

Size: 144in x 30in

Availability: Typically Stocked, Stocked in North America

Warranty: 15-Year Limited Transferable

Characteristics

Technical

Format: Modular, Panel / Sheet

Total Weight: 130 lbs

Overall Thickness: 1/2in

Recommended Grout: Artisan Joint Adhesive – ART100 Off White

Maintenance

Application

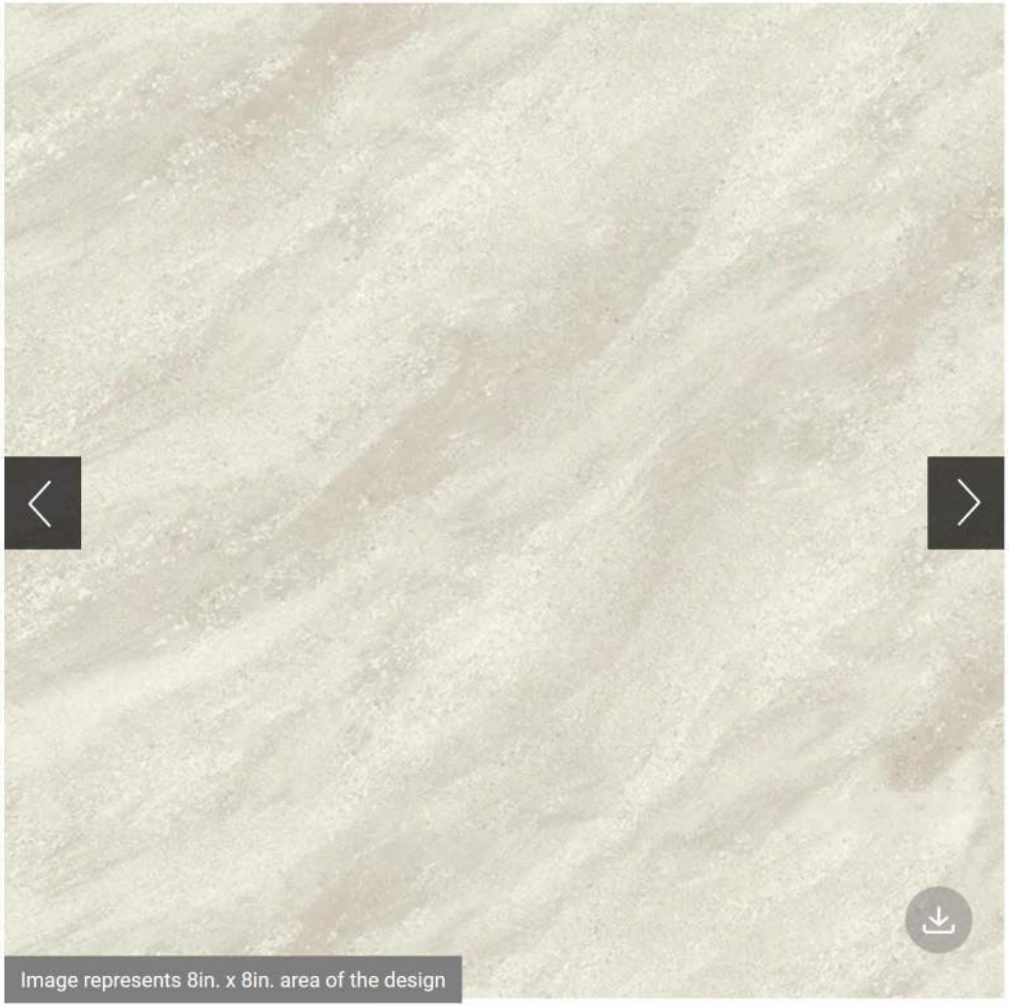
Performance

Environmental

Climate Impact: ISO 14001, LEED Compliant

Human Health Impact: Low Emitting/Low VOC, NSF/ANSI 51 Certified, UL GREENGUARD

LEED: May contribute to LEED credits



5044

Beachwalk

In Stock Design

Beachwalk is a tonal warm white directional stone with texture interest and sweeping movement.

- Design Repeat (Width X Length): **89.8" X 49.2"**

Finish: **60 MATTE**
Finish option availability is dependent on the selected laminate product type

Order a sample

Free Standard Shipping in 7–10 business days. For expedited shipping, please call Customer Support at 1-800-433-3222.

Standard Laminate | 60 Matte

Size | Qty

ORDER A SAMPLE

#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

Home / Hardware / Cabinet Hardware / Drawer Pulls

Internet # 300823363 Model # HH075328-SS Store SKU # 1004677109

143

HICKORY HARDWARE

Skylight Collection 5-1/16 in. Modern Stainless Steel Bar Pull Handle for Kitchen, Bathroom, Furniture (1-Pack)

(208) Questions & Answers (33)

Feedback

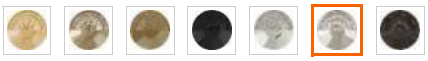
Hover Image to Zoom

Share Print

$7 43

- Contemporary metal design with a durable, stainless steel finish
- 5 in. center-to-center (distance between the drill holes)
- Screws included for easy installation
- View More Details

Finish: **Stainless Steel**



Center to Center Measurement (in.): **5 1/16 in.**

3 in. | 3 3/4 in. | **5 1/16 in.** | 6 5/16 in. | 8 13/16 in. | 12 in. | 18 in.

Package Quantity: **1**

1 | 5 | 10

Pickup at Pleasant Ridge Delivering to 45213

Ship to Store
Jul 25 - Jul 30
68 available
FREE

Delivery
Tomorrow
68 available
FREE

Need a Pro? We Can Help!
Get Referred to a Local Pro

☐ Add Pro Referral

ⓘ What to Expect

— 1 +

Add to Cart

PayPal

Pay in 4 interest-free payments on purchases of $30-$1,500 with PayPal. Learn more

Free & Easy Returns In Store or Online
Return this item within **90 days** of purchase.
Read Return Policy

Feedback

Frequently Bought Together

CURRENT ITEM

Select

HICKORY HARDWARE
Skylight Collection 5-1/16 in. Modern Stainless Steel Bar Pull Handle for Kitchen, Bathroom, Furniture (1-Pack)

(4.7 / 208)

$7.43

Select

HICKORY HARDWARE
Skylight Collection 1-1/4 In. Square Knob Modern Stainless Steel Decorative Drawer, Kitchen, Bathroom (1-Pack)

(4.8 / 60)

$5.99

Select

Amerock
Versa 1-3/8 in. (35mm) Modern Satin Nickel Round Cabinet Knob

(4.9 / 57)

$3.52

1/1

Subtotal: $16.94

Add 3 Items to Cart

Feedback

Ask about this product

Get an immediate answer with AI

Type a question

Get an Answer

AI-generated from the text of manufacturer documentation. To verify or get additional information, please contact The Home Depot customer service.

Product Details

About This Product

Hickory Hardware has been in business for more than 120 years and is a division of Belwith Products, an industry-leading brand in decorative and functional products. The company's in-house designers and craftsmen are dedicated to providing complete home solutions, making Hickory Hardware a reliable & trusted brand for all your hardware needs.WE OFFER A VARIETY OF CABINET PULLS: Hickory Hardware offers a variety of choices for upgrading your kitchens, bathrooms, dressers, vanities and more. With different styles and length options, our pulls can fit any size cabinet or drawer and add the custom touch to your space.TRADITIONAL AND CLASSIC ROUND KNOBS: Whether you prefer modern and bold or a more traditional & classic look, our 50+ collections come in a variety of shapes & styles in a multitude of sizes & finishes. These knobs are a popular option that adds a timeless charm to your cabinets & drawersHIGH QUALITY FEATURES:● Sleek & stylish design● Perfect for updating cabinet hardware● Comes with mounting hardware● Designed for cabinets & drawers● Mix & match different hardware styles● Customize your cabinets & drawersCUSTOMIZABLE HARDWARE OPTIONS: With dozens of collections to choose from, you can mix & match different hardware styles to create a unique look that suits your personal taste & home decor. With a variety of sizes & finishes, you can easily customize your cabinets & drawers to your liking. Most of our collections come in multipacks to allow for savings!

Highlights

- Designed in the USA since 1893: Our designers in Grand Rapids, Michigan, have created over 50 unique collections, so you can mix and match pulls, cup pulls, and knobs for a stunning look

- Skylight collection: Inspired by contemporary kitchen design, this collection embodies balance and simplicity, so you can choose from various pull sizes and matching hooks for on-trend style
- Upgrade your kitchen cabinets: Our handles and knobs add sophistication and aesthetic appeal, which complements any decor style with elegant silhouettes
- Trusted cabinet handle quality: With over a century of experience, our team creates lasting products in classic to contemporary styles, which adds beauty and functionality to your space
- Ergonomically designed cabinet handles: Stylish and easy to use, our drawer pulls and knobs offer quick installation and a comfortable touch
- Versatile and timeless cabinet pull handles: Elevate the look of your kitchen with durable and classic hardware designed to stand the test of time
- Stylish kitchen drawer pulls and cabinet knobs: Choose from over 50 designs to add a contemporary touch to your cabinets, and visit our website for more information at www.hickoryhardware.com
- The Polished Nickel finish coordinates well with other polished nickel finishes, and the warm silver tone has a glossy protective coating and is highly reflective
- Center to Center: 5-1/16 Inch (128mm), Length: 5-7/16 Inch, Width: 3/8 Inch, Projection: 1-1/8 Inch
- Update the cabinets in your home by replacing door pulls. Check out our Project Guide to see how it's done.
- Return Policy
- California residents see Prop 65 WARNINGS

Feedback

Product Information

Internet # 300823363
Model # HH075328-SS
Store SKU # 1004677109

Additional Resources

Shop All HICKORY HARDWARE

From the Manufacturer

- Warranty
- Return Policy

Amerock Faircrest 1-1/4 in. (32mm)…

$9.99

Sponsored

Specifications

Dimensions: H 1.13 in, W 0.38 in, D 5.44 in

Dimensions

Center to Center Measurement (mm)	128
Product Depth (in.)	5.44 in
Product Height (in.)	1.13 in
Product Width (in.)	0.38 in
Pull Length (in.)	5.44 in
Pull Projection (in.)	1.13 in

Details

Builders Hardware Product Type	Cabinet Pull
Cabinet Pull Type	Bar Pull
Center to Center Measurement (in.)	5 1/16 in.
Features	Decorative
Finish	Stainless Steel
Hardware Color Family	Stainless Steel
Hardware Finish Family	Brushed
Material	Zinc
Package Quantity	1
Returnable	90-Day
Style	Contemporary

Warranty / Certifications

Manufacturer Warranty	Limited Lifetime

How can we improve our product information? Provide feedback.

Feedback

Questions & Answers

33 Questions

Customer Reviews

4.8 out of 5 (208)

Customers Also Viewed

Top Rated

Liberty (4-Pack) Solid Bar 3 in. (76 mm) Brushed Stainless Steel Modern Cabinet Handle Drawer Pulls

(4.8 / 4154)

$19.98

($5.00/pull)

Add to Cart

Exclusive

Liberty Mandara 5-1/16 in. (128 mm) Classic Satin Nickel Cabinet Drawer Bar Pull

(4.8 / 2815)

$6.48

Add to Cart

GLIDERITE 5 in. Center-to-Center Solid Square Slim Satin Nickel Cabinet Bar Pull (10-Pack)

(4.5 / 228)

$33.49

/package

($3.35/pull)

Add to Cart

#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 WI Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

... / Appliances / Ranges / Electric Ranges / Single Oven Electric Ranges

Internet # 322003823 Model # ACR4303MMS Store SKU # 1010028527 Store SO SKU #1008399

Amana

30 in. 4 Burner Element Freestanding Electric Range in Stainless Steel

(703) Questions & Answers (94)

Hover Image to Zoom

Feedback

Share Print

Front Control Electric Ranges

PRODUCT MODEL NUMBERS

WEC310S0L WEE515S0L WEE515SAL YWEE515S0L

ELECTRICAL CONNECTION

To properly install your range, you must determine the type of electrical connection you will be using and follow the instructions provided for it here.

- Range must be connected to the proper electrical voltage and frequency as specified on the model/serial/rating plate. The model/serial/rating plate is located behind the oven door on the top right-hand side of the oven frame.
- This range is manufactured with the neutral terminal connected to the cabinet. Use a 3-wire, UL listed, 40- or 50-amp power supply cord (pigtail). See the following Range Rating chart. If local codes do not permit ground through the neutral, use a 4-wire power supply cord rated at 250 volts, 40- or 50-amps and investigated for use with ranges.

Range Rating*		**Specified Rating of Power Supply Cord Kit and Circuit Protection**
120/240 Volts	**120/208 Volts**	**Amps**
8.8 - 16.5 KW	7.8 - 12.5 KW	40 or 50**
16.6 - 22.5 KW	12.6 - 18.5 KW	50

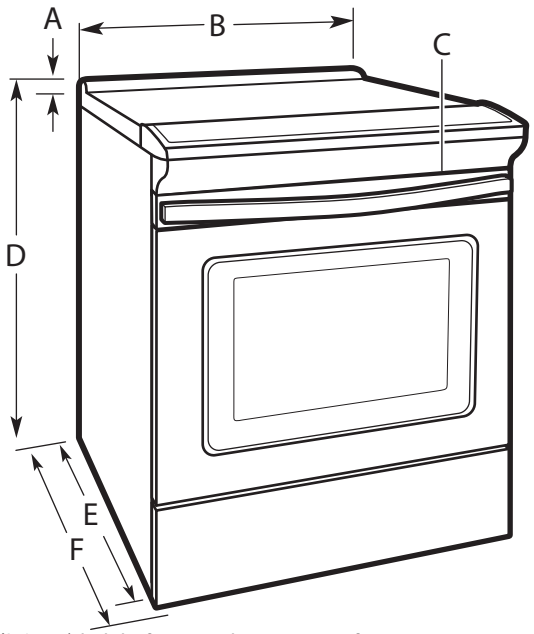
* The NEC calculated load is less than the total connected load listed on the model/serial/rating plate.

** If connecting to a 50-amp circuit, use a 50-amp rated cord with kit. For 50-amp rated cord kits, use kits that specify use with a nominal 1 3/8" (3.5 cm) diameter connection opening.

- A circuit breaker is recommended.

PRODUCT DIMENSIONS

This manual covers several models. Your model may appear different from the models depicted. Dimensions given are maximum dimensions across all models.



A. 1 3/16" (3.0 cm) height from cooktop to top of vent

B. 29 7/8" (75.9 cm)

C. Model/serial/rating plate (located behind the oven door on the top right-hand side of the oven frame)

*D. WEE515SAL: 34" (86.4 cm) height to top of cooktop edge with leveling legs screwed all the way in**
*Other models: 36" (91.4 cm) height to top of cooktop edge with leveling legs screwed all the way in**

E. 28 25/64" (72.1 cm) max. depth from front of console to back of range

F. 29 1/64" (73.7 cm) max. depth from handle to back of range

IMPORTANT: Range must be level after installation. Follow the instructions in the "Level Range" section of the Owner's Manual. Using the cooktop as a reference for leveling the range is not recommended.

* Range can be raised approximately 1" (2.5 cm) by adjusting the leveling legs.

Because Whirlpool Corporation includes a continuous commitment to improve our products, we reserve the right to change materials and specifications without notice.

Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

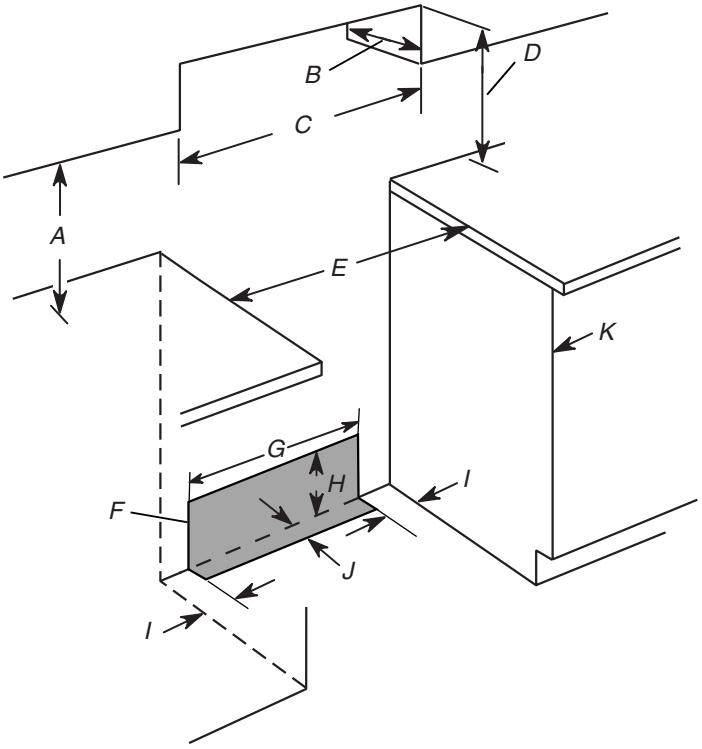
Ref. W11508843A
04/19/2021

CABINET DIMENSIONS

Cabinet opening dimensions shown are for 25" (64.0 cm) countertop depth, 24" (61.0 cm) base cabinet depth and 36" (91.4 cm) countertop height.

IMPORTANT: If installing a range hood or microwave hood combination above the range, follow the range hood or microwave hood combination installation instructions for dimensional clearances above the cooktop surface.

Range may be installed next to combustible walls with zero clearance.



A. 18" (45.7 cm) upper side cabinet to countertop
B. 13" (33 cm) max. upper cabinet depth
C. 30" (76.2 cm) min. opening width
D. For minimum clearance to top of cooktop, see NOTE.*
E. 30" (76.2 cm) min. opening width
F. The shaded area is recommended for installation of grounded outlet.
G. 13 1/8" (33.3 cm)
H. 7 11/16" (19.5 cm)
I. 4 13/16" (12.2 cm)
J. 3 11/16" (9.4 cm)
K. Cabinet door or hinges should not extend into the cutout.

* **NOTE:** 24" (61.0 cm) minimum when bottom of wood or metal cabinet is shielded by not less than 1/4" (0.64 cm) flame retardant millboard covered with not less than No. 28 MSG sheet steel, 0.015" (0.4 mm) stainless steel, 0.024" (0.6 mm) aluminum or 0.020" (0.5 mm) copper. 30" (76.2 cm) minimum clearance between the top of the cooking platform and the bottom of an uncovered wood or metal cabinet.

Because Whirlpool Corporation includes a continuous commitment to improve our products, we reserve the right to change materials and specifications without notice.

Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

Ref. W11508843A
04/19/2021

#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

Home / Appliances / Range Hoods / Under Cabinet Range Hoods

Internet # 207189288 Model # JVX3300SJSS Store SKU # 1001878519 Store SO SKU #1001878

719

GE

30 in. Over the Range Convertible Hood in Stainless Steel

(902) Questions & Answers (114)

Hover Image to Zoom

Feedback

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Please let us know how we can improve better serve you.

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$178.00 Was ~~$219.00~~
Save $41.00 (19%)

Get up to $400 in Rebates for 45213

Pay **$153.00** after **$25 OFF** your total qualifying purchase upon opening a new card.
Apply for a Home Depot Consumer Card

- Easy Install within 10 minutes or less
- Two-speed, 200-CFM venting system removes odors and moisture
- Enjoy easy access and a subtle appearance with Front Controls
- View More Details

Color/Finish: **Stainless Steel**

Range Hood Size (Width): **30 in.**

24 in. | **30 in.** | 36 in.

Maximum Air Flow Capacity (CFM): **200 CFM**

200 CFM | 300 CFM

Unavailable at Pleasant Ridge

Delivering to 45213

Pickup
Unavailable

Delivery
Earliest delivery
Wed, Jul 23

Schedule your appliance delivery in checkout. Delivery cost applied in cart.

Add to Cart

Pay in 4 interest-free payments of $44.50 with PayPal.
Learn more

Feedback

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Ask about this product

Get an immediate answer with AI

Type a question

Get an Answer

AI-generated from the text of manufacturer documentation. To verify or get additional information, please contact The Home Depot customer service.

Product Details

About This Product

At GE Appliances, we bring good things to life, by designing and building the world's best appliances. Our goal is to help people improve their lives at home by providing quality appliances that were made for real life. Whether it's enjoying the tradition of making meals from scratch or tackling a mountain of muddy jeans and soccer jerseys, GE Appliances are crafted to support any and every task in the home.

Highlights

- 2-speed, 200-CFM venting system - Removes smoke, grease, odors and moisture
- Front controls - Enjoy easy access and a subtle appearance
- Cooktop lighting - Illuminate cooking space and surrounding surface
- Convertible venting options - Select recirculating or external venting
- Vertical and rear exhaust - Exhausts from the top or rear of the hood
- Appearance (Partially enclosed bottom) - Enjoy easy access to hood interior
- Dishwasher safe filter - Filters grease and is dishwasher-safe
- Limited 1-year warranty entire appliance entire appliance entire appliance
- Click Here for details on the services included with Delivery & Basic Hook-up, Installation options for Major Appliances, and Appliance Return Policy Information
- Click here to shop more GE appliances
- California residents see Prop 65 WARNINGS

Product Information

Internet # 207189288
Model # JVX3300SJSS
Store SKU # 1001878519
Store SO SKU #1001878519

Additional Resources

Shop All GE

From the Manufacturer

- Warranty
- Installation Guide
- Specification
- Use and Care Manual

Feedback

Your ideas make us better!

How was your shopping experien

Please let us know how we can improve better serve you.

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Specifications

Dimensions: H 5.5 in, W 29.875 in, D 20 in

Questions & Answers

114 Questions

Customer Reviews

22 cu. ft. Side-by-Side Refrigerator

WRS312SNH

Monochromatic Stainless Steel
WRS312SNHM

Also available in:

White	**WRS312SNHW**
Black	**WRS312SNHB**

Capacity

Total Capacity	22 cu. ft.
Refrigerator Capacity	15 cu. ft.
Freezer Capacity	7 cu. ft.

General Features & Properties

Electronic Temperature Controls
Optional Icemaker
Frameless Glass Shelves
Adaptive Defrost
Humidity-Controlled Crispers
#1 Selling Appliance Brand in the U.S.A.*

Electrical Details

Amps	7.2
Volts	110

Technical Details

Refrigerator Type	Side-by-Side
Number of Doors	2
Number of Interior Refrigerator Shelves	4
Number of Refrigerator Door Bins	2 Fixed, 3 Adjustable
Number of Interior Freezer Shelves	4
Number of Freezer Door Bins	4 Fixed
Lighting Type	LED
Ice Maker	Optional
Ice Maker Location	Freezer
Dispenser Type	No Dispenser

Dimensions

Product Dimensions (H x W x D)	66-5/8" x 32-3/4" x 33-5/8"
Depth with Door Open 90°	49-5/16"
Cutout Dimensions	Allow extra 1/2" on sides and top Allow extra 1" on rear

Reference Material

Dimension Guide

Install Guide

Energy Guide

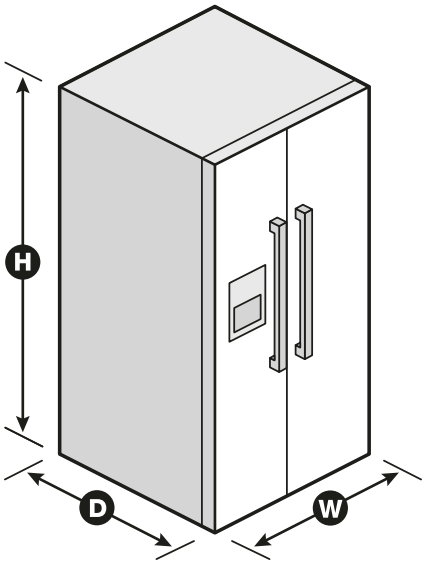
Warranty

Key Features & Benefits

Adjustable Gallon Door Bins
Move these adjustable bins anywhere in the door for increased loading flexibility when and where you need it.

LED Interior Lighting
Keep food looking as good as it tastes. Light is cast inside the refrigerator so food looks like it's supposed to.

Hidden Hinges
Get a seamless look with door hinges that stay out of sight.



*Based on 12-month average of unit sales. Refrigeration, Cooking, Dishwashers and Laundry appliances. TraQline 2018. NOTE: Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

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#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

Home / Appliances / Dishwashers / Built-In Dishwashers

Internet # 320472170 Model # GDF460PSTSS Store SKU # 1008493078 Store SO SKU #1007735

GE

24 in. Built-In Tall Tub Front Control Stainless Steel Dishwasher with 60 dBA, ENERGY STAR

(1340) Questions & Answers (206)

Hover Image to Zoom

Feedback

Share Print

Undercounter Dishwasher

PRODUCT MODEL NUMBERS

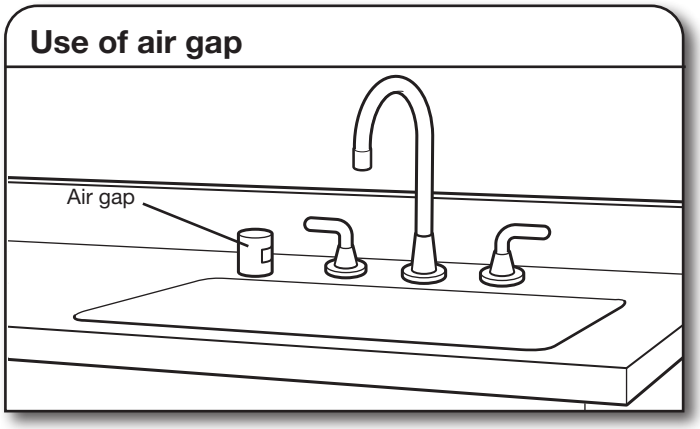
WDT550SAPW **WDT550SAPZ** **WDT550SAPB**

DRAIN REQUIREMENTS

- A new drain hose is supplied with your dishwasher. If drain hose is not long enough, use a drain hose extension with a maximum length of 12 ft (3.7 m).
- Make sure to connect drain hose to waste tee or disposer inlet above drain trap in house plumbing and 20" (508 mm) minimum above the floor. It is recommended that the drain hose either be looped up and securely fastened to the underside of the counter or be connected to an air gap.

IMPORTANT: This product is not equipped with a high loop on the side of the dishwasher. The installer is responsible for adding a high loop in the adjacent cabinet. A high loop is required if the dishwasher will drain into a floor drain. This prevents water draw off from the dishwasher during operation. When the drain is connected to a sink drain, counter-top air-gap or disposer, the high loop is generally not required. An check valve internal to the drain prevents back-flow into the dishwasher.

- Make sure to use an air gap if the drain hose is connected to house plumbing lower than 20" (508 mm) above subfloor or floor.



- If required, the air gap should be installed in accordance with the air gap installation instructions. When you are connecting the air gap, a rubber hose (not provided) will be needed to connect to the waste tee or disposer inlet.
- Use 1/2" (13 mm) minimum I.D. drain line fittings.

WATER SUPPLY REQUIREMENTS

- This dishwasher maybe fitted with a smart inlet hose with a water cut off valve. Do not cut the water inlet hose for any reason, to install, adapt or shorten.
- This dishwasher has a water heating feature and also requires a connection to a hot water supply line.
- A hot water line with 20 psi to 120 psi (138 kPa to 862 kPa) water pressure can be verified by a licensed plumber.
- 120°F (49°C) water at dishwasher.
- 3/8" (95 mm) O.D. copper tubing with compression fitting or flexible braided water supply line.
- Included water inlet hose with Leak Detection System for some models.
- Included 3/8" (9.5 mm) Compression x 3/4" (19 mm) Water inlet adapter (only for models with Leak Detection System).
- If installed in new construction, make sure the house water supply lines have been flushed prior to connecting the dishwasher to remove any debris that may exist in the supply line.

ELECTRICAL REQUIREMENTS

Be sure that the electrical connection and wire size are adequate and in conformance with the National Electrical Code, ANSI/NFPA 70 - latest edition, and all local codes and ordinances.

For a fee, a copy of the above code standards can be obtained from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

You Must Have:

- 120 V, 60 Hz, AC only, 15 A or 20 A, fused electrical supply.
- Copper wire only.
- A maximum of 2 field wiring supply conductors (12 AWG largest size) plus 1 grounding conductor are permitted in the terminal box.

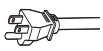
We Recommend:

- Install the dishwasher on a circuit with appropriate interrupte per your local code. The dishwasher is compatible with tim delay fuses, standard circuit breakers, and GFCI and AFCI circuit breakers.

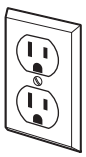
Circuit Requirement:

- The dishwasher may be installed on the same circuit as a garbage disposal providing that the branch circuit cannot exceed rated circuit load and must comply with all governing codes and regulations such as but not limited to National Electrical Code, ANSI/NFPA 70 - latest edition.
- No electrical connections other than the dishwasher power and ground connections can be made inside of the dishwasher junction box.

If Connecting Dishwasher with a Power Cord:



- Use UL Listed power cord kit marked for use with dishwasher. See the “Tools and Parts” section at the front of the Owner’s manual for part details and orders.



- Plug into a grounded 3 prong outlet. Outlet must meet all local codes and ordinances.

If Connecting Dishwasher with Direct Wiring:

- Use flexible, armored, or nonmetallic sheathed copper wire with grounding wire that meets the wiring requirements for your home and local codes and ordinances.
- Use only the supplied plastic cable fittings for flexible and non-metallic sheathed wiring (Romex, etc.). Do not use metallic strain reliefs for these wire constructions.
- Use a UL-listed/CSA-approved metallic strain relief for armored cable installations (21 mm diameter), Using the strain relief’s manufacturer installations instructions.

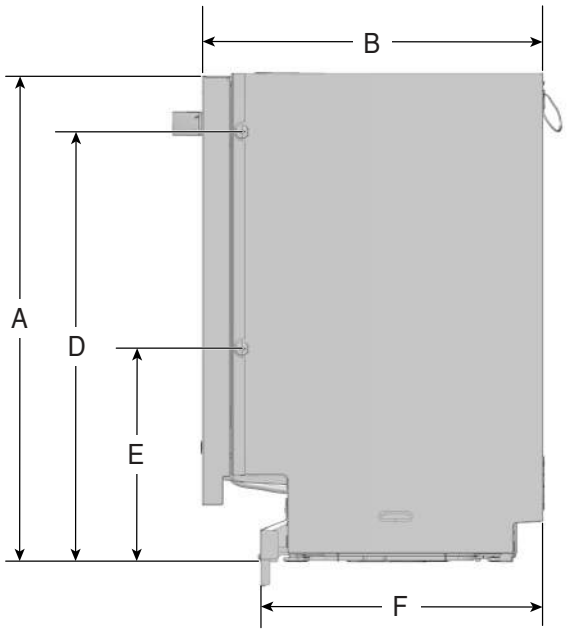
Because Whirlpool Corporation policy includes a continuous commitment to improve our products, we reserve the right to change materials and specifications without notice.

Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

W11562389A

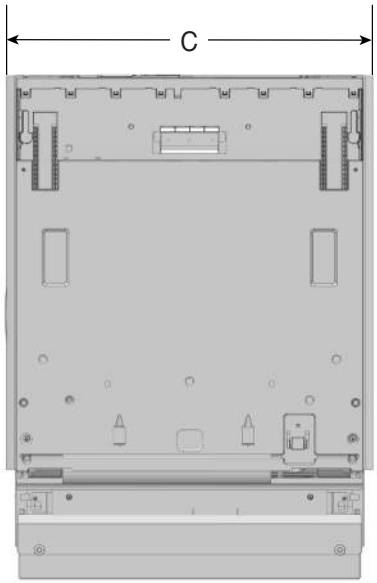
PRODUCT DIMENSIONS

C. 23 9/16" (599 mm)

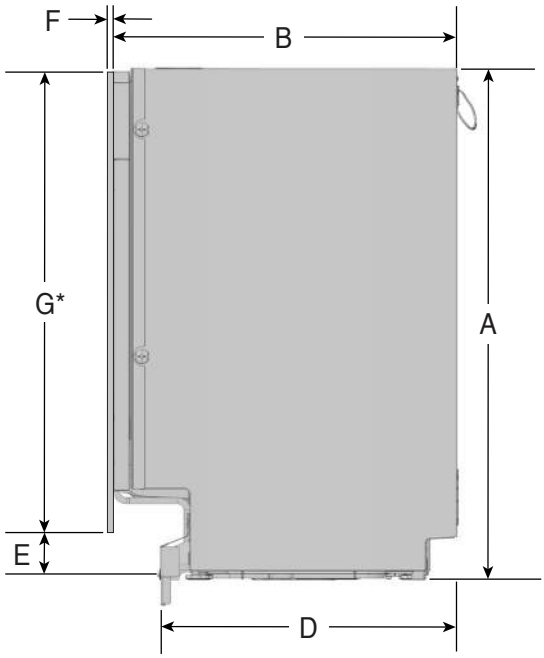


A. 32 1/4"-35 7/16" (820-900 mm)
B. 22 5/8" (574 mm)
D. 28 3/8" (721 mm)
E. 14 1/16" (358 mm)
F. 18 3/4" (477 mm)

PRODUCT DIMENSIONS (FOR PANEL READY MODELS)



C. 23 9/16" (599 mm)



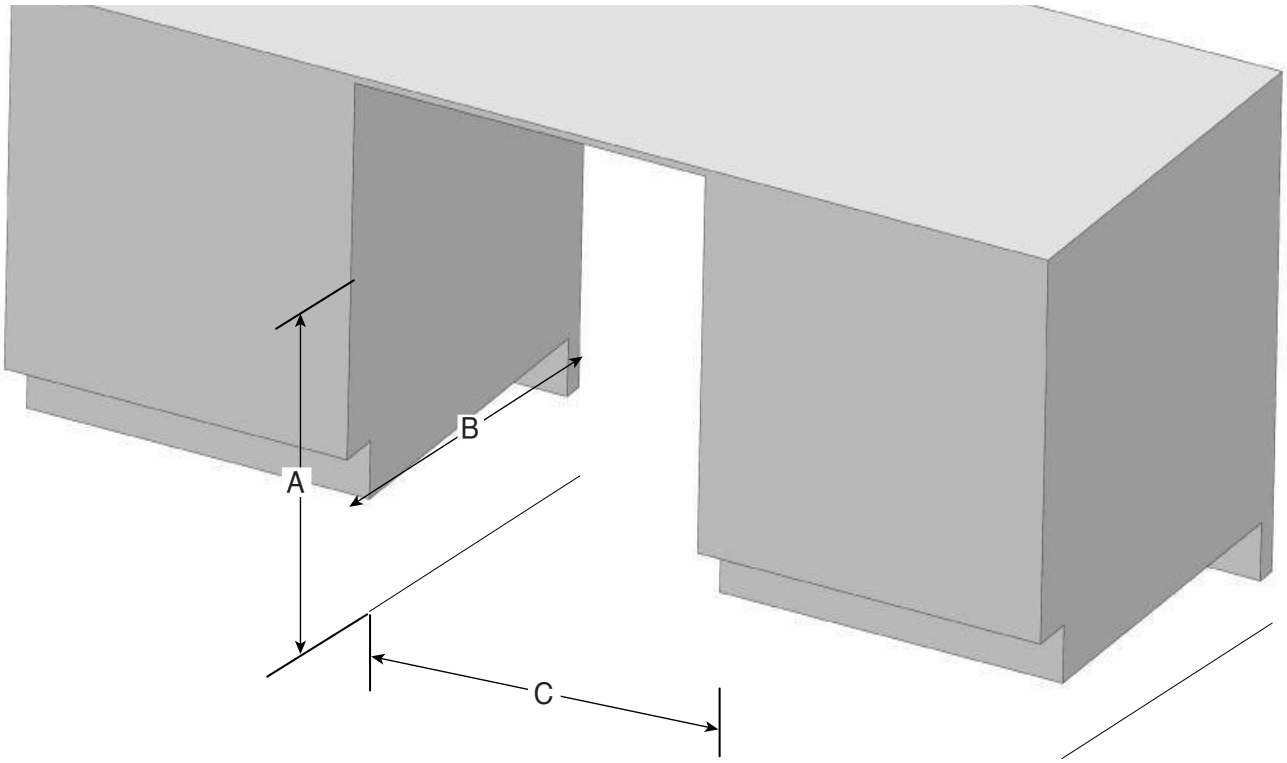
A. 32 1/4"-35 7/16" (820-900 mm)
B. 21 7/8" (555 mm)
D. 18 3/4" (477 mm)
E. E = A - G
F. 11/16"-1 3/4" (18-45 mm)
G. 28 3/8"-29 15/16" (720-760 mm)

***NOTE:** If a custom toe kick is desired to be installed, adjust the thickness of the custom panel to make it flush with the cabinet toe kick. Product's original metal toe kick must remain even if custom toe kick is installed.

Because Whirlpool Corporation policy includes a continuous commitment to improve our products, we reserve the right to change materials and specifications without notice.

Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

CABINET OPENING DIMENSIONS



A. 32 1/4"-35 7/16" (820-900 mm) measured from the lowest point on the underside of the countertop.
B. 24" (609.6 mm) Minimum
C. 23 5/8"-24 1/4" (600-616 mm) Minimum, measured from narrowest point of opening.

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Dimensions are for planning purposes only. For complete details, see Installation Instructions packed with product. Specifications subject to change without notice.

Lave-vaisselle sous comptoir

NUMÉROS DE MODÈLE DU PRODUIT

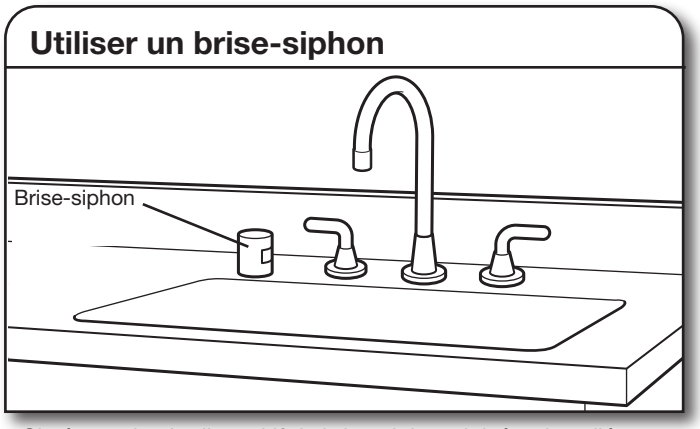
WDT550SAPW **WDT550SAPZ** **WDT550SAPB**

EXIGENCES D'ÉVACUATION

- Un tuyau d'évacuation neuf est fourni avec le lave-vaisselle. Si le tuyau de vidange n'est pas assez long, utiliser une rallonge de tuyau de vidange d'une longueur maximale de 12 pi (3,7 m).
- Veiller à raccorder le tuyau d'évacuation à la canalisation d'égout en T ou au raccord de broyeur à déchets en amont du siphon du circuit de plomberie du domicile, et à au moins 20 po (508 mm) au-dessus du sol. On recommande de lover le tuyau d'évacuation et de le fixer solidement sur la face inférieure du comptoir ou de le raccorder à un dispositif de brise-siphon.

IMPORTANT : Ce produit n'est pas équipé d'une boucle surélevée sur le côté du lave-vaisselle. L'installateur est responsable de l'ajout d'une boucle surélevée dans l'armoire adjacente. Une boucle surélevée est nécessaire si le lave-vaisselle s'écoule dans un drain de plancher. Cela permet d'éviter que l'eau ne s'écoule du lave-vaisselle pendant son fonctionnement. Lorsque le drain est raccordé à un drain d'évier, à un dispositif brise-siphon de comptoir ou à un broyeur, la boucle surélevée n'est généralement pas nécessaire. Un clapet anti-retour interne au drain empêche le reflux dans le lave-vaisselle.

- Utiliser un dispositif de brise-siphon si le tuyau d'évacuation est raccordé au circuit de plomberie du domicile à moins de 20 po (508 mm) au-dessus du sous-plancher ou du plancher.



- Si nécessaire, le dispositif de brise-siphon doit être installé conformément aux instructions d'installation de ce dernier. Lors du raccordement du dispositif de brise-siphon à la canalisation d'égout en T ou au raccord de broyeur à déchets, un tuyau en caoutchouc (non fourni) sera nécessaire.
- Utiliser des raccords de canalisation d'évacuation de diamètre intérieur de 1/2 po (13 mm) minimum.

SPÉCIFICATIONS DE L'ALIMENTATION EN EAU

- Ce lave-vaisselle peut être équipé d'un tuyau d'arrivée intelligent avec une vanne de coupure d'eau. Ne pas couper le tuyau d'arrivée d'eau pour quelque raison que ce soit, pour l'installer, l'adapter ou le raccourcir.
- Ce lave-vaisselle est doté d'une fonction de chauffage de l'eau et doit être raccordé à la canalisation d'alimentation en eau chaude.
- Une canalisation d'eau chaude, sous pression de 20 à 120 lb/po^2 (138 à 862 kPa), peut être inspectée par un plombier certifié.
- Température de 120 °F (49 °C) à l'entrée du lave-vaisselle.
- Tube de cuivre de 3/8 po (9,5 mm) de diamètre externe avec raccord de compression ou canalisation d'alimentation en eau flexible à tresse d'acier.
- Tuyau d'arrivée d'eau inclus avec le Système de Détection des Fuites pour certains modèles.
- Adaptateur de compression de 3/8 po (9,5 mm) x 3/4 po (19 mm) inclus pour l'arrivée d'eau (uniquement pour les modèles avec Système de Détection des Fuites).
- S'il est installé dans une nouvelle construction, vous assurer que l'entrée d'eau de la maison a été nettoyée avant d'effectuer le branchement au lave-vaisselle pour en enlever les débris possibles.

SPÉCIFICATIONS ÉLECTRIQUES

S'assurer que le raccordement électrique est adéquat et conforme au Code National de l'Électricité, ANSI/NFPA 70 – dernière édition, et à tous les codes et règlements locaux en vigueur.
Pour obtenir un exemplaire gratuit des normes des codes ci-dessus, contacter :

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

Il vous faut :

- Alimentation de 120 V CA à 60 Hz et protégée par un fusible de 15 ou 20 A.
- Conducteurs de cuivre uniquement.
- Un maximum de deux conducteurs d'alimentation (calibre 12 AWG maximum) plus un conducteur de mise à la terre est autorisé dans le boîtier de connexion.

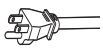
Nous recommandons :

- Installer le lave-vaisselle sur un circuit doté d'un interrupteur approprié, conformément au code local. Le lave-vaisselle est compatible avec les fusibles temporisés, les disjoncteurs standard et les disjoncteurs différentiels (GFCI) et disjoncteurs d'arc électrique (AFCI).

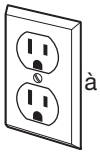
Spécifications du Circuit :

- Le lave-vaisselle peut être installé sur le même circuit que le broyeur à déchets en s'assurant que ce circuit ne dépasse pas la charge nominale et qu'il respecte les normes et codes dont, mais ne se limitant pas, au Code National de l'Électricité, ANSI/NFPA 70 – dernière édition.
- Aucun autre raccordement électrique que ceux des conducteurs d'alimentation et de mise à la terre du lave-vaisselle ne peuvent être effectués à l'intérieur du boîtier de raccordement électrique du lave-vaisselle.

Pour le Raccordement du Lave-vaisselle avec un Cordon d'Alimentation Électrique :



- Utiliser un cordon d'alimentation (homologation UL) conçu pour utilisation avec un lave-vaisselle. Voir la section « Outils et Pièces » sur la couverture du manuel de l'Utilisateur pour des détails sur les pièces et pour commander.



- Brancher l'appareil sur une prise à 3 alvéoles reliée à la terre. La prise doit être conforme tous les codes et règlements locaux.

Pour le Raccordement Direct du Lave-vaisselle :

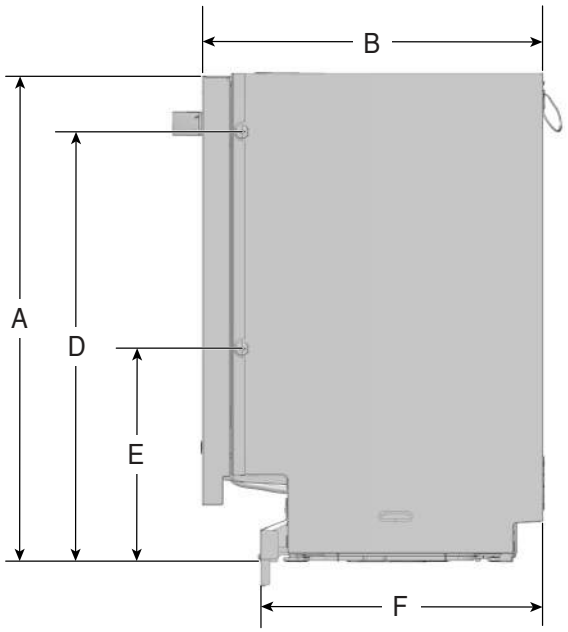
- Utiliser des conducteurs de cuivre gainés non métalliques ou blindés souples avec conducteur de liaison à la terre qui satisfassent aux exigences de l'installation électrique du domicile, et qui soient conformes aux prescriptions des codes et règlements locaux.
- Utiliser seulement les raccords de câble en plastique fournis pour les câbles flexibles et les câbles à gaine non métallique (Romex, etc.). Ne pas utiliser de serre-câbles métalliques pour ces constructions de fils.
- Utiliser un serre-câbles métallique homologuée UL/CSA pour les installations de câbles armés (21 mm de diamètre). Respecter les instructions d'installation du serre-câbles.

La politique de Whirlpool Corporation, c'est aussi notre engagement à travailler sans relâche à l'amélioration de nos produits; aussi nous nous réservons le droit de modifier les matériaux et spécifications sans préavis.

Les dimensions sont indiquées à des fins de planification uniquement. Pour des détails complets, voir les Instructions d'Installation fournies avec le produit. Spécifications indiquées sous réserve de modifications.

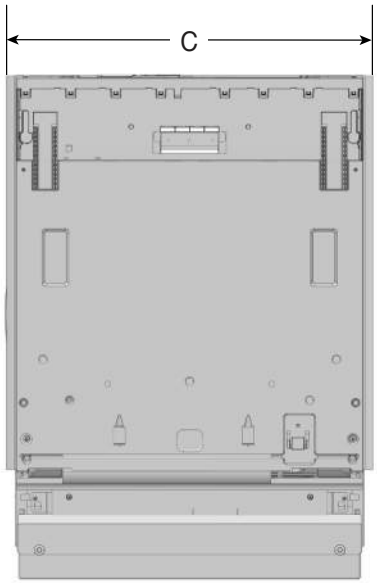
DIMENSIONS DU PRODUIT

C. 23 9/16 po (599 mm)

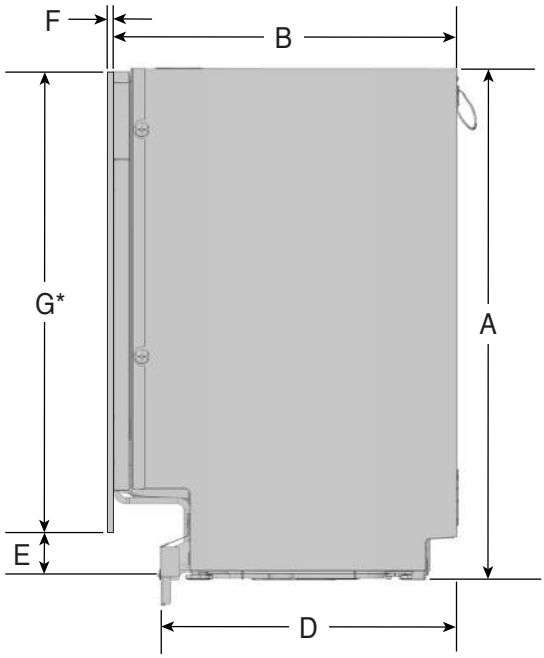


A. 32 1/4 po-35 7/16 po (820-900 mm)
B. 22 5/8 po (574 mm)
D. 28 3/8 po (721 mm)
E. 14 1/16 po (358 mm)
F. 18 3/4 po (477 mm)

DIMENSIONS DU PRODUIT (POUR LES MODÈLES AVEC PANNEAU PRÊT-À-INSTALLER)



C. 23 9/16 po (599 mm)



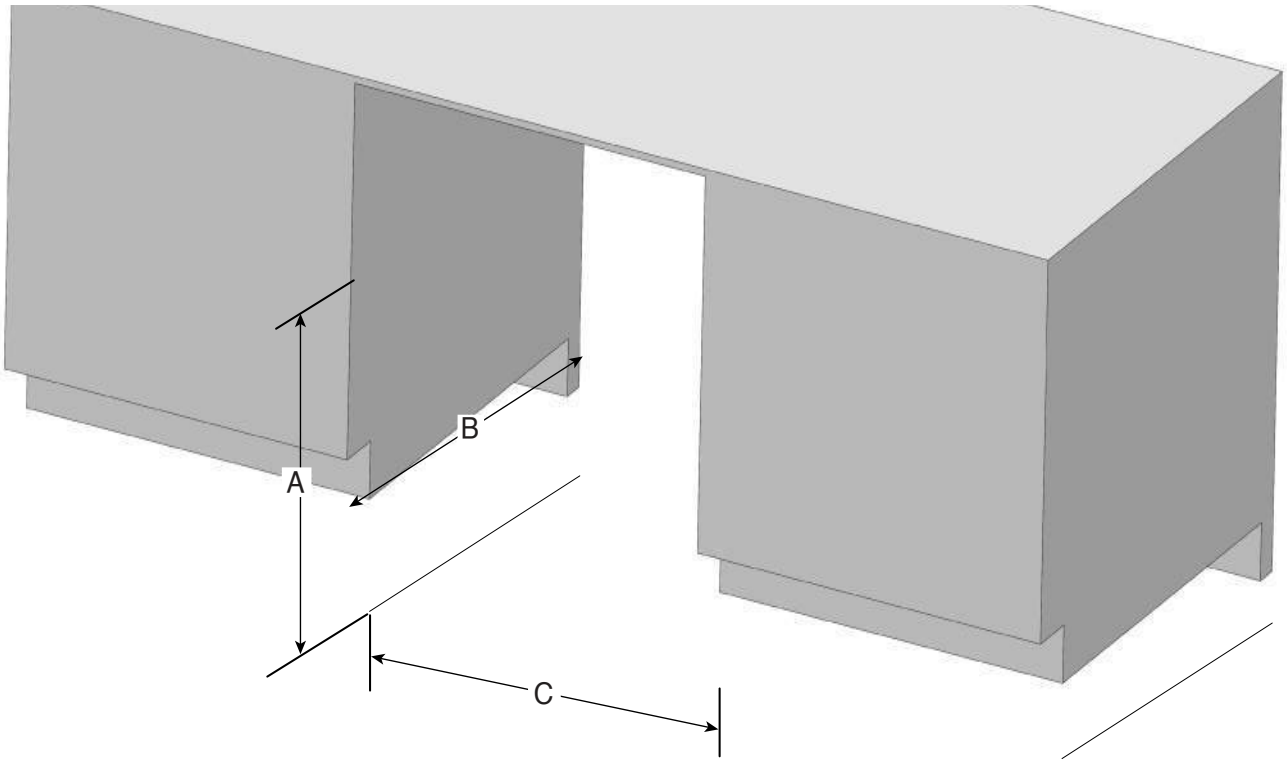
A. 32 1/4 po-35 7/16 po (820-900 mm)
B. 21 7/8 po (555 mm)
D. 18 3/4 po (477 mm)
E. E = A - G
F. 11/16 po-1 3/4 po (18-45 mm)
G. 28 3/8 po-29 15/16 po (720-760 mm)

***REMARQUE :** Pour installer une plinthe personnalisée, ajuster l'épaisseur du panneau personnalisé pour qu'il soit au même niveau que la plinthe du meuble.w La plinthe métallique d'origine du produit doit rester en place même si une plinthe personnalisée est installée.

La politique de Whirlpool Corporation, c'est aussi notre engagement à travailler sans relâche à l'amélioration de nos produits; aussi nous nous réservons le droit de modifier les matériaux et spécifications sans préavis.

Les dimensions sont indiquées à des fins de planification uniquement. Pour des détails complets, voir les Instructions d'Installation fournies avec le produit. Spécifications indiquées sous réserve de modifications.

DIMENSIONS DE L'OUVERTURE DE L'ARMOIRE



A. 32 1/4 po à 35 7/16 po (820 à 900 mm) depuis le point le plus bas de la face inférieure du plan de travail.
B. Minimum de 24 po (609,6 mm)
C. 23 5/8 po-24 1/4 po (600-616 mm) Minimum mesuré au point le plus étroit de l'ouverture.

La politique de Whirlpool Corporation, c'est aussi notre engagement à travailler sans relâche à l'amélioration de nos produits; aussi nous nous réservons le droit de modifier les matériaux et spécifications sans préavis.

Les dimensions sont indiquées à des fins de planification uniquement. Pour des détails complets, voir les Instructions d'Installation fournies avec le produit. Spécifications indiquées sous réserve de modifications.

Lavavajillas para instalarse debajo del mostrador

NÚMEROS DE MODELOS DE PRODUCTOS

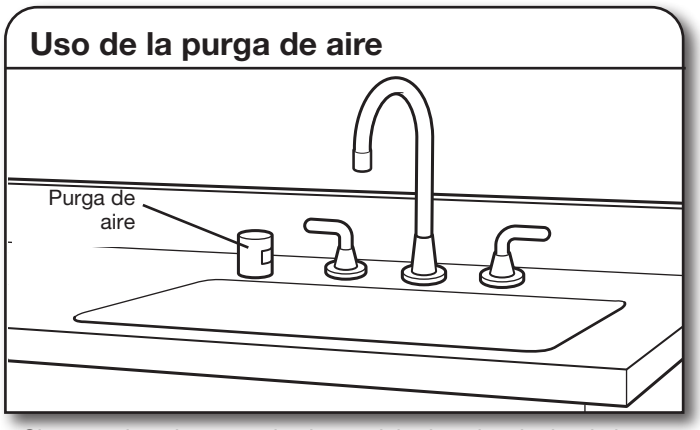
WDT550SAPW WDT550SAPZ WDT550SAPB

REQUISITOS DE DESAGÜE

- Se provee una manguera nueva de desagüe con su lavavajillas. Si la manguera de desagüe no es lo suficientemente larga, utilice una extensión de manguera de desagüe con una longitud máxima de 12 pies (3,7 m).
- Asegúrese de conectar la manguera de desagüe al conector de residuos en "T" o a la entrada del colector de residuos sobre el sifón de desagüe en la plomería de la casa, y a un mínimo de 20" (508 mm) por encima del piso. Se recomienda que la manguera de desagüe se enrolle y fije con firmeza a la parte inferior del mostrador o que se conecte a una purga de aire.

IMPORTANTE: Este producto no está equipado con un circuito alto en el lateral del lavavajillas. El instalador es responsable de añadir un circuito alto en el gabinete adyacente. Se requiere un circuito alto si el lavavajillas va a vaciar en un desagüe de piso. De este modo se evita la salida de agua del lavavajillas durante el funcionamiento. Cuando el desagüe está conectado a un desagüe de fregadero, a una cámara de aire de mostrador o a un triturador de basura, el circuito alto no suele ser necesario. Una válvula de retención interna al desagüe impide el reflujo hacia el lavavajillas.

- Asegúrese de utilizar una purga de aire si la manguera de desagüe está conectada a la plomería de la casa a una altura menor de 20" (508 mm) sobre el contrapiso o el piso.



- Si se requiere, la purga de aire se debe instalar siguiendo las instrucciones de instalación de la misma. Al conectar la purga de aire, se requiere una manguera de goma (no proporcionada) para conectarla al tubo de residuos en "T" o la entrada del colector de residuos.
- Use accesorios para líneas de desagüe con un diámetro interior de 1/2" (13 mm) mínimo.

REQUISITOS DE SUMINISTRO DE AGUA

- Este lavavajillas puede estar equipado con una manguera de entrada inteligente con válvula de corte de agua. No corte la manguera de entrada de agua por ningún motivo, ni para instalarla, adaptarla o acortarla.
- Este lavavajillas tiene una función de calentamiento de agua y también requiere una conexión a una tubería de suministro de agua caliente.
- Una tubería de agua caliente con presión de agua de 20 psi a 120 psi (de 138 kPa a 862 kPa), que pueda ser verificada por un plomero autorizado.
- Agua a 120 °F (49 °C) en el lavavajillas.
- Tubería de cobre con un diámetro externo de 3/8" (9,5 mm) con racor con conexión de compresión o tubería de suministro de agua trenzada flexible.
- Manguera de entrada de agua incluida con Sistema de Detección de Fugas para algunos modelos.
- Incluye el adaptador de entrada de agua de 3/8" (9,5 mm) con compresión x 3/4" (19 mm) (solo para modelos con Sistema de Detección de Fugas).
- Si la instalación se realiza en una construcción nueva, asegúrese de enjuagar las tuberías de suministro de agua domésticas antes de conectar la lavavajillas para eliminar cualquier residuo presente en la tubería de suministro.

REQUISITOS ELÉCTRICOS

Asegúrese de que la conexión eléctrica y el tamaño del cable sean adecuados y cumplan con el Código Nacional Eléctrico, ANSI/NFPA 70, su edición más reciente, y con todos los códigos y las ordenanzas locales.

Puede obtener una copia sin costo de los códigos antes indicados en:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

Usted debe tener:

- Un suministro eléctrico de 120 V, 60 Hz., CA solamente, con fusibles de 15 A o 20 A.
- Solo cable de cobre.
- Se permite un máximo de 2 conductores de suministro de cable en sitio (tamaño máximo: 12 AWG) y 1 conductor de conexión a tierra en la caja de terminales.

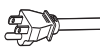
Se recomienda:

- Instale el lavavajillas en un circuito con interrupción adecuada según su código local. El lavavajillas es compatible con fusibles temporizados, disyuntores estándar y disyuntores GFCI y AFCI.

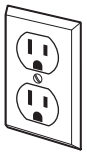
Requisitos del Circuito:

- El lavavajillas se puede instalar en el mismo circuito que el triturador de basura siempre y cuando el circuito derivado no exceda la carga calculada del circuito y cumpla con todos los códigos y regulaciones vigentes, como, por ejemplo, la edición más reciente del Código Nacional Eléctrico, ANSI/NFPA 70.
- No se puede realizar ninguna otra conexión eléctrica dentro de la caja de conexiones del lavavajillas más que la conexión a tierra y la de suministro eléctrico de este.

Conexión del Lavavajillas con un Cable de Alimentación:



- Use un cable de suministro de energía con certificación UL para uso con lavavajillas. Consulte la sección "Herramientas y Piezas" al principio del manual del Propietario para los detalles y el pedido de piezas.



- Conecte a un tomacorriente con conexión a tierra de 3 terminales. El tomacorriente debe cumplir con todos los códigos y ordenanzas locales.

Conexión del Lavavajillas con Cableado Directo:

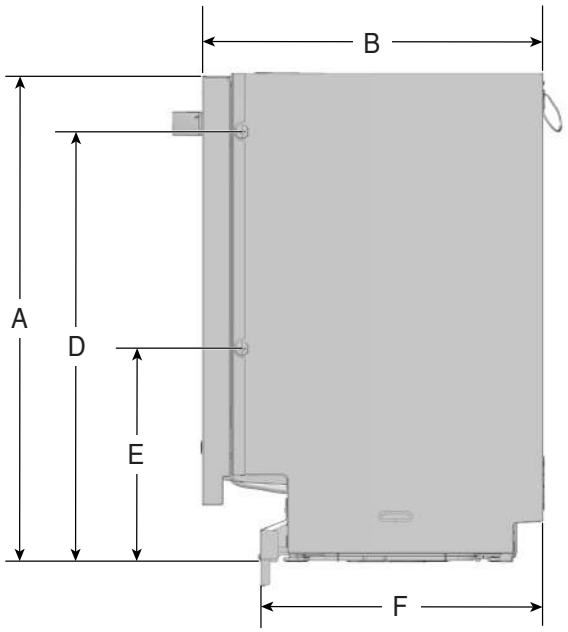
- Utilice un cable de cobre flexible, blindado o con una funda no metálica con un cable de conexión a tierra que cumpla con los requisitos de cableado para su hogar y con los códigos y ordenanzas locales.
- Use solamente los racores de plástico suministrados para el cableado flexible y no metálico (Romex, etc.). No use alivios de tensión metálicos para estas construcciones de cables.
- Use un alivio de tensión metálico homologado por UL/CSA para las instalaciones de cables armados (21 mm de diámetro), siguiendo las instrucciones de instalación del fabricante del alivio de tensión.

Debido a que la política de Whirlpool Corporation incluye un compromiso continuo para mejorar sus productos, se reserva el derecho de cambiar los materiales y las especificaciones sin previo aviso.

Las dimensiones son solo para fines de planificación. Para obtener los detalles completos, vea las Instrucciones de Instalación incluidas con el producto. Las especificaciones están sujetas a cambio sin previo aviso.

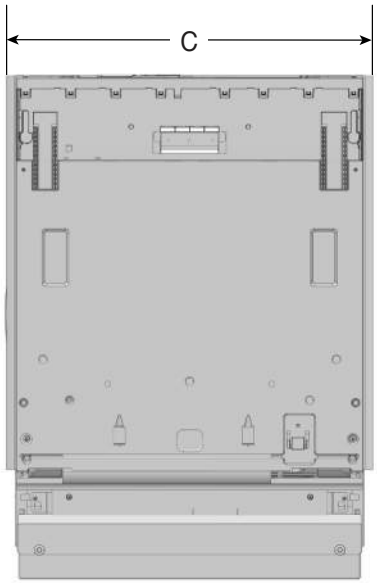
DIMENSIONES DEL PRODUCTO

C. 23 9/16" (599 mm)

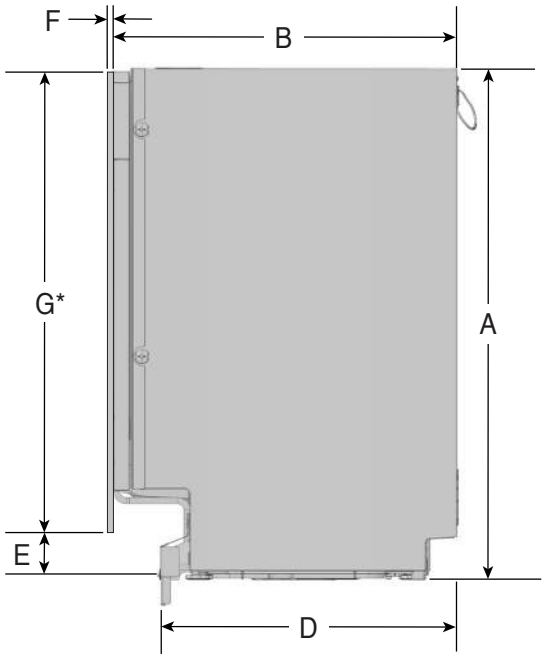


A. 32 1/4"-35 7/16" (820-900 mm)
B. 22 5/8" (574 mm)
D. 28 3/8" (721 mm)
E. 14 1/16" (358 mm)
F. 18 3/4" (477 mm)

DIMENSIONES DEL PRODUCTO (PARA MODELOS LISTOS PARA PANEL)



C. 23 9/16" (599 mm)



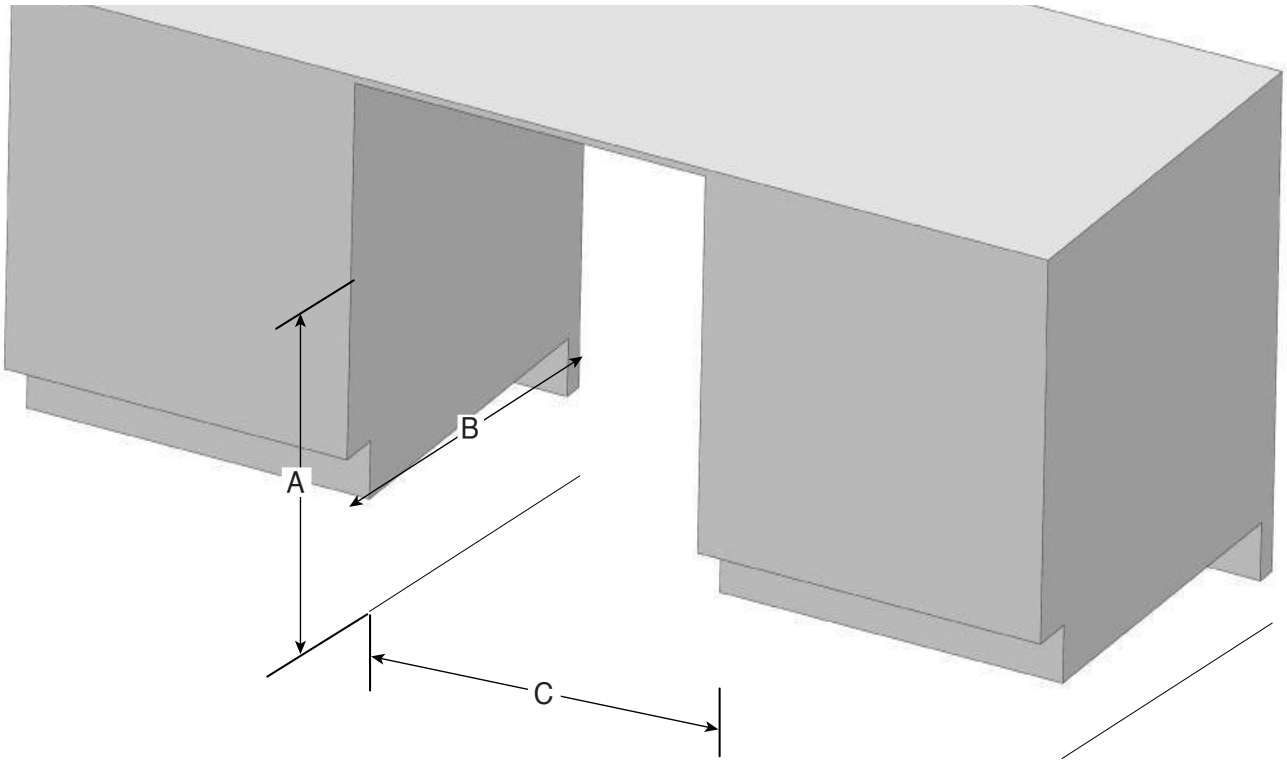
A. 32 1/4"-35 7/16" (820-900 mm)
B. 21 7/8" (555 mm)
D. 18 3/4" (477 mm)
E. E = A - G
F. 11/16"-1 3/4" (18-45 mm)
G.28 3/8"-29 15/16" (720-760 mm)

***NOTA:** Si se desea instalar un zócalo a medida, ajuste el grosor del panel a medida para que quede enrasado con el zócalo del gabinete. El zócalo metálico original del producto debe permanecer aunque se instale un zócalo personalizado.

Debido a que la política de Whirlpool Corporation incluye un compromiso continuo para mejorar sus productos, se reserva el derecho de cambiar los materiales y las especificaciones sin previo aviso.

Las dimensiones son solo para fines de planificación. Para obtener los detalles completos, vea las Instrucciones de Instalación incluidas con el producto. Las especificaciones están sujetas a cambio sin previo aviso.

DIMENSIONES DE LA ABERTURA DEL GABINETE



A. 32 1/4"-35 7/16" (820-900 mm) medido desde el punto más bajo de la parte inferior del mostrador.
B. 24" (609,6 mm) Mínimo
C. 23 5/8"-24 1/4" (600-616 mm) Mínimo, medido desde el punto más estrecho de la abertura.

Debido a que la política de Whirlpool Corporation incluye un compromiso continuo para mejorar sus productos, se reserva el derecho de cambiar los materiales y las especificaciones sin previo aviso.

Las dimensiones son solo para fines de planificación. Para obtener los detalles completos, vea las Instrucciones de Instalación incluidas con el producto. Las especificaciones están sujetas a cambio sin previo aviso.

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#1 Home Improvement Retailer

Pleasant Ridge 10PM 45213 Wh Pleasant Ridge 10PM 45213 Shop All Services DIY Log In

Home / Appliances / Garbage Disposals

Internet # 206577650 Model # GXP50C Store SKU # 1001619357

Top Rated

2.0k

MOEN

Prep Series 1/2 HP Continuous Feed Garbage Disposal with Power Cord and Universal Mount

(3790) Questions & Answers (191)

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5. BUILDING SPECIFICATIONS

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

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DOCUMENT 000115 - LIST OF DRAWING SHEETS

PART 1 - GENERAL

1.1 LIST OF DRAWINGS

A. Drawings: Drawings that will be enumerated in the Owner/Contractor Agreement as part of the Contract Documents are listed on the Table of Contents page of the separately bound drawing set titled

1. 1526 LINN ST SET - SHEET INDEX, 1502 LINN STREET - SHEET INDEX, 1431 LINN STREET - SHEET INDEX ,, dated 8/4/2025, as modified by subsequent Addenda and Modifications.
2. The words "Resource Drawing" or "For information" after the titles of drawings indicate that those drawings are not intended to be incorporated in the Contract Documents.

B. List of Drawings: Drawings that will be enumerated in the Owner/Contractor Agreement as part of the Contract Documents are the following Drawings and other drawings of type indicated, as modified by subsequent Addenda and Modifications:

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PART 2 - EXECUTION (Not Used)

END OF DOCUMENT 000115

DOCUMENT 003126 - EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for the Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. An existing mold report for Project, **Insert agency or firm name**>, **Insert date of report**>, [**on Project web-based bidding management software site**][**as appended to this Project Manual**].

C. An existing radon report for Project

D. Related Requirements:

1. "Invitation for Bids, Schedule and Instructions" for the Bidder's responsibilities for examination of Project site and existing conditions.
2. Division 02 Sections for abatement of hazardous materials.
3. Section 024119 "Selective Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 003126

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Contractor's use of site and premises.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and Drawing conventions.
8. Miscellaneous provisions.

1.2 PROJECT INFORMATION

A. Project Identification: Linn Street Exchange RAD Conversion Renovations, Solicitation No. 2025-3018.

1. Project Location: 1436 Linn Street, 1502 Linn Street, and 1526 Linn Street, Cincinnati, OH.

B. Owner: Cincinnati Metropolitan Housing Authority.

1. Owner's Representative: Michael Koch, michael.koch@cintimha.com.

C. Architect: Envisage Architecture, Sarah Kleiner, skleiner@envisage-arch.com.

1. Architect's Representative: Krista Nicholas, knicholas@envisage-arch.com.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Building Envelope Specialist: RDA Group Architects.

a. Principal, Sr. Project Architect Representative: Jonathan Schaaf, jrs@rda-group.com.

2. Mechanical, Electrical, Plumbing Engineering: True Power Systems

a. Owner Representative: Ben True, ben@truepowersystems.com

E. Other Owner Consultants: Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

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1. Sustainability Assessment: SOL Design & Consulting has prepared the following portions of the Contract Documents:

    a. Assistant Project Manager Representative: David Su, davids@solconsults.com.

F. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination" for requirements for using web-based Project software.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. <**Insert a brief description of Project indicating the size, code classification for occupancy and construction type, and general description of major building assemblies**> and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.
2. Project will be constructed under coordinated, concurrent multiple contracts. See Section 011200 "Multiple Contract Summary" for a list of multiple contracts, a description of work included under each of the multiple contracts, and the responsibilities of Project coordinator.

1.4 PHASED CONSTRUCTION

A. Construct the Work in phases, with each phase substantially complete as indicated on Drawings.

1. Phase 1: 1436 Linn St. renovation.

    a. Commencement of Construction:

        1) Notice to Proceed: Work of this phase shall commence within 30 days after the Notice to Proceed.
        2) Start Date: Work of this phase shall commence by July 1, 2026.

    b. Substantial Completion:

        1) Within 112 days after commencement of construction of this phase.

2. Phase 2: 1502 Linn St Renovation

    a. Commencement of Construction

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1) Notice to Proceed: Work of this phase shall commence withing 30 days after the Notice to Proceed.
2) Start Date: Work of this phase shall commence by October 27, 2026

b. Substantial Completion:

1) Within 112 days after commencement of construction of this phase

3. Phase 3: 1526 Linn St. Renovation

a. Commencement of Construction

1) Notice to Proceed: Work of this phase shall commence within 30 days after the Notice to Proceed.
2) Start Date: Work of this phase shall commence by March 1, 2027

b. Substantial Completion:

1) Within 112 days after commencement of construction of this phase

B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule, showing the sequence, commencement and completion dates, and move-out and -in dates of Owner's personnel for all phases of the Work.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012100 "Allowances" for products selected under an allowance.
2. Section 012300 "Alternates" for products selected under an alternate.
3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 ACTION SUBMITTALS

A. Substitution Requests: Submit documentation identifying 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 form acceptable to Architect.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
b. Coordination of 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 substitutions 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 as well as 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. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the

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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.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. 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.

l. 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 through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven 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.

1.3 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 018113.16 "Sustainable Design Requirements - LEED 2009 for Commercial Interiors" for sustainable design submittals.
2. Section 018113.19 "Sustainable Design Requirements - LEED 2009 for Core and Shell Development" for sustainable design submittals.
3. Section 018113.23 "Sustainable Design Requirements - LEED 2009 for Schools" for sustainable design submittals.
4. Section 018113.14 "Sustainable Design Requirements - LEED v4 BD+C" for sustainable design submittals.
5. Section 018113.17 "Sustainable Design Requirements - LEED v4 ID+C" for sustainable design submittals.
6. Section 018113.33 "Sustainable Design Requirements - IgCC" for sustainable design submittals.
7. Section 018113.43 "Sustainable Design Requirements - ASHRAE 189.1" for sustainable design submittals.
8. Section 018113.53 "Sustainable Design Requirements - Green Globes" for sustainable design submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

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SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for alteration work.

1.2 INFORMATIONAL SUBMITTALS

A. Alteration Work Subschedule:

1. Submit alteration work subschedule within 30 days of date established for commencement of alteration work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.

C. Alteration Work Program: Submit 30 days before work begins.

D. Fire-Prevention Plan: Submit 30 days before work begins.

1.3 QUALITY ASSURANCE

A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.

a. Construct new mockups of required work whenever a supervisor is replaced.

B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.

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1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

D. Safety and Health Standard: Comply with ANSI/ASSP A10.6.

1.4 FIELD CONDITIONS

A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings preconstruction photographs.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."

B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

C. Owner's Removals: Before beginning alteration work, verify in correspondence with Owner that the following items have been removed:

1. Trash.

D. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

PART 2 - PRODUCTS - (Not Used)
PART 3 - EXECUTION

3.1 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to

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which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

END OF SECTION 013516

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SECTION 01 45 23 - TESTING

PART 1 - GENERAL

1.1 PULL / UPLIFT RESISTANCE TESTING:

A. Obtain independent third party firm to accomplish field pull testing [uplift resistance] of the existing OSB roof sheathing. Provide documentation to Owner and Architect for review.

B. Results of the pull tests may result in changes to the fastening rates in accordance with the manufacturer's requirements.

1.2 MOISTURE SURVEY

A. No moisture survey was conducted for this project.

1.3 ROOF MOUNTED EQUIPMENT

A. Anchor all existing roof-mounted equipment or provide new support stands to resist, uplift, sliding and overturning in accordance with building code requirements [includes equipment supports to the deck and equipment attachment to supports].

1.4 DRAINAGE TESTING

A. Prior to start of work, test each roof drain / scupper / downspout or other drainage component for proper water flow. Notify Architect / Owner of any clogged, leaking drainage and roof drains that cannot have the roof membrane secured to the existing clamping ring [broken, bolts, etc] or the drain bowl is cracked or bowl pipe connection is leaking/not watertight or piping below drain is leaking, blocked or otherwise not functioning [refer to the drawings]. The contractor shall identify any corrective actions and location of deficiencies. Commencement of work without notification shall constitute acceptance of drainage devices and any costs to unclog or repair these items shall be borne by the Contractor.

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of This 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 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012500 "Substitution Procedures" for requests for substitutions.
3. Section 014200 "References" for applicable industry standards for products specified.

1.2 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. Resolution of Compatibility Disputes between Multiple Contractors:

a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products will be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is inconspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

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a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 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.
3. Installation.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting surveys.
2. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to submitting cutting and patching plan, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.
d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

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1.3 INFORMATIONAL SUBMITTALS

A. 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.

1.4 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. 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, or when encountering the need for cutting and patching of elements whose structural function is not known, 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. Plumbing piping systems.
f. Mechanical systems piping and ducts.
g. Control systems.

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h. Communication systems.
i. Fire-detection and -alarm systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Operating systems of special construction.
m. <**Insert operating system**>.

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.
h. <**Insert miscellaneous element**>.

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.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

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. Use materials that are not considered

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hazardous.

C. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. 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 [**96 inches**]<**Insert dimension**> in occupied spaces and [**90 inches**]<**Insert dimension**> in unoccupied spaces, unless otherwise indicated on Drawings.

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 satisfactory results as judged by Architect. 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 of type expected for Project.

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: Select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.

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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, as judged by Architect. Fit exposed connections together to form hairline joints.

END OF SECTION 017300

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous [**demolition**][**and**][**construction**] waste.
2. Recycling nonhazardous [**demolition**][**and**][**construction**] waste.
3. Disposing of nonhazardous [**demolition**][**and**][**construction**] waste.

1.2 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within [**7**][**30**]<**Insert number**> days of date established for [**commencement of the Work**][**the Notice to Proceed**][**the Notice of Award**]. Plan must include the following:

1. Strategies to reduce the generation of waste during Project design and construction.
2. Waste diversion goals for Project, identifying the materials (both structural and nonstructural) targeted for recycling, reuse, or salvage and identifying the target diversion percentage (at least 50 percent).
3. Where materials will be taken, including expected diversion rates for each material.

1.3 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**]<**Insert Owner's form designation**>. 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.

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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. LEED Submittal: Submit documentation to GBCI, signed by Contractor, tabulating total waste material, quantities diverted, and means by which it is diverted, along with a statement that requirements for the credit have been met. Respond to questions and requests from USGBC regarding construction waste management and disposal until the GBCI Reviewer has made its determination on Project's LEED certification application. Document correspondence with USGBC as informational submittals.

H. Qualification Statements: For [**waste management coordinator**][**and**][**refrigerant recovery technician**].

I. 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 in accordance with EPA regulations. Include name and address of technician and date refrigerant was recovered.

J. Refrigerant Recovery: Comply with requirements in [**Section 024116 "Structure Demolition"**][**Section 024119 "Selective Demolition"**] for refrigerant recovery submittals.

1.4 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent [**may**][**may not**] serve as Waste Management Coordinator.

1. Firm employs a LEED Accredited Professional, certified by USGBC, as waste management coordinator.
2. Waste management coordinator may also serve as LEED coordinator.

B. Refrigerant Recovery Technician Qualifications:

1. [**Type I**][**Type II**][**Type III**][**Universal**], certified by EPA-approved certification program.
2. Comply with requirements in [**Section 024116 "Structure Demolition."**][**Section 024119 "Selective Demolition."**]

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C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "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 each contractor and 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of [**50**][**75**]<**Insert number**> percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in 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. Asphalt paving.
b. Concrete.
c. Concrete reinforcing steel.
d. Brick.
e. CMU.
f. Wood studs.
g. Wood joists.
h. Plywood and oriented strand board.
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.

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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.
pp. <**Insert materials required**>.

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) Wood pallets.
8) Plastic pails.

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m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:

1) Paper.
2) Aluminum cans.
3) Glass containers.

n. <**Insert materials required**>.

PART 3 - EXECUTION (Not Used)

END OF SECTION 017419

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SECTION 018113

SUSTAINABILITY DESIGN REQUIREMENTS

Linn St Exchange

PART 1 GENERAL

GENERAL CONDITIONS

A. The General Conditions, Modifications to General Conditions, Supplementary or Special Conditions and any Instructions to Bidders shall apply to all Divisions of work.
B. The requirements of State, Local or appropriate codes applicable to the work, whichever is the most stringent is a requirement of all Divisions of work.

WORK OF THIS SECTION

A. Section includes:
    1. Sustainable Project Goals
    2. Enterprise Green Communities Certification requirements
B. The intent of this project is to achieve an Enterprise Green Communities 2020 certification.
C. Contractor shall coordinate work and requirements with Owner Contracted Green Rater/Verifier for Green certifications. Pertinent to green certifications the role of the Green Rater/Verifier is to guide the construction team with certification process; review documentation, verify green requirements are met; and to perform third-party testing.

REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
    1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
    2. ASHRAE 62 - Ventilation for Acceptable Indoor Air Quality.
    3. ASHRAE 90.1 - Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
    4. ASHRAE 129 - Measuring Air-Change Effectiveness.
B. ASTM International:
    1. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
    2. ASTM E903 - Standard Test Method for Solar Absorption, Reflectance, and Transmittance of Materials Using Integrating Spheres.
C. Forest Stewardship Council: FSC Guidelines- Forest Stewardship Council Guidelines.
D. Sheet Metal and Air Conditioning Contractors: SMACNA IAQ - IAQ Guidelines for Occupied Buildings under Construction.
E. South Coast Air Quality Management District: SCAQMD Rule 1168 - Adhesive and Sealant Applications.
F. South Coast Air Quality Management District: SCAQMD Rule 1113 – Interior paints, coatings, and primers.
G. SCS Global Services Recycled Content Certification
H. California Department of Public Health (CDPH) emission standard, formerly California 01350 – VOC emission limits
I. CARB Phase 2 – composite wood formaldehyde emissions testing standard
J. American National Standards Institute (ANSI) / American Water Works Association (AWWA) C810-17 Standard
K. National Pollutant Discharge Elimination System (NPDES)'s Stormwater Discharges from Construction Activities guidance
L. U.S. Environmental Protection Agency:
    1. EPA Baseline IAQ - Testing for Indoor Air Quality, Baseline IAQ, and Materials Section 01445.
    2. EPA 402-K-01-002 – A Step-by-Step Guide on how to Build Radon-Resistant Homes

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section Includes:

1. Demolition and removal of selected portions of exterior or interior of building or structure and site elements.
2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
3. Section 017300 "Execution" for cutting and patching procedures.
4. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
5. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.
6. Section 330500 "Common Work Results for Utilities" for removal of site utility systems piping, equipment, and components.

1.2 PREINSTALLATION MEETINGS

A. Predemolition 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 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.
6. Review and finalize protection requirements.
7. Review procedures for noise control.
8. Review storage, protection, and accounting for items to be removed for salvage or reinstallation.

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1.3 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For refrigerant recovery technician.

B. 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.

C. 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 Owner's on-site operations are uninterrupted.
2. Temporary interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. 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 in accordance with EPA regulations. Include name and address of technician and date refrigerant was recovered.

E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.4 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.5 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Type III certified by an EPA-approved certification program.

1.6 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted in occupied commercial spaces.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

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a. <**Insert items to be removed by Owner**>.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials:

1. It is not expected that hazardous materials will be encountered in the Work.

a. Hazardous materials will be removed by Owner before start of the Work.
b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

2. Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is [**on file**][**included in Section 003126 "Existing Hazardous Material Information"**] for review and use. Examine report to become aware of locations where hazardous materials are present.

a. Hazardous material remediation is specified in Section <**Insert Section number**> "<**Insert Section title**>."
b. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified in Section <**Insert Section number**> "<**Insert Section title**>."
c. Owner will provide material safety data sheets for hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

E. On-site sale of removed items or materials is not permitted.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:

1. <**Insert warranted system**>.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

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PART 2 - PRODUCTS

2.1 PERFORMANCE 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/ASSP A10.6 and NFPA 241.

C. Sustainable Design Requirements for Building Reuse:

1. Maintain the existing building structure, envelope, and interior nonstructural elements of an abandoned or blighted building. Do not demolish such existing construction beyond indicated limits.
2. Maintain the existing building structural systems where indicated to remain. Do not demolish such existing construction beyond indicated limits.
3. Maintain the existing interior ceilings, interior partitions, and/or demountable walls where indicated to remain. Do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 UTILITY SERVICES AND BUILDING SYSTEMS

A. Existing Services/Systems to Remain: Maintain utilities and building systems and equipment to remain and protect against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utilities and building systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If disconnection of utilities and building systems will affect adjacent occupied parts of the building, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to those parts of the building.
4. Demolish and remove existing building systems, equipment, and components indicated on Drawings 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. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

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c. Equipment to Be Removed: Disconnect and cap services and remove equipment and components.

5. Abandon existing building systems, equipment, and components indicated on Drawings to be abandoned in place.

   a. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
   b. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

6. Remove and reinstall/salvage existing building systems, equipment, and components indicated on drawings to be removed and reinstalled or removed and salvaged:

   a. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment and components; when appropriate, reinstall, reconnect, and make equipment operational.
   b. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and components and deliver to Owner.

3.2 SELECTIVE DEMOLITION SCHEDULE

A. Remove: <**Insert description of items and construction to remove**>.

B. Remove and Salvage: <**Insert description of items to remove and salvage**>.

C. Remove and Reinstall: <**Insert description of items to remove and reinstall**>.

D. Existing to Remain: <**Insert description of items to remain**>.

END OF SECTION 024119

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SECTION 030130 - MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removal of deteriorated concrete and subsequent replacement and patching.
2. Floor joint repair.
3. Epoxy crack injection.
4. Drying process

    a. Remove standing water
    b. Enhance air circulation w/ fresh air, fans, and dehumidifiers
    c. Monitor Drying process

1.2 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

1. Unit prices apply to authorized work covered by [**quantity allowances**][**estimated quantities**].
2. Unit prices apply to authorized additions to and deletions from the Work as authorized by Change Orders.

B. General: Unit prices include the cost of preparing existing construction to receive the work indicated[**and costs of field quality control required for units of work completed**].

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to concrete maintenance including, but not limited to, the following:

    a. Verify concrete-maintenance specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
    b. Materials, material application, sequencing, tolerances, and required clearances.
    c. Quality-control program.
    d. Coordination with building occupants.
    e. <**Insert agenda items**>.

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1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturers.

B. Material Certificates: For each type of portland cement aggregate ready-mix concrete supplied for mixing or adding to products at Project site.

C. Product Test Reports: For each cementitious patching mortar joint-filler, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Field quality-control reports.

E. Quality-Control Program: Submit before work begins.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Each packaged patching-mortar joint-filler crack-injection-adhesive manufacturer shall employ factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.

B. Concrete-Maintenance Specialist Qualifications: Engage an experienced concrete-maintenance firm that employs installers and supervisors who are trained and approved by manufacturer to apply crack-injection adhesive to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing or patching new concrete is insufficient experience for concrete-maintenance work.

1. Field Supervision: Concrete-maintenance specialist firm shall maintain experienced full-time supervisors on Project site during times that concrete-maintenance work is in progress.

C. Quality-Control Program: Prepare a written plan for concrete maintenance to systematically demonstrate the ability of personnel to properly perform maintenance work, including each phase or process, protection of surrounding materials during operations, and control of debris and runoff during the Work. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.

D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Concrete Removal and Patching: Remove and repair an [**approximately 50 sq. ft.**][**approximately 100 sq. in.**]<**Insert dimension**> area of [**deteriorated concrete deck**][**deteriorated concrete wall**]<**Insert description**>.
2. Floor Joint Repair: Cut out and reinstall joints in two separate areas [**, each approximately 48 inches long**][**as indicated on Drawings**]<**Insert dimension**>.
3. Epoxy Crack Injection: Perform epoxy crack injection in two separate areas [**, each approximately 48 inches long**][**as indicated on Drawings**]<**Insert**

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dimension>.

4. Polymer Overlay: Apply an [**approximately 50 sq. ft.**]<**Insert dimension**> area of polymer overlay.
5. Polymer Sealer: Apply an [**approximately 50 sq. ft.**]<**Insert dimension**> area of polymer sealer.
6. Composite Structural Reinforcement: Apply composite structural reinforcement [**a minimum of 48 inches long**][**as indicated on Drawings**]<**Insert dimension**>.
7. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
8. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

B. Store cementitious materials off the ground, under cover, and in a dry location.

C. Store aggregates covered and in a dry location; maintain grading and other required characteristics and prevent contamination.

1.7 FIELD CONDITIONS

A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.

1. Use only Class A epoxies when substrate temperatures are below or are expected to go below **40 deg F** within eight hours.
2. Use only Class A or B epoxies when substrate temperatures are below or are expected to go below **60 deg F** within eight hours.
3. Use only Class C epoxies when substrate temperatures are above and are expected to stay above **60 deg F** for eight hours.

B. Cold-Weather Requirements for Cementitious Materials:

1. Do not apply unless concrete-surface and air temperatures are above **40 deg F** and will remain so for at least 48 hours after completion of Work.
2. Comply with the following procedures:

    a. When air temperature is below **40 deg F**, heat patching-material ingredients and existing concrete to produce temperatures between **40 and 90 deg F**.
    b. When mean daily air temperature is between **25 and 40 deg F**, cover completed Work with weather-resistant insulating blankets for 48 hours

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after repair or provide enclosure and heat to maintain temperatures above **32 deg F** within the enclosure for 48 hours after repair.

c. When mean daily air temperature is below **25 deg F**, provide enclosure and heat to maintain temperatures above **32 deg F** within the enclosure for 48 hours after repair.

C. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of **90 deg F** and above.

D. Environmental Limitations for High-Molecular-Weight Methacrylate Sealers: Do not apply when concrete surface temperature is below **55 deg F** or above [**75 deg F**][**90 deg F**]<**Insert temperature**>. Apply only to [**dry substrates**][**substrates that have been dry for at least 72 hours**].

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. For repair products, obtain each color, grade, finish, type, and variety of product from single source and from single manufacturer with resources to provide products of consistent quality in appearance and physical properties.

2.2 PREPLACED CONCRETE MATERIALS

A. Preplaced Aggregate: Washed aggregate, ASTM C33/C33M, Class 5S, with 95 to 100 percent passing a 1-1/2-inch sieve, 40 to 80 percent passing a 1-inch sieve, 20 to 45 percent passing a 3/4-inch sieve, zero to 10 percent passing a 1/2-inch sieve, and zero to 2 percent passing a 3/8-inch sieve.

B. Fine Aggregate for Grout: Fine aggregate according to ASTM C33/C33M, but with 100 percent passing a **No. 8** sieve, 95 to 100 percent passing a **No. 16** sieve, 55 to 80 percent passing a **No. 30** sieve, 30 to 55 percent passing a **No. 50** sieve, 10 to 30 percent passing a **No. 100** sieve, zero to 10 percent passing a **No. 200** sieve, and having a fineness modulus of 1.30 to 2.10.

C. Grout Fluidifier for Grout: ASTM C937.

D. Pozzolans for Grout: ASTM C618.

2.3 MISCELLANEOUS MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I, II, or III unless otherwise indicated.

B. Water: Potable.

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2.4 MIXES

A. General: Mix products, in clean containers, according to manufacturer's written instructions.

1. Do not add water, thinners, or additives unless recommended by manufacturer.
2. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
3. Do not mix more materials than can be used within time limits recommended by manufacturer. Discard materials that have begun to set.

B. Mortar Scrub Coat: Mix dry ingredients with enough water to provide consistency of thick cream.

C. Dry-Pack Mortar: Mix required type(s) of patching-mortar dry ingredients with just enough liquid to form damp cohesive mixture that can be squeezed by hand into a ball but is not plastic.

D. Concrete: Comply with Section 033000 "Cast-in-Place Concrete."

E. Grout for Use with Preplaced Aggregate: Proportion according to ASTM C938. Add grout fluidifier to mixing water followed by portland cement, pozzolan, and fine aggregate.

PART 3 - EXECUTION

3.1 CONCRETE-MAINTENANCE SPECIALIST
3.2 CONCRETE MAINTENANCE

A. Have concrete-maintenance work performed only by qualified concrete-maintenance specialist.

B. Comply with manufacturers' written instructions for surface preparation and product application.

3.3 EXAMINATION

A. Notify Architect seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.

B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.

C. Pachometer Testing: Locate at least three reinforcing bars using a pachometer, and

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drill test holes to determine depth of cover. Calibrate pachometer using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

D. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

3.4 PREPARATION

A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building being repaired, building site, plants, and surrounding buildings from harm resulting from concrete maintenance work.

1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
2. Use only proven protection methods appropriate to each area and surface being protected.
3. Provide temporary barricades, barriers, and directional signage to exclude public from areas where concrete maintenance work is being performed.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of concrete maintenance work.
5. Contain dust and debris generated by concrete maintenance work and prevent it from reaching the public or adjacent surfaces.
6. Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.
7. Protect floors and other surfaces along haul routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
9. Protect adjacent surfaces and equipment by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
10. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
11. Dispose of debris and runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

C. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.

1. Prevent solids such as aggregate or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by

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sand or other materials resulting from concrete maintenance work.

2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

D. Preparation for Concrete Removal: Examine construction to be repaired to determine best methods to safely and effectively perform concrete maintenance work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed in the course of repair.

1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed for reinstallation or salvage.
3. Provide and maintain shoring, bracing, and temporary structural supports as required to preserve stability and prevent unexpected or uncontrolled movement, settlement, or collapse of construction being demolished and construction and finishes to remain. Strengthen or add new supports when required during progress of removal work.

E. Reinforcing-Bar Preparation: Remove loose and flaking rust from exposed reinforcing bars by wire brushing until only tightly adhered light rust remains.

1. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in two or more adjacent bars, cut bars and remove and replace as indicated on Drawings.
2. Remove additional concrete as necessary to provide at least **3/4-inch** clearance at existing and replacement bars.
3. Splice replacement bars to existing bars according to **ACI 318** by lapping, welding, or using mechanical couplings.

F. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than 3/4 inch deep. Clean out debris and loose concrete; vacuum or blow clear with compressed air.

G. Surface Preparation for Corrosion-Inhibiting Treatment: Clean concrete to remove dirt, oils, films, and other materials detrimental to treatment application.

1. Use detergent scrubbing.
2. Allow surface to dry before applying corrosion-inhibiting treatment.

H. Surface Preparation for Overlays:

1. Remove delaminated material and deteriorated concrete surface material.
2. Roughen surface of concrete to produce a surface profile matching CSP 3 according to ICRI 310.2.
3. Use scarifying.
4. Sweep and vacuum roughened surface to remove debris[**followed by low-pressure water cleaning**].

I. Acidic Surface Preparation for Sealers: Acid etch surface of concrete to produce a surface profile matching CSP 1 according to ICRI 310.2.[**Prepare surface for acid**

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etching by detergent scrubbing to remove oils and films that may prevent acid penetration.]

1. Remove excess acid solution, reaction products, and debris by squeegeeing or vacuuming.
2. Scrub surface with an alkaline detergent, rinse, and squeegee or vacuum.
3. Check acidity of surface with pH test paper and continue rinsing until pH is acceptable according to sealer manufacturer's written instructions.
4. When pH is acceptable according to sealer manufacturer's written instructions and surface is clean, vacuum dry.

J. Nonacidic Surface Preparation for Sealers: Clean concrete to remove dirt, oils, films, and other materials detrimental to sealer application.

1. Use detergent scrubbing.

K. Surface Preparation for Composite Structural Reinforcement: Clean concrete where reinforcement and epoxy patching mortar is to be placed by detergent scrubbing to remove dirt, oils, films, and other materials detrimental to epoxy patching mortar.

1. Roughen surface of concrete by sand blasting.
2. Remove delaminated material and deteriorated concrete surface material.
3. Sweep and vacuum roughened surface to remove debris[**followed by low-pressure water cleaning**].

3.5 REMOVAL OF CONCRETE

A. Do not overload structural elements with debris.

B. Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.

C. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.

D. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch over entire removal area.

E. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least **3/4-inch** clearance around bar.

F. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.

G. Provide surfaces with a fractured profile of at least **1/8 inch** that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level unless otherwise directed.

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H. Thoroughly clean removal areas of loose concrete, dust, and debris.

3.6 APPLICATION OF BONDING AGENT

A. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concreteby stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.

B. Epoxy Bonding Agent: Apply to reinforcing bars and concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas.[**Apply to reinforcing bars in at least two coats, allowing first coat to dry before applying second coat.**] Place patching mortar or concrete while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar or concrete.

C. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar or concrete.

D. Latex Bonding Agent, Type II: Mix with portland cement and scrub into concrete surface according to manufacturer's written instructions. Place patching mortar or concrete while bonding agent is still wet. If bonding agent dries, recoat before placing patching mortar or concrete.

E. Mortar Scrub Coat for Job-Mixed Patching Mortar and Concrete: Dampen repair area and surrounding concrete **6 inches** beyond repair area. Remove standing water and apply scrub coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub coat dries, recoat before placing patching mortar or concrete.

F. Slurry Coat for Cementitious Patching Mortar: Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar[**mixed with latex bonding agent**] into substrate, filling pores and voids.

3.7 CONCRETE PLACEMENT

A. Place concrete according to Section 033000 "Cast-in-Place Concrete" and as specified in this article.

B. Standard Placement: Place concrete by form-and-pump method unless otherwise indicated.

1. Use vibrators to consolidate concrete as it is placed.
2. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.

C. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.

D. Fill placement cavities with dry-pack mortar and repair voids with patching mortar.

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Finish to match surrounding concrete.

3.8 FLOOR-JOINT REPAIR

A. Cut out deteriorated concrete and reconstruct sides of joint with patching mortar as indicated on Drawings. Install joint filler in nonmoving floor joints where indicated and as specified in this article.

B. Depth: Install joint filler to a depth of at least 3/4 inch. Use fine silica sand no more than **1/4 inch** deep to close base of joint. Do not use sealant backer rods or compressible fillers below joint filler.

C. Top Surface: Install joint filler so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.

3.9 EPOXY CRACK INJECTION

A. Clean cracks with oil-free compressed air or low-pressure water to remove loose particles.

B. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond.

C. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.

D. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least **1/4 inch** thick by **1 inch** wider than crack.

E. Inject cracks wider than **0.003 inch** to a depth of **8 inches**.

F. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.

G. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.

3.10 APPLICATION OF CORROSION-INHIBITING-TREATMENT

A. Apply corrosion-inhibiting treatment to [**surfaces indicated on Drawings, from wall-to-wall or curb-to-curb and from joint-to-joint in the perpendicular direction**]<**Insert locations and extent where treatment shall be applied**>.

B. Apply by brush, roller, or airless spray in two coats at manufacturer's recommended application rate. Remove film of excess treatment by high-pressure washing before patching treated concrete[**or applying a sealer or overlay**].

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3.11 APPLICATION OF POLYMER SEALER

A. Apply to traffic-bearing surfaces, including parking areas and walks.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Packaged, Cementitious Patching Mortar: <**Insert number**> randomly selected sets of samples for each type of mortar required, tested according to ASTM C928/C928M.
2. Job-Mixed Patching Mortar: <**Insert number**> randomly selected sets of samples for each type of mortar required, tested for compressive strength according to ASTM C109/C109M.
3. Concrete: As specified in Section 033000 "Cast-in-Place Concrete."
4. Grout for Preplaced Aggregate: Tested for compressive strength according to ASTM C942.

    a. Testing Frequency: One sample for each **25 cu. yd.** of grout or fraction thereof, but not less than one sample for each day's work.

5. Joint Filler: Core-drilled samples to verify proper installation.

    a. Testing Frequency: One sample for each **100 feet** of joint filled.
    b. Where samples are taken, refill holes with joint filler.

C. Product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Manufacturers Field Service: Engage manufacturers' factory-authorized service representatives for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.

1. Have manufacturers' factory-authorized service representatives perform the following number of Project-site inspections to observe progress and quality of the Work, distributed over the period of product installation, regardless of on-site assistance requested by Architect:

    a. Bonding-Agent and Packaged Patching-Mortar Installation: Three inspections.
    b. Joint-Filler Installation: Two inspections.
    c. Crack-Injection-Adhesive Preparation and Installation: Four inspections.
    d. Corrosion-Inhibiting Treatment: Two inspections.

END OF SECTION 030130

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SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.

B. Related Requirements:

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Zinc repair material.

B. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Third-Party Certifications: For each product.
3. Third-Party Certified Life Cycle Assessment: For each product.

C. Delegated Design Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Delegated Design Engineer Qualifications: Include the following:

1. Experience providing delegated design engineering services of the type indicated.
2. Documentation that delegated design engineer is licensed in the jurisdiction in which Project is located.

C. Material Certificates: For each of the following, signed by manufacturers:

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1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design structural thermal break insulated connection system, including attachment to building construction.

2.2 STEEL REINFORCEMENT

1. Indigenous Materials: Steel 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. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.

B. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

C. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

D. Headed-Steel Reinforcing Bars: ASTM A970/A970M.

E. Galvanized Reinforcing Bars:

1. Steel Bars: ASTM A615/A615M, Grade 60, deformed bars.

PART 3 - EXECUTION

3.1 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

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B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than **1 inch**, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with **ACI 318**.

3.2 INSTALLATION TOLERANCES

A. Comply with **ACI 117**.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.

END OF SECTION 032000

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement
7. Aggregates.
8. Admixtures:

    a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

9. Vapor retarders.
10. Floor and slab treatments.
11. Liquid floor treatments.
12. Curing materials.

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a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.

13. Joint fillers.
14. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.

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8. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance

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with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.
f. Permeability.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and **ACI 301**.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with **ACI 301** and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below **40 deg F** for three successive days, maintain delivered concrete mixture temperature within the temperature range required by **ACI 301**.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than **35 deg F**, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with **ACI 301** and **ACI 305.1**, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed **95 deg F**.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

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1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with **ACI 301** unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Indigenous Materials: Concrete shall be manufactured within **500 miles** of Project site from aggregates[**and cementitious materials**] that have been extracted, harvested, or recovered, as well as manufactured, within **500 miles** of Project site. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.

B. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

C. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, [**Type I**][**Type II**][**Type I/II**][**Type III**][**Type V**], [**gray**][**white**].
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C595/C595M, [**Type IS, portland blast-furnace slag**][**Type IP, portland-pozzolan**][**Type IL, portland-limestone**][**Type IT, ternary blended**] cement.
5. Silica Fume: ASTM C1240 amorphous silica.
6. Performance-Based Hydraulic Cement: ASTM C1157/C1157M: [**Type GU, general use**][**Type HE, high early strength**][**Type MS, moderate sulfate resistance**][**Type HS, high sulfate resistance**][**Type MH, moderate heat of hydration**][**Type LH, low heat of hydration**].

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D. Normal-Weight Aggregates: ASTM C33/C33M, [**Class 3S**][**Class 3M**][**Class 1N**]<**Insert class**> coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
c. Alkali Content in Concrete: Not more than **4 lb./cu. yd.** for moderately reactive aggregate or **3 lb./cu. yd.** for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with **ACI 301**.

2. Maximum Coarse-Aggregate Size: [**1-1/2 inches**][**1 inch**][**3/4 inch**]<**Insert dimension**> nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

E. Lightweight Aggregate: ASTM C330/C330M, [**1-inch**][**3/4-inch**][**1/2-inch**][**3/8-inch**] nominal maximum aggregate size.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable [**or**][**complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4**]

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A[**, except with maximum water-vapor permeance of**]<**Insert rating**>; not less than **10 mils** thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. ISI Building Products

2.4 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/8 inch** and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

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3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than [**4100 psi**]<**Insert strength**> at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/4 inch** and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch** or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than [**5000 psi**]<**Insert strength**> at 28 days when tested in accordance with ASTM C109/C109M.

2.5 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with **ACI 301**.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 50 percent by mass.
3. Silica Fume: 10 percent by mass.
4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use [**water-reducing**][**high-range water-reducing**][**or**][**plasticizing**] admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in [**pumped concrete,**][**concrete for heavy-use industrial slabs**][**concrete for parking structure slabs,**][**and**][**concrete with a w/cm below 0.50**].
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Use permeability-reducing admixture in concrete mixtures where indicated.

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D. Color: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.6 CONCRETE MIXTURES

A. Class [**A**]<**Insert designation**>: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**][**As indicated**]<**Insert strength**> at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inchbefore adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:
    a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
    b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

B. Class [**B**]<**Insert designation**>: Normal-weight concrete used for foundation walls.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**][**As indicated**]<**Insert strength**> at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch, before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:

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a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].

7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

C. Class [**C**]<**Insert designation**>: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: **ACI 318** [**F0**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**][**As indicated**]<**Insert strength**> at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Minimum Cementitious Materials Content: [**470 lb/cu. yd.**][**520 lb/cu. yd.**][**540 lb/cu. yd.**][**610 lb/cu. yd.**].
5. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch, before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
6. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
7. Air Content:

   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

8. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.
9. Steel-Fiber Reinforcement: Add to concrete mixture, in accordance with manufacturer's written instructions, at a rate of [**50 lb/cu. yd.**]<**Insert weight**>.
10. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**1.0 lb/cu. yd.**][**1.5 lb/cu. yd.**]<**Insert dosage**>.
11. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**4.0 lb/cu. yd.**][**5 lb/cu. yd.**]<**Insert dosage**>.

D. Class [**D**]<**Insert designation**>: Normal-weight concrete used for interior suspended slabs.

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1. Exposure Class: **ACI 318** [**F0**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Minimum Cementitious Materials Content: [**470 lb/cu. yd.**][**520 lb/cu. yd.**][**540 lb/cu. yd.**][**610 lb/cu. yd.**].
5. Slump Limit: [**4 inches**, **plus or minus 1 inch**][**5 inches**, **plus or minus 1 inch**][**8 inches**, **plus or minus 1 inch for concrete with verified slump of 3 inches**, **plus or minus 1 inch**, **before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
6. Slump Flow Limit: [**22 inches**, **plus or minus 1.5 inches**][**30 inches**, **plus or minus 2.5 inches**]<**Insert limits**>.
7. Air Content:

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

8. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.
9. Steel-Fiber Reinforcement: Add to concrete mixture, in accordance with manufacturer's written instructions, at a rate of [**50 lb/cu. yd.**]<**Insert weight**>.
10. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**1.0 lb/cu. yd.**][**1.5 lb/cu. yd.**]<**Insert dosage**>.
11. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**4.0 lb/cu. yd.**][**5 lb/cu. yd.**]<**Insert dosage**>.

E. Class [**E**]<**Insert designation**>: Structural lightweight concrete used for interior suspended slabs.

1. Exposure Class: **ACI 318** [**F0**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Calculated Equilibrium Unit Weight: [**115 lb/cu. ft.**][**110 lb/cu. ft.**][**105 lb/cu. ft.**], plus or minus **3 lb/cu. ft.** as determined by ASTM C567/C567M.
4. Slump Limit: [**4 inches**, **plus or minus 1 inch**][**5 inches**, **plus or minus 1 inch**][**8 inches**, **plus or minus 1 inch for concrete with verified slump of 3 inches**, **plus or minus 1 inch**, **before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches**, **plus or minus 1.5 inches**][**30 inches**, **plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.
8. Steel-Fiber Reinforcement: Add to concrete mixture, in accordance with

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manufacturer's written instructions, at a rate of [**50 lb/cu. yd.**]<**Insert weight**>.

9. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**1.0 lb/cu. yd.**][**1.5 lb/cu. yd.**]<**Insert dosage**>.
10. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**4.0 lb/cu. yd.**][**5 lb/cu. yd.**]<**Insert dosage**>.

F. Class [**F**]<**Insert designation**>: Normal-weight concrete used for concrete toppings.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Minimum Cementitious Materials Content: [**470 lb/cu. yd.**][**520 lb/cu. yd.**][**540 lb/cu. yd.**].
4. Slump Limit: [**4 inches**][**5 inches**], plus or minus **1 inch**.
5. Air Content:

    a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
    b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].

6. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

    a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished toppings.

7. Steel-Fiber Reinforcement: Add to concrete mixture, in accordance with manufacturer's written instructions, at a rate of [**50 lb/cu. yd.**]<**Insert weight**>.
8. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**1.0 lb/cu. yd.**][**1.5 lb/cu. yd.**]<**Insert dosage**>.
9. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of [**4.0 lb/cu. yd.**][**5 lb/cu. yd.**]<**Insert dosage**>.

G. Class [**G**]<**Insert designation**>: Normal-weight concrete used for building frame members.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].

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2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch, before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:

    a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
    b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].

7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

H. Class [**H**]<**Insert designation**>: Normal-weight concrete used for building walls.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch, before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:

    a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
    b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of**

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delivery for concrete containing 1-inch nominal maximum aggregate size][**5.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].

7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

I. Class [**I**]<**Insert designation**>: Normal-weight concrete used for interior metal pan stairs and landings:

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Maximum w/cm: [**0.53**][**0.45**][**0.40**]<**Insert number**>.
4. Minimum Cementitious Materials Content: **470 lb/cu. yd.**.
5. Maximum Size Aggregate: **1/2 inch**.
6. Slump Limit: **3 inches**, plus **1 inch** or minus **2 inches**.
7. Air Content: [**0**]<**Insert number**> percent, plus or minus 0.5 percent at point of delivery.
8. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.
9. Retarding Admixture: Not allowed.
10. Accelerating Admixture: Not allowed.

J. Class [**J**]<**Insert designation**>: Normal-weight concrete used for exterior retaining walls.

1. Exposure Class: **ACI 318** [**F0**][**F1**][**F2**][**F3**][**S0**][**S1**][**S2**][**S3**][**W0**][**W1**][**C0**][**C1**][**C2**].
2. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert strength**>[**As indicated**] at 28 days.
3. Maximum w/cm: [**0.50**][**0.45**][**0.40**]<**Insert number**>.
4. Slump Limit: [**4 inches, plus or minus 1 inch**][**5 inches, plus or minus 1 inch**][**8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches, plus or minus 1 inch, before adding high-range water-reducing admixture or plasticizing admixture at Project site**]<**Insert limits**>.
5. Slump Flow Limit: [**22 inches, plus or minus 1.5 inches**][**30 inches, plus or minus 2.5 inches**]<**Insert limits**>.
6. Air Content:

    a. Exposure Class F1: [**5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-1/2-inch nominal maximum aggregate size**].
    b. Exposure Classes F2 and F3: [**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size**][**6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size**][**5.5 percent, plus or minus 1.5 percent at point of delivery for**

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concrete containing 1-1/2-inch nominal maximum aggregate size].

7. Limit water-soluble, chloride-ion content in hardened concrete to [**1.00**][**0.30**][**0.15**]<**Insert number**> percent by weight of cement.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M[**and ASTM C1116/C1116M**], and furnish batch ticket information.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of **1 cu. yd.** or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than **1 cu. yd.**, increase mixing time by 15 seconds for each additional **1 cu. yd.**.
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

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3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than **6 inches**, sealing vapor retarder to concrete.
4. Lap joints **6 inches** and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by **6 inches** on all sides, and sealing to vapor retarder.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.

    a. Continue reinforcement across construction joints unless otherwise

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indicated.

b. Do not continue reinforcement through sides of strip placements of floors and slabs.

3. Form keyed joints as indicated. Embed keys at least **1-1/2 inches** into concrete.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls [**as indicated on Drawings**]<**Insert spacing**>. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least [**one-fourth**]<**Insert depth**> of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch**. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch-** wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than **1/2 inch** or more than **1 inch** below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

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3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of **ACI 301**, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with **ACI 301**.

a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least **6 inches** into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

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1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. **ACI 301** Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

    a. Patch voids larger than **1-1/2 inches** wide or **1/2 inch** deep.
    b. Remove projections larger than **1 inch**.
    c. Tie holes do not require patching.
    d. Surface Tolerance: **ACI 117** Class D.
    e. Apply to concrete surfaces [**not exposed to public view**]<**Insert locations**>.

2. **ACI 301** Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

    a. Patch voids larger than **3/4 inch** wide or **1/2 inch** deep.
    b. Remove projections larger than **1/4 inch**.
    c. Patch tie holes.
    d. Surface Tolerance: **ACI 117** Class B.
    e. Locations: Apply to concrete surfaces [**exposed to public view,**][**to receive a rubbed finish,**][**or to be covered with a coating or covering material applied directly to concrete**]<**Insert locations**>.

3. **ACI 301** Surface Finish SF-3.0:

    a. Patch voids larger than **3/4 inch** wide or **1/2 inch** deep.
    b. Remove projections larger than **1/8 inch**.
    c. Patch tie holes.
    d. Surface Tolerance: **ACI 117** Class A.
    e. Locations: Apply to concrete surfaces [**exposed to public view,**][**to receive a rubbed finish,**][**or to be covered with a coating or covering material applied directly to concrete**]<**Insert locations**>.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

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1. Smooth-Rubbed Finish:

    a. Perform no later than one day after form removal.
    b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
    d. Maintain required patterns or variances as shown on Drawings or to match [**design reference sample**][**field sample panels**][**mockups**].

2. Grout-Cleaned Rubbed Finish:

    a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    b. Do not clean concrete surfaces as Work progresses.
    c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    d. Wet concrete surfaces.
    e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
    f. Maintain required patterns or variances as shown on Drawings or to match [**design reference sample**][**field sample panels**][**mockups**].

3. Cork-Floated Finish:

    a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
    b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    c. Wet concrete surfaces.
    d. Compress grout into voids by grinding surface.
    e. In a swirling motion, finish surface with a cork float.
    f. Maintain required patterns or variances as shown on Drawings or to match [**design reference sample**][**field sample panels**][**mockups**].

4. Scrubbed Finish: After concrete has achieved a compressive strength of from **1000 to 1500 psi**, apply scrubbed finish.

    a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed.
    b. Rinse scrubbed surfaces with clean water.

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c. Maintain continuity of finish on each surface or area of Work.
d. Remove only enough concrete mortar from surfaces to match [**design reference sample**][**field sample panels**][**mockups**].

C. Abrasive-Blast Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Perform abrasive blasting after compressive strength of concrete exceeds **2000 psi**.
2. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at the same age.
3. Surface Continuity:

a. Perform abrasive-blast finishing as continuous operation, maintaining continuity of finish on each surface or area of Work.
b. Maintain required patterns or variances in depths of blast to match [**design reference sample**][**field sample panels**][**mockups**].

4. Abrasive Blasting:

a. Abrasive-blast corners and edges of patterns carefully, using backup boards to maintain uniform corner and edge lines.
b. Determine type of nozzle pressure and blasting techniques required to match field sample.
c. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match field sample, as follows:

1) Brush Texture: Remove cement matrix to dull surface sheen and expose face of fine aggregate, with no significant reveal.
2) Light Texture: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color, with maximum reveal of **1/16 inch**.
3) Medium Texture: Generally, expose coarse aggregate with slight reveal and with a maximum reveal of **1/4 inch**.
4) Heavy Texture: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter, with reveal range of **1/4 to 1/2 inch**.

d. Maintain required patterns or variances in reveal projection to match [**design reference sample**][**field sample panels**][**mockups**].

D. High-Pressure Water-Jet Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of **4500 psi**.
2. Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
3. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of

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Work.

4. Maintain required patterns or variances in reveal projection to match [**design reference sample**][**field sample panels**][**mockups**].

E. Bushhammer Finish: Apply the following to as-cast surface finishes where indicated on Drawings:

1. Perform bushhammer finish to concrete that has achieved a minimum compressive strength of **4500 psi**.
2. Surface Continuity:

   a. Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work.

3. Surface Cut:

   a. Maintain required depth of cut and general aggregate exposure.
   b. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.

4. Remove impressions of formwork and form facings with exception of tie holes.
5. Maintain required patterns or variances of cut as shown on Drawings or to match [**design reference sample**][**field sample panels**][**mockups**].
6. Maintain control of concrete chips, dust, and debris in each Work area, limiting migration of airborne materials and dust by use of tarpaulins, wind-breaks, or similar devices.

F. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of **1/4 inch** in one direction.
3. Apply scratch finish to surfaces [**to receive concrete floor toppings**][**to receive mortar setting beds for bonded cementitious floor finishes**]<**Insert locations**>.

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C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with **ACI 117** tolerances for conventional concrete.
3. Apply float finish to surfaces [**to receive trowel finish**][**and**][**to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo**]<**Insert locations**>.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces [**exposed to view**][**or**][**to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system**]<**Insert locations**>.
7. Finish surfaces to the following tolerances, in accordance with **ASTM E1155**, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, **10-ft.-** long straightedge resting on two high spots and placed anywhere on the surface does not exceed [**1/4 inch**][**3/16 inch**][**1/8 inch**][**1/8 inch and also no more than 1/16 inch in2 feet**].
        2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.
        3) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.
        4) Specified overall values of flatness, FF 45; and of levelness, FL 35; with minimum local values of flatness, FF 30; and of levelness, FL 24.
        5) Specified overall values of flatness, FF 50; and of levelness, FL 25; with minimum local values of flatness, FF 40; and of levelness, FL 17.

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b. Suspended Slabs:

1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, **10-ft.-** long straightedge resting on two high spots and placed anywhere on the surface does not exceed [**1/4 inch**][**3/16 inch**][**1/8 inch**][**1/8 inch and also no more than 1/16 inch in 2 feet**].
2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.
3) Specified overall values of flatness, FF 35; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15.
4) Specified overall values of flatness, FF 45; and of levelness, FL 35; with minimum local values of flatness, FF 30; and of levelness, FL 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces [**indicated on Drawings**][**where ceramic or quarry tile is to be installed by either thickset or thinset method**]. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive [**aggregate**][**aluminum granule**] finish to concrete stair treads, platforms, ramps as indicated on Drawings

1. Apply in accordance with manufacturer's written instructions and as follows:

a. Uniformly spread [**25 lb/100 sq. ft.**]<**Insert rate**> of dampened slip-resistive [**aggregate**][**aluminum granules**] over surface in one or two applications.
b. Tamp aggregate flush with surface, but do not force below surface.
c. After broadcasting and tamping, apply float finish.
d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive [**aggregate**][**aluminum granules**].

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of [**100 lb/100 sq. ft.**]<**Insert rate**> unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over

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surface by hand or with mechanical spreader, and embed by power floating.
3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
4. After final floating, apply a trowel finish.
5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases [**4 inches**][**6 inches**][**8 inches**]<**Insert dimension**> high unless otherwise indicated on Drawings, and extend base not less than **6 inches** in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: [**5000 psi**][**4500 psi**][**4000 psi**][**3500 psi**][**3000 psi**]<**Insert value**> at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch** centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

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3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with **ACI 301** and ACI 306.1 for cold weather protection during curing.
2. Comply with **ACI 301** and **ACI 305.1** for hot-weather protection during curing.
3. Maintain moisture loss no more than **0.2 lb/sq. ft. x h** before and during finishing operations.

B. Curing Formed Surfaces: Comply with **ACI 308.1** as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
b. Continuous Sprinkling: Maintain concrete surface continuously wet.
c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with **ACI 308.1** as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than **12 inches**.

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b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches**, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than **12 inches**.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches**, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted

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absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than **12 inches**.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

d. Floors to Receive Chemical Stain:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
3) Butt sides of curing paper tight; do not overlap sides of curing paper.
4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Urethane Flooring:

1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped **6 inches** and sealed in place.
3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors to Receive Curing Compound:

1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer[**unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project**].

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g. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to **ACI 117**.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least [**one**][**six**] month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least **2 inches** deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a **No. 16** sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than **1/2 inch** in any dimension to solid concrete.

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a. Limit cut depth to **3/4 inch**.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

a. Correct low and high areas.
b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of **0.01 inch** wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

a. Cut out low areas to ensure a minimum repair topping depth of **1/4 inch** to match adjacent floor elevations.

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b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes **1 inch** or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a **3/4-inch** clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes **1 inch** or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: [**Owner will engage**][**Engage**] a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM

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C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding **5 cu. yd.**, but less than **25 cu. yd.**, plus one set for each additional **50 cu. yd.** or fraction thereof.

   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

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a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.

3. Slump Flow: ASTM C1611/C1611M:

a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
b. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; [**ASTM C173/C173M volumetric method, for structural lightweight concrete**].

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M:

a. One test hourly when air temperature is **40 deg F** and below or **80 deg F** and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.

a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M:

a. Cast and laboratory cure two sets of [**two**][**three**][**four**] **6-inch** by **12-inch** or 4-**inch** by 8-**inch** cylinder specimens for each composite sample.
b. Cast, initial cure, and field cure [**two**]<**Insert number**> sets of [**two**][**three**][**four**] standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C39/C39M.

a. Test one set of [**two**][**three**][**four**] laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. Test one set of [**two**][**three**][**four**] field-cured specimens at seven days and one set of two specimens at 28 days.
c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than **500 psi** if specified compressive

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strength is **5000 psi**, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than **5000 psi**.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests:

    a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

        1) Acceptance criteria for concrete strength to be in accordance with **ACI 301**, Section 1.6.6.3.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with **ASTM E1155** within [**24**][**48**][**72**]<**Insert number**> hours of completion of floor finishing and promptly report test results to Architect.

3.15 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Shelf angles.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for manufactured metal roof walkways and metal roof stairs.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Fasteners.
3. Shop primers.
4. Shrinkage-resisting grout.
5. Prefabricated building columns.
6. Slotted channel framing.
7. Manufactured metal ladders.
8. Alternating tread devices.
9. Metal ships' ladders and pipe crossovers.
10. Metal bollards.
11. Vehicular barrier cable systems.
12. Pipe and downspout guards.
13. Abrasive metal nosings, treads, and thresholds.
14. Cast-iron wheel guards.
15. Metal downspout boots.

B. Shop Drawings: Show fabrication and installation details.[**Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.**] Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Elevator machine beams, hoist beams, and divider beams.
3. Steel shapes for supporting elevator door sills.
4. Steel girders for supporting wood frame construction.
5. Steel pipe columns for supporting wood frame construction.
6. Prefabricated building columns.

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7. Shelf angles.
8. Metal ladders.
9. Alternating tread devices.
10. Metal ships' ladders and pipe crossovers.
11. Metal floor plate and supports.
12. Elevator pit sump covers.
13. Structural-steel door frames.
14. Miscellaneous steel trim including [**steel angle corner guards**][**steel edgings**][**and**][**loading-dock edge angles**].
15. Metal bollards.
16. Loose steel lintels.
17. Vehicular barrier cable systems.

C. Samples for Verification: For each type and finish of extruded [**nosing**][**and**][**tread**].

D. Delegated Design Submittals: For [**ladders**][**alternating tread devices**][**and**][**vehicular barrier cable systems**], including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Sustainable Design Submittals:

1. Environmental product declaration.
2. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
3. Environmental Product Declaration: For each product.
4. Third-Party Certifications: For each product.
5. Third-Party Certified Life Cycle Assessment: For each product.

1.3 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by stainless steel manufacturers, 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. Research Reports: For post-installed anchors.

E. Delegated design engineer qualifications.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

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1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design [**ladders**][**alternating tread devices**][**and**][**vehicular barrier cable systems**].

B. Structural Performance of Aluminum Ladders: Ladders[**, including landings,**] are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3.

C. Structural Performance of Alternating Tread Devices: Alternating tread devices are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Uniform Load: **100 lbf/sq. ft.**.
2. Concentrated Load: **300 lbf** applied on an area of **4 sq. in.**.
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Comply with applicable railing loadings in Section 055213 "Pipe and Tube Railings."

D. Vehicular Barrier Cable Systems: Design vehicular barrier cable systems to resist a single [**6000-lbf**]<**Insert value**> service load and [**10,000-lbf**]<**Insert load**> ultimate load applied horizontally in any direction to the cable system, with anchorages or attachments capable of transferring this load to the structure. Limit deflection to **18 inches**. Design is to assume loads are applied at a height of [**18 inches**]<**Insert height**> above the floor or ramp surface on an area not to exceed **1 sq. ft.**.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: [**120 deg F, ambient; 180 deg F, material surfaces**]<**Insert temperature change**>.

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2.2 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with [**Section 099113 "Exterior Painting."**][**Section 099123 "Interior Painting."**][**Section 099600 "High-Performance Coatings."**][**Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."**]

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 that contains pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of **3000 psi**.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch 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.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

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D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing[**and contour of welded surface matches that of adjacent surface**].

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches**, with a minimum **6-inch** embedment and **2-inch** hook, not less than **8 inches** from ends and corners of units and **24 inches** o.c., unless otherwise indicated.

2.4 VEHICULAR BARRIER CABLE SYSTEMS

A. Vehicular Barrier Cable Systems: Of diameter required by performance requirements, but not less than **1/2-inch-** diameter, [**zinc-coated steel wire rope**][**stainless steel wire rope**][**zinc-coated steel prestressing strand**] with turnbuckles, toggles, machine swage terminals, and other fittings and accessories for securing to structural columns and walls and for tightening barrier cable.

2.5 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

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2.6 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items[**not indicated to be galvanized**] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with [**universal shop primer**][**primers specified in Section 099113 "Exterior Painting"**][**primers specified in Section 099123 "Interior Painting"**] unless [**zinc-rich primer is**][**primers specified in Section 099600 "High-Performance Coatings" are**] indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with [**SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."**][**SSPC-SP 3, "Power Tool Cleaning."**][**requirements indicated below:**]

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.7 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.
2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for [**ceiling-hung toilet partitions**][**operable partitions**][**overhead doors**][**and**][**overhead grilles**] securely to, and rigidly brace from, building structure.

C. Anchor shelf angles securely to existing construction with [**expansion anchors**][**anchor bolts**][**through bolts**].

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D. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

E. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLATION OF SHELF ANGLES

A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.

3.4 INSTALLATION OF METAL SHIPS' LADDERS AND PIPE CROSSOVERS

A. Secure top and bottom of ships' ladders to construction to comply with manufacturer's written instructions.

B. Secure pipe crossovers to construction to comply with manufacturer's written instructions.

3.5 INSTALLATION OF METAL FLOOR PLATE

A. Install metal floor plates flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.6 INSTALLATION OF ELEVATOR PIT SUMP COVERS

A. Install tops of elevator sump pit cover plates and frames flush with finished surface. Adjust as required to avoid lippage that could present a tripping hazard.

3.7 INSTALLATION OF STRUCTURAL-STEEL DOOR FRAMES

A. Fasten structural steel door frames to the floor slab by means of angle clips and expansion bolts. Anchor door jambs to adjacent construction in accordance with shop drawing details.

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3.8 INSTALLATION OF MISCELLANEOUS STEEL TRIM

A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.9 INSTALLATION OF METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.

B. Anchor bollards to existing construction with [**expansion anchors**][**anchor bolts**][**through bolts**]. Provide four **3/4-inch** bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least **4 inches** in concrete.

C. Anchor bollards in concrete [**with pipe sleeves preset and anchored into concrete**][**in formed or core-drilled holes not less than 42 inches deep and 3/4 inch larger than OD of bollard**]. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch** toward bollard.

D. Anchor bollards in place with concrete footings. Center and align bollards in holes **3 inches** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

E. Anchor internal sleeves for removable bollards in [**concrete by inserting in pipe sleeves preset into concrete**][**formed or core-drilled holes not less than 42 inches deep and 3/4 inch larger than OD of sleeve**]. Fill annular space around internal sleeves solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch** toward internal sleeve.

F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes **3 inches** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.

G. Place removable bollards over internal sleeves and secure with **3/4-inch** machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.

H. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

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3.10 INSTALLATION OF VEHICULAR BARRIER CABLE SYSTEMS

A. Install vehicular barrier cable systems at locations indicated, mounted at heights indicated on Drawings above the parking surface. Anchor [**wire ropes**][**steel prestressing strand**] to structural columns and walls and tension to withstand vehicle loading as specified in "Performance Requirements" Article with no cable tensioned less than **3000 lbf**. Do not displace supporting components.

3.11 INSTALLATION OF PIPE AND DOWNSPOUT GUARDS

A. Provide pipe guards at exposed vertical pipes in [**parking garage**][**at locations indicated on Drawings**] where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four **3/4-inch** bolts at each pipe guard. Mount pipe guards with top edge **26 inches** above driving surface.

3.12 INSTALLATION OF CAST-IRON WHEEL GUARDS

A. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's written instructions. Fill cores solidly with concrete.

3.13 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

END OF SECTION 055000

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. Section includes structural wall and roof framing, built-up structural members, wall and roof sheathing; subfloor sheathing; flashings; preservative and fire retardant treatment; blocking and related furring and framing materials.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI A135.4 - Basic Hardboard.
   2. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. American Wood-Preservers' Association:
   1. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.
   2. AWPA U1 - Use Category System: User Specification for Treated Wood.

C. ASTM International:
   1. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
   2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
   3. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
   4. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

D. Forest Stewardship Council:
   1. FSC Guidelines - Forest Stewardship Council Guidelines.

E. Green Seal:
   1. GS-36 - Aerosol Adhesives.

F. National Lumber Grades Authority:
   1. NLGA - Standard Grading Rules for Canadian Lumber.

G. Northeastern Lumber Manufacturers Association:
   1. NELMA - Standard Grading Rules for Northeastern Lumber.

H. South Coast Air Quality Management District:
   1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

I. Southern Pine Inspection Bureau:
   1. SPIB - Standard Grading Rules for Southern Pine Lumber.

J. U.S. Department of Commerce National Institute of Standards and Technology:
   1. DOC PS 1 - Construction and Industrial Plywood.
   2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
   3. DOC PS 20 - American Softwood Lumber Standard.

K. West Coast Lumber Inspection Bureau:
   1. WCLIB - Standard Grading Rules for West Coast Lumber.

L. Western Wood Products Association:
   1. WWPA G-5 - Western Lumber Grading Rules.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the following agencies:
   1. Lumber Grading Agency: Certified by DOC PS 20.

2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
3. Plywood Grading Agency: Certified by APA.
4. Lumber: DOC PS 20.
5. Wood Structural Panels: DOC PS 1 or DOC PS 2.

B. Perform Work in accordance with Ohio Building Code.

C. Apply label from agency approved by authority having jurisdiction to identify each preservative treated and fire retardant treated material.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Lumber Grading Rules: SPIB, ASLS.

B. Beam Framing: southern yellow pine species, No. 1 grade, 2” and wider size classification, 19 percent maximum moisture content.

C. Joist Framing: southern yellow pine species, No. 1 grade, 2” and wider size classification, 19 percent maximum moisture content.

D. Columns: southern yellow pine species, No. 2 grade, 4” and wider size classification, 19 percent maximum moisture content.

E. Non-structural Light Framing: Stress Group D, spruce, pine, fir species, 19 percent maximum moisture content.

F. Studding: Stress Group D, spruce, pine, fir species, 19 percent maximum moisture content.

G. Sill Plate: AWPA C2 Lumber, Stress Group D, spruce, pine, and fir species, and 19 percent maximum moisture content, pressure preservative treated.

2.2 SHEATHING MATERIALS

A. Wall Sheathing: ANSI A208.1, Oriented Strand Board [OSB]; wood chips set with waterproof resin binder; unsanded faces; 1/2 inch thickness; 48x96 inch sized sheets [match existing conditions]

B. Roof Sheathing: ANSI A208.1, Oriented Strand Board [OSB]; wood chips set with waterproof resin binder; unsanded faces; 1/2 inch thickness; 48x96 inch sized sheets [match existing conditions]

C. Subfloor Sheathing: APA Rated Sheathing Structural I, Span Rating 24/16, Exposure Durability 1, unsanded; 3/4 inch thickness; 48x96 inch sized sheets [match existing conditions]

2.3 UNDERLAYMENT

A. Not Applicable.

2.4 FIREBLOCKING AND FIRESTOPPING

A. Fireblocking: Solid lumber, structural wood panel, or particleboard.
1. Solid lumber nominal 2 inches thick.
2. Structural wood panel 23/32 inch thick with joints backed by structural wood panel.

B. Draftstopping: Gypsum board or OSB
1. Gypsum board: 1/2 inch thick.
2. OSB: 7/16 inch thick.

2.5 ACCESSORIES

A. Fasteners and Anchors:
   1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
   2. Nails and staples: ASTM F1667.

B. Die Stamped Connectors: galvanized steel, specific type/profile as applicable

C. Structural Framing Connectors: Galvanized steel, sized to suit framing conditions.
   1. Simpson or Equal.

D. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Powder actuated fasteners into slab. Hilti or Equal. All anchors sized to suit application and loads.

E. Sill Gasket: Plate width, closed cell foam strip.

F. Sill Flashing: Polyethylene Sheet or Galvanized Steel.

G. Subfloor Glue: ASTM D3498, water base, waterproof.

H. Weather Resistive Barrier / Building Paper: ASTM D226; spun bonded polyethylene, Tyvek or Equal. Coordinate with existing conditions as appropriate.

I. Self Sealing, Flexible Flashing: 40 mil thick, self-adhesive, cold applied flashing. GCP Applied Technologies, Vycor Flashing or Equal.

2.6 WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWPA U1, Commodity Specification A-Sawn Products or F-Wood Composites using water-borne preservative with .25 pcf retention.

B. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Exterior or Interior Type.

C. Moisture Content After Treatment: Kiln dried (KDAT).
   1. Lumber: Maximum 19 percent.
   2. Structural Panels: Maximum 15 percent.

PART 3 EXECUTION

3.1 FRAMING

A. Set structural members level and plumb, in correct position.

B. Fasten framing in accordance with Ohio Building Code.

C. Place horizontal members crown side up.

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

E. Provide all required shoring and temporary bracing required to support structure prior to removing any load-bearing components.

F. Construct load bearing framing members full length without splices.

G. Double members at openings. Space short studs over and under opening to stud spacing.

H. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joint 4 inches.

I. Place sill gasket directly on cementitious foundation. Puncture gasket clean and fit tight to protruding foundation anchor bolts.

J. All exterior framing intended to be left exposed to weather shall be pressure treated and anchored with galvanized fasteners and appropriate connectors.

K. All framing in contact with concrete shall be treated. Interior or exterior walls.

L. Frame new walls, partitions, and openings to suit conditions and as designed.

M. Install solid 2x bearing at each end of beams and headers. Ensure that blocking is positioned with full support/blocking under to existing bearing conditions. Install supplemental blocking as required between joists, framing, etc.

N. Bridge joists at mid-space with solid 2x blocking.

3.2 SHEATHING

A. Install sheathing over framing members in full size sheets in accordance with APA Construction Guide.

B. Fasten sheathing in accordance with Ohio Building Code.

C. Install subfloor sheathing with longer edge perpendicular to floor framing with end joints staggered. Secure sheet edges over firm bearing. Attach sheathing with subfloor glue and appropriate fasteners.

D. Install underlayment in accordance with APA Construction Guide.

E. Secure wall sheathing with ends staggered, over firm bearing.

F. Install new underlayment at areas of wood framed floor systems where required for new finish flooring. Remove all existing underlayment down to original subfloor as required.

G. Place WRB/building paper over wall sheathing, weather lap joints and end laps, staple in place. Coordinate flashing installation to ensure continuous water resistant barrier.

3.3 FIREBLOCKING AND DRAFTSTOPPING

A. Install fireblocking to cut off concealed draft openings as required.
   1. Concealed Framed Wall and Furred Spaces: Install fireblocking vertically at floor and ceiling levels and horizontally.
   2. Connections Between Horizontal and Vertical Spaces: Install fireblocking between vertical walls and partitions and the following:
      a. Horizontal floor and roof framing.
      b. Soffits, dropped ceilings, cove ceilings and other horizontal concealed spaces.

3.4 SITE APPLIED WOOD TREATMENT

A. Treat site sawn cuts. Brush apply one coat of preservative treatment on untreated wood in contact with cementitious materials.

B. Allow preservative to cure prior to erecting members.

3.5 TOLERANCES

A. Framing members: ¼ inch from indicated position, maximum.

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.
2. Wood-preservative-treated lumber.
3. Fire-retardant-treated lumber.
4. Dimension lumber framing.
5. Miscellaneous lumber.
6. Plywood backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 064023 "Interior Architectural Woodwork" for interior wood stairs and railings.
3. Section 313116 "Termite Control" for site application of borate treatment to wood framing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

B. Sustainable Design Submittals:

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

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1.4 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Indigenous Materials: Wood products 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. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.

B. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, [**mark grade stamp on end or back of each piece**][**or**][**omit grade stamp and provide certificates of grade compliance issued by grading agency**].
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
4. Dress lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content:

1. Boards: 15 percent.
2. Dimension Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1, Use categories as follows:

1. UC1: Interior construction not in contact with ground or subject to moisture. Include all rough carpentry.

a. Wood sills, sleepers, blocking, [**furring,**][**stripping,**]and similar concealed members in contact with masonry or concrete.
b. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
c. Wood floor plates that are installed over concrete slabs-on-grade.
d. Wood furniture.
e. Wood millwork.
f. <**Insert item**>.

2. UC2: Interior construction not in contact with ground but may be subject to

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moisture. Include all rough carpentry.

a. Wood sills, sleepers, blocking, [**furring,**][**stripping,**]and similar concealed members in contact with masonry or concrete.
b. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
c. Wood floor plates that are installed over concrete slabs-on-grade.
d. Wood millwork.
e. Wood flooring.
f. <**Insert item**>.

3. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.[**Do not use inorganic boron (SBX) for sill plates.**]

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all rough carpentry unless otherwise indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, [**furring,**][**stripping,**] and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than **18 inches** above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.
6. <**Insert item**>.

2.3 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than **10.5 feet** beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.

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2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber is to be tested according to ASTM D5664 and design value adjustment factors are to be calculated according to ASTM D6841.[**For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.**]

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.[**Kiln-dry plywood after treatment to maximum moisture content of 15 percent.**]

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat all rough carpentry unless otherwise indicated.

1. Concealed blocking.
2. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
3. Plywood backing panels.
4. <**Insert item**>.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions by Grade: Construction or No. 2 grade.

1. Application: [**All interior partitions**][**Interior partitions not indicated as load bearing**].
2. Species:

a. Hem-fir (north); NLGA.
b. Southern pine or mixed southern pine; SPIB.
c. Spruce-pine-fir; NLGA.
d. Hem-fir; WCLIB, or WWPA.
e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

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2.5 METAL FRAMING ANCHORS

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. MiTek Industries, Inc.
2. Simpson Strong-Tie Co., Inc.
3. Tamlyn

B. Wall Bracing:

1. T-shaped bracing made for letting into studs in saw kerf, **1-1/8 inches** wide by **9/16 inch** deep by **0.034 inch** thick with hemmed edges.
2. Angle bracing made for letting into studs in saw kerf, **15/16 by 15/16 by 0.040 inch** thick with hemmed edges.

C. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, **G60** coating designation.

a. Use for interior locations unless otherwise indicated.

2. Heavy-Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); **G185** coating designation; and not less than **0.036 inch** thick.

a. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring,nailers, blocking, [**grounds,**]and similar supports to comply with requirements for attaching other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials,

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fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches** o.c.

F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal** thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft.** and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet** o.c.

G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

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3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

A. Install where indicated and where required for[**screeding or**] attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than **1-1/2 inches** wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board or Plaster Lath: Install **1-by-2-inch nominal-** size furring vertically at 16 inches o.c.

3.4 INSTALLATION OF WALL AND PARTITION FRAMING

A. General: Provide single bottom plate and double top plates using members of **2-inch nominal** thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions[**and for load-bearing partitions where framing members bearing on partition are located directly over studs**]. Fasten plates to supporting construction unless otherwise indicated.

1. For interior partitions and walls, provide 2-by-6-inch nominal- 2-by-4-inch nominal- size wood studs spaced 16 inches o.c. unless otherwise indicated.
2. Provide continuous horizontal blocking at midheight of partitions more than **96 inches** high, using members of **2-inch nominal** thickness and of same width as wall or partitions.

B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs and headers not less than **4-inch nominal** depth for openings **48 inches** and less in width, **6-inch nominal** depth for openings **48 to 72 inches** in width, **8-inch nominal** depth for openings **72 to 120 inches** in width, and not less than **10-inch nominal** depth for openings **10 to 12 feet** in width.

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END OF SECTION 061000

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SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY FOR ROOFING

PART 1 - GENERAL

1.1 WORK INCLUDES, BUT NOT LIMITED TO:

A. Miscellaneous sized new wood nailers/blocking, curbs, fascia/trim boards, roof framing members, plywood and associated fasteners, bolts and adhesives as required for installation of the roofing system and sheet metal.

B. Secured existing or new wood members that meet the requirements of Section 07 01 50 can remain in place as per conditions/guidelines and attachment as specified herein. All existing sound decking to be refastened as outlined herein. Review the existing fastening on all remaining wood nailers/blocking and upgrade if necessary to meet the attachment requirements as outlined herein. Any new replacement nailers must be minimum of 1-1/2 inch x 5-1/2 inch [nominal 2x6] unless otherwise noted or conditions dictate otherwise. New nailers shall be elevated/ blocked up to match thickness of new insulation, as applicable.

1.2 APPLICABLE REFERENCES

A. The following references form a part of this specification.
1. NFPA - National Forest Products design specifications.
2. Factory Mutual Research Corporation, Loss Prevention Data Sheet 1-49, Perimeter Flashings.
3. APA - American Plywood Association.
4. Lumber Grading Agency.
5. American Wood Preservers Association
6. State Building Code
7. ANSI/SPRI/FM 4435 ES-1 Edge Systems.
8. WWPA - Western Wood Products Association
9. SPIB - Southern Pine Inspection Bureau
10. ASTM C476 Standard Specification for Grout for Masonry.
11. AWPA - American Wood Protection Association

B. Perform work in accordance with Local Building Code.

PART 2 - PRODUCTS

2.1 DIMENSIONAL LUMBER

A. Board Stock: Graded in accordance with NFPA and Lumber Grading Agency, board class number 2, structural grade, kiln-dried Douglas fir or Southern yellow pine. Moisture content for all lumber shall not exceed 19% by weight at time of installation, including any lumber that can remain in place. Lumber will be removed if moisture content exceeds 19%. Provide fire retardant treated blocking in combustible buildings according to ASTM E84. Sizes as shown are standard nominal sizes. Provide dressed lumber, S4S, unless otherwise noted.
1. Any lumber intended to be left exposed shall be appearance grade, suitable for a painted finish or finish as specified.
2. Where fire retardant treated lumber/materials are indicated, use product with flame spread index of 25 or less in accordance with ASTM E 84.

B. Preservative treated: AWPA, asphaltic, creosote or copper additive [CA & ACQ] type treated lumber is not acceptable for use on this project. Use MQC or CCA [wolmanized] water borne treated lumber complying with C2 and C5 standards for use as nailers on top of concrete or masonry wall surface and other above grade applications. Use treatment that does not promote corrosion of metal fasteners.

C. Plywood decking: Refer to Section 06 10 00.

2.2 FASTENERS

A. General: Contractor to determine the required length for each application in accordance with manufacturer data and Factory Mutual Data Sheet 1-49 recommendations.
   1. Minimum embedment:
      a. Steel-3/4 inch unless otherwise noted.
      b. Wood-1 1/4 inch unless otherwise noted.
      c. Concrete/concrete block [masonry] -1 1/4 inch unless otherwise noted.
   2. Comply with the fastening requirements of the Local Building Code and State requirements, whichever is more stringent.
   3. All fasteners to anchor wood members shall be corrosion-resistant steel unless exposed to weather, pressure preservatives or in high humidity areas, provide fasteners of Type 304 Stainless steel, compatible for the conditions or other requirements stated herein [as noted].
   4. Refer to roofing section for additional fastener data.
   5. Notify Owner if deteriorated substrate conditions exist.

B. Lag Bolts: ANSI/ASME B18.2.1

C. Steel Bolts: ASTM A 307, Grade A

D. Decking Nails: ASTM F 1667 [RSRS-01], 10d, 9 gauge, 0.121-inch diameter [or larger if required by code], ring-shank, corrosion resistant by coating [ASTM A 641 Class 1], flat head.

E. Wood Screws: ANSI/ASME B 18.6.1-81 [2016] or ASTM A 153, corrosion resistance by coating, galvanization or stainless steel.

F. Expansion Anchors: Steel, corrosion resistant, 3/8-inch diameter.

2.3 ADHESIVES

A. Standard wood adhesive, caulk grade.

B. ITW Red Head, A7 acrylic adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect fastening of existing wood members left in place for conformance to requirements specified herein, upgrade as necessary to meet performance criteria outlined.

B. Examine surfaces for satisfactory conditions and do not use materials that are warped, bowed, twisted or unsound.

3.2 INSTALLATION

General: Installation shall be in accordance with Factory Mutual Loss Prevention Data Sheet 1-49 perimeter flashing recommendations and details, Local Building Code, ANSI/SPRI/FM 4435 ES-1, other standard industry framing methods and as shown.

A. Attachment withdrawal resistance criteria for nailers/wood blocking is 250 P/F for perimeter, 300 P/F for corners onto substrate with margins of safety applied from printed values, as follows: Steel, Wood, Structural Steel 2:1, Concrete, 4:1, Gypsum 3:1. No power actuated fasteners or pin drive fasteners allowed. Fastener spacing as outlined below is the maximum allowable, unless otherwise shown on the plans, exception: maximum spacing shall be 18 inches on center in the perimeter and 12 inches on center in the corners [see below].

B. Install members true, plumb and level, secure in place. Provide all required shoring and temporary bracing required.
   1. Use members of continuous possible lengths. Do not use materials with defects or pieces that are too small [optimum joint arrangement].

2. # 8 screws or 10d nails used to secure fascia and top nailers [stacked] to other wood members shall penetrate 1-1/2 inch, apply stacked nailers in two rows at 24 inches on center at perimeters and 12 inches in corners, staggered if feasible.
3. Wood nailers/blocking shall have a ¼ inch space between boards.

C. Metal/Metal and Wood Decks: Wood nailers on deck at perimeter/corners shall be fastened to the deck with two rows of #14 steel, wood to metal deck [Tek] fasteners [wafer head] or #14 HD steel roofing fastener or appropriate #14 wood screw at **24*** inches on center staggered in perimeters and **12*** inches staggered in corners. Start fasteners 3 inches from each end of the board, staggered fasteners 2 inches from edge if nailer is wider than 5 1/2 inches [if existing or stacked wood nailers exceed 6 inches in thickness height consult RDA for fastener selection]. An alternative method, when nailers/blocking are parallel to deck ribs, the nailers can be attached to the structural members [joists] with 3/8-inch steel bolts/nuts or Tek/5 self-tapping fasteners, 7 feet on center max. spacing. All fasteners must penetrate the top flange of the deck and be driven flush or countersunk, if necessary.

D. Steel Members: Wood nailers at perimeter/corners shall be fastened to a steel member with one row of #14 or 1/4-inch steel, wood to metal deck [Tek/5 self-tapping fasteners] at 18 inches on center, centered, stagger fasteners 2 inches from edge if nailer is wider than 6 inches; pre-drill holes and countersink, if necessary. Fasteners shall start 3 inches from each end of the boards and shall be spaced **16*** inches on center each way from the corner.

E. Concrete Block/Concrete, Stone and Concrete Decking: Wood nailers at perimeter/corners or on top of parapet wall shall be fastened with one row [two rows if nailer is over 5 1/2 inches wide] of 1/4-inch self-tapping fasteners at **24*** inches on center [offset or staggered] in perimeters and **16*** inches [offset or staggered] in corners-each way. Fasteners shall be spaced 2 inches from edge if nailer is wider than 5 1/2 inches; pre-drill holes and countersink, if necessary. Fasteners shall start 3 inches from each end of the boards [if existing or stacked wood nailers exceed 6 inches in height consult Architect for fastener selection] or use a 3/8-inch diameter treaded rod placed into a pre-drilled hole with adhesive injected for a solid substrate, bolt boards to rod. Rods placed at 3 feet on center in the perimeter and 2 feet on center in corners-each way. Cores of hollow block must be completely filled with grout [forming a bond beam] where rods are located. Embed rods 5 inches minimum into filled block cores or solid block/concrete.

F. Plywood Sheathing. Install replacement sheathing in full sheet onto existing rafters/joists/trusses. End joints should be directly over center of rafters/joists/trusses and be attached with 10d ring shank nails spaced *6* inches on center at the perimeter and 12 inches on center at field of each panel at each rafter/joist/truss [nail penetration into rafters/joists/trusses,2 inches]. All existing sound decking shall be refastened to ensure a fastener is spaced no further than 6 / 12 inches. Joints in the next board should not occur in the same structural member space. No decking boards shall be used that are not long enough to span over two structural members, if applicable. Steep Sloped Application: Allow a two-inch space on each side at the ridges for proper ventilation to occur from the ridge vents, if ridge vents are required. In addition, provide u-shaped expansion clips between sheets that are not nailed in place.

3.3 SURFACE TREATMENT

A. All exposed to view newly installed wood members shall be primed and painted to match surrounding adjacent surfaces colors, unless otherwise noted.

END OF SECTION

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Subflooring and underlayment.
3. Sheathing joint-and-penetration treatment materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.
2. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Subflooring and underlayment.
3. Sheathing joint-and-penetration treatment materials.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.

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3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

C. Sustainable Design Submittals:

1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
2. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.
3. Product Data: For installation adhesives, indicating VOC content.
4. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

D. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, including list of ABAA-certified installers and supervisors employed by Installer, who work on Project.

B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.

C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.

D. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.
4. Air-barrier and water-resistant glass-mat gypsum sheathing.

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E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

1. Installer is to be licensed by ABAA in accordance with ABAA's Quality Assurance Program and is to employ ABAA-certified installers and supervisors on Project.

B. Testing Agency Qualifications:

1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations[**, tie-ins to installed waterproofing**][**, tie-ins to other installed air barriers**], and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

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2.2 WALL SHEATHING

A. Plywood Sheathing, Walls: [**DOC PS 1**][**Either DOC PS 1 or DOC PS 2**], [**Exterior, Structural I**][**Exterior**][**Exposure 1, Structural I**][**Exposure 1**] sheathing.

1. Span Rating: Not less than [**16/0**][**20/0**][**24/0**][**32/16**].
2. Nominal Thickness: Not less than [**11/32 inch**][**3/8 inch**][**1/2 inch**].

B. Oriented-Strand-Board Sheathing, Walls: DOC PS 2, [**Exposure 1, Structural I**][**Exposure 1**] sheathing.

1. Span Rating: Not less than [**16/0**][**20/0**][**24/0**][**24/16**][**32/16**].
2. Nominal Thickness: Not less than [**5/16 inch**][**3/8 inch**][**1/2 inch**].

C. Cementitious Backer Units, Walls: ASTM C1325, Type A.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. USG Corporation

2. Thickness: As indicated.

D. Fiberboard Sheathing: ASTM C208, Type IV, [**Grade 1 (Regular)**][**Grade 2 (Structural)**] cellulosic fiberboard sheathing with square edges, [**1/2 inch**][**25/32 inch**] thick.

2.3 SUBFLOORING AND UNDERLAYMENT

A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exposure 1, Underlayment single-floor panels.

1. Span Rating: Not less than 16.
2. Nominal Thickness: Not less than 23/32 inch.
3. Edge Detail: Tongue and groove.
4. Surface Finish: Fully sanded face.

B. Plywood Subflooring: [**DOC PS 1**][**Either DOC PS 1 or DOC PS 2**], Exposure 1 single-floor panels or sheathing.

1. Span Rating: Not less than 16.
2. Nominal Thickness: Not less than 23/32 inch.

C. Underlayment: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than **1/4 inch** over smooth subfloors and not less than **3/8 inch** over board or uneven subfloors.

1. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exposure 1 Underlayment with fully sanded face.
2. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not

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less than **5/8-inch** nominal thickness.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced and Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum **2 inches** wide, **10 by 10 or 10 by 20 threads/inch**, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.5 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with [**APA AFG-01**][**ASTM D3498**] that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Adhesive shall have a VOC content of [**50**][**70**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

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C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate [**wall**][**parapet**][**and**][**roof**] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:

   a. [**Glue and nail**][**Nail**] to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels **1/8 inch** apart at edges and ends.

2. Subflooring:

   a. [**Glue and nail**][**Nail**][**Nail or staple**] to wood framing.
   b. Screw to cold-formed metal framing.
   c. Space panels **1/8 inch** apart at edges and ends.

3. Wall and Roof Sheathing:

   a. [**Nail**][**Nail or staple**] to wood framing.[**Apply a continuous bead of glue to framing members at edges of wall sheathing panels.**]
   b. Screw to cold-formed metal framing.
   c. Space panels **1/8 inch** apart at edges and ends.

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4. Underlayment:

   a. [**Nail**][**Nail or staple**] to subflooring.
   b. Space panels **1/32 inch** apart at edges and ends.
   c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with [**nails**][**or**][**screws**].
2. Fasten gypsum sheathing to cold-formed metal framing with screws.
3. Install panels with a **3/8-inch** gap where non-load-bearing construction abuts structural elements.
4. Install panels with a **1/4-inch** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to

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exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:

1. Install accessory materials in accordance with sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.

    a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
    b. Install transition strip on roofing membrane or base flashing, so that a minimum of **3 inches** of coverage is achieved over each substrate.

2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply [**transition strip**][**preformed silicone extrusion**], so that a minimum of **3 inches** of coverage is achieved over each substrate. Maintain **3 inches** of full contact over firm bearing to perimeter frames, with not less than **1 inch** of full contact.

    a. Transition Strip: Roll firmly to enhance adhesion.
    b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional **6-inch-** wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending **6 inches** beyond repaired areas in strip direction.

3.4 INSTALLATION OF CEMENTITIOUS BACKER UNITS

A. Install panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

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3.5 INSTALLATION OF FIBERBOARD SHEATHING

A. Comply with ASTM C846 and with manufacturer's written instructions.

B. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails[**or galvanized staples**]; comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least **3/8 inch** from edges and ends.

C. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow **1/8-inch** open space between edges and ends of adjacent units. Stagger horizontal joints if any.

D. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.

3.6 INSTALLATION OF FOAM-PLASTIC SHEATHING

A. Comply with manufacturer's written instructions.

B. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.

C. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.7 INSTALLATION OF PARTICLEBOARD UNDERLAYMENT

A. Comply with CPA's recommendations for type of subfloor indicated. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush.

1. Fastening Method: [**Glue and nail**][**Nail**][**Nail or staple**] underlayment to subflooring.

3.8 INSTALLATION OF HARDBOARD UNDERLAYMENT

A. Comply with CPA's recommendations and hardboard manufacturer's written instructions for preparing and applying hardboard underlayment.

1. Fastening Method: [**Nail**][**Nail or staple**] underlayment to subflooring.

3.9 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation,

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testing, and inspections under ABAA's Quality Assurance Program.

B. Testing and Inspecting Agency: [**Owner will engage**][**Engage**] a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements.[**Inspections may include the following:**]

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
3. Termination mastic has been applied on cut edges.
4. Strips and transition strips have been firmly adhered to substrate.
5. Compatible materials have been used.
6. Transitions at changes in direction and structural support at gaps have been provided.
7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
8. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage in accordance with [**ASTM E1186, chamber pressurization or depressurization with smoke tracers**][**ASTM E1186, chamber depressurization using detection liquids**]<**Insert requirement**>.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with [**ASTM E783**][**or**][**ASTM E2357**].

E. Air barriers will be considered defective if they do not pass tests and inspections.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

END OF SECTION 061600

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SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shelving and clothes rods.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view[**and for framing exposed to view**].
2. Section 064023 "Interior Architectural Woodwork" for shop-fabricated carpentry.
3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Interior trim.
2. Shelving and clothes rods.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

C. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Environmental Product Declaration: For each product.
3. Third-Party Certifications: For each product.
4. Third-Party Certified Life Cycle Assessment: For each product.

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5. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
6. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.
7. Product Data: For installation adhesives, indicating VOC content.
8. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.3 QUALITY ASSURANCE

1.4 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Indigenous Materials: The following wood products 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. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.

1. Interior trim.
2. Shelving[**and clothes rods**].
3. Interior railings.

B. Certified Wood: The following wood products shall be labeled according to the AF&PA's Sustainable Forestry Initiative, be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004, or be certified and labeled according to the standards of the Programme for Endorsement of Forest Certification.

1. Interior trim.
2. Shelving[**and clothes rods**].
3. Interior railings.

C. Composite Wood Products: Formaldehyde emission rates shall not be greater than the

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following when tested according to ASTM D6007 or ASTM E1333:

1. Hardwood Plywood: 0.05 ppm.
2. Particleboard: 0.09 ppm.
3. MDF More Than **5/16 Inch** Thick: 0.11 ppm.
4. MDF **5/16 Inch** or Less in Thickness: 0.13 ppm.

D. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece[**, or omit grade stamp and provide certificates of grade compliance issued by grading agency**].

E. Softwood Plywood: DOC PS 1.

F. Hardboard: ANSI A135.4.

G. MDF: ANSI A208.2, [**Grade 130**]<**Insert grade**>.

H. Particleboard: ANSI A208.1, [**Grade M-2**][**Grade M-2-Exterior Glue**].

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC1.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
2. Preservative Chemicals: Acceptable to authorities having jurisdiction[**and containing no arsenic or chromium**].
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

    a. For exposed lumber indicated to receive a stained or natural finish, [**mark end or back of each piece**][**or**][**omit marking and provide certificates of treatment compliance issued by inspection agency**].

6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

    a. For exposed plywood indicated to receive a stained or natural finish, mark

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back of each piece.

7. Application: Where indicated on Drawings.

2.3 SHELVING AND CLOTHES RODS

A. Shelving: shelving, made from one of the following materials, **3/4 inch** thick:

1. MDO softwood plywood with solid-wood edge.
2. Melamine-faced particleboard with applied-PVC front edge.
3. Wood boards as specified above for [**lumber trim for opaque**][**softwood lumber trim for transparent**][**hardwood lumber trim for transparent**] finish.

B. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Knape & Vogt Manufacturing Company

C. Wood Rod Flanges: Clear, kiln-dried, Douglas fir or southern pine turnings[**with clear finish**].

D. Metal Rod Flanges: Aluminum.

2.4 MISCELLANEOUS MATERIALS

A. 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.

B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
2. Adhesives shall have a VOC content of [**30**]<**Insert value**> g/L or less.

C. Installation Adhesive for Foam-Plastic Moldings: Product recommended for indicated use by foam-plastic molding manufacturer.

1. Adhesives shall have a VOC content of [**50**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu.

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m or 7 ppb, whichever is less.

D. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

1. Adhesives shall have a VOC content of [**70**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.5 FABRICATION

A. Back out or kerf backs of the following members, except those with ends exposed in finished work:

1. Interior standing and running trim, except shoe and crown molds.

B. Ease edges of lumber less than **1 inch** in nominal thickness to **1/16-inch** radius and edges of lumber **1 inch** or more in nominal thickness to **1/8-inch** radius.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.

1. Use concealed shims where necessary for alignment.
2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of **1/8 inch in 96 inches** for level and plumb. Install adjoining interior finish carpentry with **1/32-inch** maximum offset for flush installation and **1/16-inch** maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.2 INSTALLATION OF SHELVING AND CLOTHES RODS

A. Cut shelf cleats at ends of shelves about **1/2 inch** less than width of shelves and sand

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exposed ends smooth.

1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
2. Space fasteners not more than **16 inches** o.c.[**Use two fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.**]
3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
4. Remove adhesive that is squeezed out after fastening shelf cleats in place.

B. Install shelf brackets according to manufacturer's written instructions, spaced not more than [**32 inches**][**36 inches**] o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

C. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than **12 inches** o.c.

D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than **36 inches** o.c. and within **6 inches** of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.

1. Install shelves, fully seated on cleats, brackets, and supports.
2. Fasten shelves to cleats with finish nails or trim screws, set flush.
3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

F. Install rod flanges for rods as indicated.

1. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
2. Install rods in rod flanges.

END OF SECTION 062023

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SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim for opaque finish.
2. Interior frames and jambs for opaque finish.
3. Interior wood railings.
4. Preservative-treated wood material.
5. Miscellaneous materials.
6. Shop priming.
7. Field finishing.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
2. Section 062023 "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.

B. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Environmental Product Declaration: For each product.
3. Third-Party Certifications: For each product.
4. Third-Party Certified Life Cycle Assessment: For each product.

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5. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
6. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
7. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.

C. Shop Drawings:

1. Include the following:

   a. Dimensioned plans, elevations, and sections.
   b. Attachment details.

2. Show [**large-scale**][**full-size**] details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
4. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:

   a. Panel Products: **12 inches by 12 inches**.
   b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

E. Samples for Initial Selection: For each type of shop-applied exposed finish.

1. Size:

   a. Panel Products: **12 inches by 12 inches**.
   b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

F. Samples for Verification: For the following:

1. Lumber and Panel Products with Shop-Applied Opaque Finish: **5 inches** wide by **12 inches** long for lumber and [**8 by 10 inches**][**12 by 12 inches**] for panels, for each finish system and color.

   a. Finish [**entire**][**one-half of**] exposed surface.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For architectural woodwork manufacturer and Installer.

B. Product Certificates: For the following:

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1. Composite wood products.
2. Adhesives.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
2. Installer Qualifications: Manufacturer of products.

1.7 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F** and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Frames: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.2 WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.
2. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

B. Indigenous Materials: Wood products 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. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.

C. Certified Wood: Wood products shall be labeled according to the AF&PA's Sustainable Forestry Initiative, be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004, or be certified and labeled according to the standards of the Programme for Endorsement of Forest Certification.

2.3 INTERIOR WOOD STAIRS AND RAILINGS

A. Architectural Woodwork Standards Grade: Economy.

B. Wood for Opaque Finish:

1. Species: Any closed-grain hardwood.
2. Wood Moisture Content: 5 to 10 percent.

C. Finishes for Stair Parts:

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1. Handrails: Opaque.

D. Handrail Brackets: Cast bronze with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Size to provide **1-1/2-inch** clearance between handrail and face of wall.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Julius Blum & Co., Inc.
b. The Wagner Companies

2.4 HARDWOOD SHEET MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.

1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert value**> percent.
2. Composite Wood Products: Formaldehyde emission rates shall not be greater than the following when tested according to ASTM D6007 or ASTM E1333:

a. Hardwood Plywood: 0.05 ppm.
b. Particleboard: 0.09 ppm.
c. MDF More Than **5/16 Inch** Thick: 0.11 ppm.
d. MDF **5/16 Inch** or Less in Thickness: 0.13 ppm.

3. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
4. Particleboard: ANSI A208.1, Grade M-2.
5. Softwood Plywood: DOC PS 1, medium-density overlay.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: [**Softwood or hardwood lumber**][**Fire-retardant-treated softwood lumber**], kiln-dried to less than 15 percent moisture content.

1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWPA U1; Use Category UC3b.

a. Provide [**where indicated**][**where in contact with concrete or masonry**]<**Insert requirements**>.
b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
c. Preservative Chemicals: Acceptable to authorities having jurisdiction[**and containing no arsenic or chromium**].
d. Mark lumber with treatment quality mark of an inspection agency approved

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by the American Lumber Standards Committee's (ALSC) Board of Review.

2. Fire-Retardant Treatment: Complying with requirements; provide [**where indicated**]<**Insert requirements**>.

B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

D. Adhesives: Do not use adhesives that contain urea formaldehyde.

E. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

1. Adhesives shall have a VOC content of [**70**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.6 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:

a. Edges of Solid-Wood (Lumber) Members: **1/16 inch** unless otherwise indicated.
b. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: **1/8 inch**.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely

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assembled.

a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion.

1. Shim as required with concealed shims.
2. Install level and plumb to a tolerance of **1/8 inch in 96 inches**.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWPA M4.

F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails[**or finishing screws**] for exposed fastening, countersunk and filled flush with interior architectural woodwork.
3. For shop-finished items, use filler matching finish of items being installed.

H. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than [**36 inches**][**60 inches**][**96 inches**] long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with [**plastic wood filler; sand**

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smooth; and finish same as wood base if finished][**latex sealant, painted to match wall**].

5. Install standing and running trim with no more variation from a straight line than **1/8 inch in 96 inches**.

I. Railings:

1. Install rails with no more than **1/8 inch in 96-inch** variation from a straight line.
2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.

    a. Secure with countersunk, concealed fasteners and blind nailing.
    b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.

3. Wall Rails: Support rails on wall brackets securely fastened to wall framing.

    a. Space rail brackets not more than <**Insert dimension**> o.c.

3.2 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity is to prepare and submit report of inspection.

END OF SECTION 064023

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SECTION 064100 - ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood-veneer-faced casework for transparent finish.
2. Wood-veneer-faced casework for opaque finish.
3. Plastic-laminate-clad casework.
4. Wood materials.
5. Casework hardware.
6. Shop finishing.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud-framing required for anchoring cabinets.
3. [**Section 123616 "Metal Countertops."**][**Section 123619 "Wood Countertops."**][**Section 123623.13 "Plastic-Laminate-Clad Countertops."**][**Section 123640 "Stone Countertops."**][**Section 123661 "Simulated Stone Countertops."**]

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review locations and method of attachment of backing required for casework installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include panel material description and finish.
2. Include accessories.
3. Include hardware.
4. Include shop finishing.

B. Shop Drawings:

1. Plans, elevations, sections, and attachment details.

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a. Show large-scale details.
b. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
c. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
d. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

2. Apply AWI's Quality Certification Program (hereafter AWI QCP) label to Shop Drawings.

C. Samples for Initial Selection: For each exposed product and for each color and finish specified, in manufacturer's standard size.

D. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Product Data: Verify compliance with requirements for Forest Stewardship Council U.S. (FSC).
3. Laboratory Test Reports: For composite wood products, indicating compliance with the formaldehyde emissions evaluation.
4. Product Data: For installation adhesives, indicating VOC content.
5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.4 INFORMATIONAL SUBMITTALS

A. Test Reports: Valid AWI "Performance Quality Test Report" indicating compliance with specified ANSI/AWI 0641 Structural Performance Duty Level.

B. Certification Reports:

1. Provide labels and certificates from AWI QCP indicating woodwork and installation comply with requirements of aesthetic grade and duty level specified.

a. Register the Work of this Section with AWI's Quality Certification Program.

C. Product Certificates: For each type of product.

1. Composite wood products.
2. Thermally fused laminate (TFL) panels.
3. Adhesives.

D. Field quality control reports.

E. Qualification Statements: For manufacturer and Installer.

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1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI QCP Certificate.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Manufacturer of products.

1.7 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Unless otherwise indicated, comply with ANSI/AWI 0641 for duty level and grade of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI QCP indicating that woodwork and installation comply with requirements of aesthetic grade and duty level specified.
2. The Contract Documents contain requirements that are more stringent than the

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referenced woodwork quality standard. Comply with requirements of the Contract Documents in addition to those of the referenced quality standard.

2.2 Cabinet Hardware

A. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

1. Hickory Hardware

2.3 PLASTIC-LAMINATE-CLAD CASEWORK

A. High-Pressure Decorative Laminate (HDPL): ISO 4586-3, grades as indicated or, if not indicated, as required by quality standard.

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. Formica Corporation
b. Wilsonart LLC

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches** wide.
2. Wood Moisture Content:

a. Non-Climate-Controlled Environments: 9 to 15 percent.
b. Climate-Controlled Environments: 6 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Composite Wood Products: Verify formaldehyde emission rates are not greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

a. Hardwood Plywood: 0.05 ppm.
b. Particleboard: 0.09 ppm.
c. MDF More Than 5/16 Inch (8 mm) Thick: 0.11 ppm.
d. MDF 5/16 Inch (8 mm) or Less in Thickness: 0.13 ppm.

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2. Medium-Density Fiberboard (MDF): ANSI A208.2, [**Grade 130**]<**Insert grade**>.
3. Particleboard (Medium Density): ANSI A208.1, [**Grade M-2**][**Grade M-2-Exterior Glue**].
4. Softwood Plywood: DOC PS 1[**, medium-density overlay**].
5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
6. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of AWI 300.

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease sharp edges and corners.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 INSTALLATION OF CASEWORK

A. Install casework to comply with requirements of the structural and aesthetic performance specified.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Install cabinets level, plumb, and true in line to a tolerance of **1/8 inch in 96 inches** using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are

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accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

3. Maintain veneer sequence matching of cabinets with transparent finish.

D. Anchor cabinets in accordance with AWI requirements or tested method to anchors or blocking built in or directly attached to framing or substrates.

1. Install cabinets to comply with seismic requirements as indicated on Drawings.

E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

a. Use filler matching finish of items being installed.

F. Field Finishing: See Section 099123 "Interior Painting" for finishing of installed architectural cabinets.

3.2 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that casework, including installation, complies with requirements of ANSI/AWI 0620 for the specified grade.

1. AWI QCP Inspector to prepare and submit inspection report.

END OF SECTION 064100

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SECTION 07 01 50 – PREPARATION FOR REROOFING

PART 1 – GENERAL

1.1 WORK INCLUDES, BUT IS NOT LIMITED TO:

General: Roof Membrane Removals and Other Removal Summary [Refer to section 01 45 23 for deck testing requirements]: Roof Replacement at Buildings 1503 and 1515 Linn Street only.

Roofs A-1, A-2, C-1 and C-2: Remove the entire roof system down to the structural wood deck. Removal includes EPDM membrane, insulation, fasteners, flashings, and other rooftop components, see other removals below.

Roofs B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, and B-10: Remove the entire roof system down to the structural wood deck. Removal includes EPDM membrane, tapered insulation, fasteners, flashings, and other rooftop components, see other removals below.

A. Removal of existing perimeter base flashing [metal, EPDM / single ply as applicable] and associated equipment supports and related items.
   1. Removal and reinstall existing electrical conduits, cable lines and associated wall attachments.

B. Removal of wood nailers and blocking. Wood members that are securely bolted or adequately fastened or can be adequately fastened to the structure per the specifications and are in a dry good condition can remain in place as a base for new members or sheet metal items. Remove deteriorated and damaged wood members. [Refer to section 06 10 53 for anchoring requirements].

C. Removal of sheet metal items such as copings, edges, scuppers, conductor heads, downspouts, skirt flashings, counter-flashings, penetration pockets, pipe flashings, equipment supports and like components necessary for application of new membrane.

D. Removal of existing unused curbs, membrane repairs, abandoned equipment as noted in the drawings.

E. Removal of existing curbs, vents and covering of associated openings as noted on the drawings.

F. Removal of defective existing roof drains and replacing/reworking drain components.

G. Other removals are necessary to accomplish the new work.

1.2 QUALITY ASSURANCE

A. Work shall be performed in strict accordance with the terms and conditions of all municipal and state regulations and local codes.

B. Demolition shall comply with the requirements of ANSI - American National Standard Safety Requirements for Demolition.

C. Conduct demolition work in a manner that will minimize disruption of Owner's normal operations. Coordinate work activities daily with Owner.

D. Properly protect all facility surfaces and associated landscaping from damage due to normal demolition operations. Return all areas to their original condition at no charge to the Owner.

E. Drainage Testing: The contractor shall test each roof drain, downspouts/scuppers and other drainage elements for proper water flow before commencement of work. Commencement of work shall constitute acceptance of drainage device and any costs to unclog or repair these items shall be borne by the Contractor.

F. Do not remove existing roofing membrane or components when weather conditions threaten the integrity of building contents.

G. Field pull testing is required prior to commencing with work. All test results must meet the design pressures, manufacturer's requirements [deck/membrane resistance], requirements by the state building codes.

1.3 OCCUPATIONAL SAFETY and HEALTH ADMINISTRATION [OSHA]:

A. Walking working surfaces and fall protection standards, 29 CFR 1926.501 [b][1].

1.4 COORDINATION

A. All utilities and mechanical rooftop equipment will remain active during normal work hours, unless approved otherwise by the Owner.

B. All removals shall be legally disposed of, except those indicated to be reinstalled, salvaged or to remain Owner's property. Comply with hauling and disposal regulations of authorities having jurisdiction and EPA notification regulations.

1.5 FIELD CONDITIONS

A. Do not overload the structure with storage of materials, verify roof deck weight capacity and location of structural supports; only items needed that day shall be stored on the roof. Limit loads on roof to 25 pounds per square foot for uniformly distributed loads for metal / wood decks, 75 pounds per square for concrete decks. **Provide temporary securement of existing membrane to prevent membrane blow off while installing new roof system, if applicable.**

B. Do not apply the roofing system during inclement weather or when the chance of precipitation is 40% or greater, as listed on www.weather.com for the local area, when read at 7 AM local time or at time of work commencement. Proceed with roofing and associated work when weather conditions permit unrestricted use of materials and quality control of the work being installed.

C. Building space underneath roof work is utilized by on-going operations. Coordinate all work with the Owner including material storage and contractor parking. Owner's approval required before proceeding with the work. **Contractor must provide overhead protection for Owner's workers, public, visitors, etc from falling materials/debris at building entry points.**

1.6 **ALLOWANCES**.

A. Refer to Section 01 20 00.

PART 2 - **PRODUCTS**

NOT USED

PART 3 **- EXECUTION**

3.1 ROOF REPLACEMENT PREPARATION/EXAMINATION

A. All Roof Areas**.** Removal of all moisture, and other materials/debris from existing decking that inhibits new roofing materials from conforming to substrate, including power blowing of deck surfaces.

B. Verify that surfaces and site conditions are ready to receive work. Verify that deck is clean and smooth, free of depressions, irregularities, or projections and properly leveled, and the condition of the wood decking is suitable for re-roofing. Replace all damaged, deteriorated, rotted, or soft decking. Start of work constitutes acceptance of conditions.

C. Verify that all wood blocking, nailers are securely anchored in place.

3.2 DECK PREPARATION/REPAIRS

A. Wood Deck: Refer to Section 06 10 00.

3.3 DUST / FUME CONTROL

A. Take measures to avoid dust, dirt and debris from entering the building.

B. Throwing material off the roof is prohibited; provide an enclosed chute, crane or raised dump truck to remove roofing materials.

C. Provide a tarp and any or all other protection of walls / finish surfaces where material is being removed.

D. Take special precautions around deck penetrations, including but not limited to installation and removal of reinforced visqueen below the roof deck to protect property below.

E. Special precautions shall be taken to prevent fumes from entering the facilities through air intakes. Provide charcoal filters or other filtration media as necessary.

3.4 TRAFFIC

A. Conduct demolition operations and the removal of debris to ensure minimum interference with streets, walk and other adjacent facilities. Do not close or obstruct streets or walks, without permission from Owner and authorities having jurisdiction.

3.5 DISPOSAL OF MATERIALS

A. Remove from the site all debris, rubbish and other materials resulting from the demolition operations, are not being reused as soon as possible. The landfill used for disposal shall be approved for the type of materials being disposed of. Comply with local laws and EPA regulations when transporting materials from the site.

B. All materials that are to be reused in the new work shall be removed, cleaned and stored in a safe place until reinstallation, as applicable.

3.6 ASBESTOS REMOVAL / NOTIFICATION

A. If asbestos is found during the course of work, all removals shall be in accordance with written guidelines provided by OSHA Asbestos Construction Standard [29 CFR 1926.1101], and State, County and EPA guidelines as applicable. The contractor must be OSHA trained meeting the requirements of 29 CFR 1926.1101 for the removal, handling and monitoring of removed material. Transport and disposal of asbestos shall follow 40 CFR 61, Subpart A, 49 CFR 171 and 49 CFR 172. **No asbestos was found in the existing roof membranes.**

B. When applicable, indicate receipt and acceptance of hazardous wastes, such as asbestos containing materials, by a landfill licensed to accept such materials. Notify and provide all documentation to the Owner for disposal of asbestos. All costs for asbestos removal, permitting and handling will be included in the bid if noted herein. The owner will engage with an approved firm to provide an asbestos containing survey for the roof membranes that are to be removed in accordance with the contract documents. The results of this survey will be provided to the bidders prior to the bid due date.

C. All asbestos removals shall be done in a manner that does not cause the roofing fibers to become crumbed, pulverized, or airborne, these materials shall be handled as Category I and II non-friable asbestos. Should asbestos be encountered noted or not, that has become friable due to the actions of the Contractor or the condition of the material, the Contractor shall secure the services of an abatement contractor to remove the material and an independent firm to monitor removal activities and procedures [removal plan required]. The contractor shall pay for this abatement contractor if asbestos became friable due to their removal procedures. Notify Owner’s rep if asbestos has been encountered that was not noted, prior to removal.

3.7 UTILITIES / EQUIPMENT

A. Where electrical lines, refrigerant line sets, equipment, controls, etc. interface with the performance of the work, they shall be temporality removed, replaced and made fully operational as soon as possible, a 48-hour notice and approval from Owner is required before any removals can take place. The Contractor has the responsibility to verify the operational status of all equipment before removals take place.

B. The Contractor must notify the Owner of any non-operational items prior to removal; commencement of work constitutes acceptance of equipment and any costs to make operational shall be borne by the Contractor.

END OF SECTION

SECTION 23 54 00 - FURNACES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Forced air furnaces.

B. Thermostats.

1.2 REFERENCE STANDARDS

A. AHRI 610 (I-P) - Standard for Performance Rating of Central System Humidifiers for Residential Applications; 2014.

B. ANSI Z21.47 - American National Standard for Gas-Fired Central Furnaces; 2021.

C. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).

D. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.

E. NEMA MG 00001 - Motors and Generators; 2024.

F. NFPA 54 - National Fuel Gas Code; 2021.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

I. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2019.

J. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Project Record Documents: Record actual locations of components and connections.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Filters: One for each furnace.
   3. Extra Pilot Thermocouples: One.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide three year manufacturers warranty for solid state ignition modules.

C. Provide five year manufacturers warranty for heat exchangers.

D. Provide five year manufacturers warranty for electronic air cleaners.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Goodman

B. Carrier Corporation, a brand of United Technologies Corporation Building & Industrial Systems

C. Rheem Manufacturing Company Inc

D. Trane Inc, a subsidiary of Ingersoll Rand

E. York International Corporation / Johnson Controls

2.2 REGULATORY REQUIREMENTS

A. Comply with NFPA 70.

B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

2.3 GAS FIRED FURNACES

A. Annual Fuel Utilization Efficiency (AFUE): 0.95 ("condensing") in accordance with ASHRAE Std 103.

B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, humidifier, and accessories; wired for single power connection with control transformer.
   1. Safety certified by CSA in accordance with ANSI Z21.47.
   2. Venting System: Direct.

3. Combustion: Sealed.
4. Air Flow Configuration: Downflow.
5. Heating: Natural gas fired.
6. Accessories:
   a. Condensate drain.
   b. Concentric roof termination kit.
   c. Concentric wall termination kit.
7. Performance:
   a. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.
8. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner. If not certified for combustible flooring, please provide additional steel base.
9. Primary Heat Exchanger:
   a. Material: Hot-rolled steel.
   b. Coating: Ceramic.
   c. Shape: Tubular type.
10. Secondary Heat Exchanger:
    a. Material: Aluminized steel.
    b. Coating: Polypropylene.
11. Gas Burner:
    a. Atmospheric type with adjustable combustion air supply.
    b. Gas valve, two stage provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
    c. Electronic pilot ignition, with electric spark igniter.
    d. Combustion air damper with synchronous spring return damper motor.
    e. Non-corrosive combustion air blower with permanently lubricated motor.
12. Gas Burner Safety Controls:
    a. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
    b. Flame rollout switch: Installed on burner box and prevents operation.
    c. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
    d. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
13. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.
14. Motor:
    a. 1750 rpm single-speed, permanently lubricated, hinge mounted.
    b. Comply with NEMA MG 00001.
15. Air Filters: 1 inch thick urethane, washable type arranged for easy replacement.

16. Operating Controls:
    a. Room Thermostat: Cycles burner to maintain room temperature setting.
    b. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with adjustable timed off delay and fixed timed on delay, with manual switch for continuous fan operation. Provide continuous low speed fan operation.

2.4 THERMOSTATS

A. Room Thermostat: Low voltage, controlling heat and fan to maintain temperature setting; with system selector switch (heat-off) and fan control switch (auto-off), thermostat shall be 7-day programmable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and located correctly.

C. Verify that proper fuel supply is available for connection.

D. Verify that water supply is available for humidifier.

E. Verify that water supply is available for humidifier and water cooled condenser package.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.

B. Install in accordance with NFPA 90A.

C. Install gas fired furnaces in accordance with NFPA 54.

D. Provide vent connections in accordance with NFPA 211.

E. Install humidifiers in accordance with AHRI 610 (I-P).

F. Mount counterflow furnaces installed on combustible floors on additive base.

G. Pipe drain from humidifier to nearest floor drain.

END OF SECTION 23 54 00

SECTION 07 46 00 - FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fiber cement lap siding, fiber cement sheet siding, fiber cement trim, composite trim, flashings, accessories, and fastenings.

1.2 SUBMITTALS

A. Product Data: Submit data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture, finishes, and accessories.

B. Samples: Submit two samples illustrating surface texture and color.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Minimum of 3 years' experience with installation of similar products.

B. 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. Remodel mock-up area as required to produce acceptable work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 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.

1.6 WARRANTY

A. Limited product warranty against manufacturing defects for 30 years, non pro-rated

PART 2 PRODUCTS

2.1 FIBER CEMENT SIDING

A. Non-asbestos fiber-cement siding to comply with ASTM C1186, Grade II, Type A; ASTM E 136, non-combustible materials.
   1. Hardie Artisan HZ5 lap siding.

B. Manufacturers:
   1. James Hardie [basis of design]
   2. Approved Equal.

C. Siding to meet the following building code compliance National Evaluation Report NER 405; US Department of Housing and Urban Development Materials Release 1263. Non-asbestos fiber cement siding to be non-combustible when tested in accordance with ASTM E136.

D. Lap Siding:

1. Hardie Plank Lap Siding HZ5 lap siding as manufactured by James Hardie Building Products, Inc.
2. Width: 8-1/4 inches with 7 inch exposure.
3. Length: 12 feet.
4. Finish: Smooth

E. Panel / Sheet Siding:
1. Hardie HZ5 Panels as manufactured by James Hardie Building Products, Inc. A non-combustible fiber-cement panel.
2. Product Composition: Grade II, Type A, fiber-cement sheets as defined by ASTM C1186. manufactured by the Hatschek process and cured by high pressure steam autoclaving.
3. Size and Profile: 48 inch x 96 inch sheets x .312 inch thickness
4. Finish: Smooth

F. Trim: Hardie HZ5 boards
1. Width: as noted on drawings.
2. Thickness: 3/4 inch and 1 inch as noted on drawings.
3. Finish: Smooth

G. Trim Accessories: As applicable to the installation

2.2 COMPOSITE TRIM

A. Exterior synthetic/composite trim, ASTM C 1185
1. Manufactured by Boral TruExterior Trim or Equal

B. Properties:
1. Density, ASTM C 1185, 40 to 50 pcf.
2. Water Absorption, ASTM D 570: Less than 1.5 percent.
3. Fungi Rot, AWPA E10:
a. White Rot: Negligible Loss.
b. Brown Rot: Negligible Loss.
4. Termite Resistance, AWPA E1: Greater than 9.0 with 10 being impervious.
5. Flexural Strength, ASTM C 1185: Greater than 1,600 psi
6. Nail Withdraw, ASTM D 1761: Greater than 50 lbf/in.
7. Coefficient of Linear Expansion, ASTM D 6341: 1.40E-05 in/in/degree F
8. Flame Spread, ASTM E 84: Between 25 and 29.
9. Smoke Developed, ASTM E 84: Less than 450.

C. Trim Sizes: Coordinate with drawings as applicable.
1. Exposed Texture: Smooth.

2.3 PRE-FINISHING

A. Factory applied primer system.

B. Field applied final paint coating, Refer to Section 09 90 00.

2.4 FASTENERS

A. Wood Framing: 16 gauge, galvanized ring shank nails or screws as applicable to the installation and meeting manufacturer requirements.

2.5 ACCESSORIES

A. Flashings: 26 gauge thick metal to match siding color.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify framing conditions are within allowable tolerances without twists, bows, waves, etc.

B. Verify weather resistive barrier is installed and wall surfaces are ready to receive siding.

C. Nominal 2 x 4wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches face and straight, true, of uniform dimensions and properly aligned.
   1. Install water-resistive barriers and claddings to dry surfaces.
   2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
   3. Protect siding from other trades.

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. Install water-resistive barrier.

D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

E. Install Weather Barrier in accordance with local building code requirements.

F. Install Seam Tape at joints, penetrations, and laps.

G. Install flashing where applicable in accordance with manufacturer's requirements.

3.3 INSTALLATION

A. Install materials in strict accordance with manufacturer's installation instructions.

B. Install over braced wood. See General Fastening Requirements. Irregularities in framing and sheathing can mirror through the finished application. Correct irregularities before installing siding.

C. A water-resistive barrier (WRB) is required in accordance with local building code requirements. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.

D. When installing horizontally, a WRB with min. 90 percent drainage efficiency shall be used.

E. Adjacent finished grade must slope away from the building in accordance with local building codes - typically a minimum of 6 inches. in the first 10 ft

F. Do not install that product remains in contact with standing water.

G. Installed on flat vertical wall applications only.

H. Install flashing around wall openings, etc.

I. Trim/Fascia and Rake
   1. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate a minimum of 3/4” into framing or full thickness of sheathing. Additional fasteners may be required to ensure adequate installation. Place fasteners no closer than 3/4” and no further than 2” from side edge of trim.
   2. Trim inside corners with a single board.
   3. Install single board at outside corner then align second corner board to outside edge of first board. Do not fasten trim board to trim board.
   4. Allow 1/8” gap between trim and siding.

J. Siding:
   1. Install materials in strict accordance with manufacturer's installation instructions.
   2. Install metal Z flashing and provide a 1/4 inch gap at horizontal panel joints.

3. Place fasteners no closer than 3/8 inch from panel edges and 2 inches from panel corners.
4. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
5. Maintain clearance between siding and adjacent finished grade.
6. Specific framing and fastener requirements refer to Tables 2 and 3 in International Code Council Evaluation Report No. ESR-2290.
7. Use off-stud metal jointer when vertical joints occur between framing members.

K. Align level, and plumb.

L. Install metal flashings at sills, head of wall openings, and all areas required by siding manufacturer.

M. Seal watertight.

3.4 FINISHING

A. Apply full finish field coating over the factory primed siding and trim. Refer to Section 09 90 00.

END OF SECTION

SECTIONS 07 62 00 - SHEET METAL FLASHING, TRIM AND SPECIALTIES

PART 1 - GENERAL

1.1 WORK INCLUDES BUT NOT LIMITED TO:

General: Intent of project is to provide new sheet metal components for a new roof replacement. Install all components, including sheet metal items, accessories of the new roof system needed for a completed watertight installation.

A. Removal of existing sheet metal items as noted. Refer to section 07 01 50 Preparation for Reroofing.

B. Installation of new sheet metal items:
1. Wind-rated coping, fascia/cover and edge, ANSI/SPRI/FM ES 1, tested and approved.
2. Sheet metal fasteners.
3. Skirt / Bib flashing [around units and curbs], counter flashing, and other sheet metal items.
4. Thru wall scuppers, conductor heads, and downspouts.
5. Equipment support flashings.
6. Equipment enclosures

1.2 APPLICABLE REFERENCES

General: The following references form a part of this specification.
1. ASTM A 653 Metallic Coated, Sheet Steel [Galvanized], Grade A, Hot Dipped, Zinc Coated, Coating Class G90.
2. ASTM A 792, Metallic Coated, Sheet Steel [Galvalume], Grade 40, Coating Class A250 [Galvalume] Zinc Alloy.
3. ASTM A 755, Pre-Finished, Sheet Steel [Galvanized/Galvalume], Grade 40, Coating Class A250 or G90, Pre-painted by the coil coating process.
4. ASTM B 209, Aluminum.
5. ASTM D 1970 Self-Adhered Membrane
6. ASTM E 108 Fire Test of Roof Coverings.
7. ASTM E 2112 Installation of Exterior Door Flashings.
8. [FMG] Factory Mutual Global - Current Approval System [NAV assembly numbers], Loss Prevention Data Sheets for Roof Deck Securement for Above Deck Roof Components, Perimeter Flashings, Wind Design-ANSI/FM 4474, Approval Standards for Roof Materials FM 4470 and Roof Loads for Construction
9. [UL] Underwriters Laboratories - Roofing Materials and Systems Directory, Fire Resistance Directory, Current Edition.
10. [NRCA] National Roofing Contractors Association - Current Roofing and Waterproofing Manual, including shop fabricated metal edge testing.
11. [AISC] Manual of Steel Construction
12. [SMACNA] Sheet Metal and Air Conditioning Contractors Association-Current Manual.
13. [OSHA] Occupational Safety and Health Administration, Guidelines
14. [ASCE/SEI] 7-16 Minimum Design Loads for Buildings
15. [ANSI/SPRI/FM 4435] standard ES-1-17 Wind Design for Edge Systems
16. [NFPA] National Fire Protection Association, 58 Liquefied Petroleum Gas Code
17. [ANSI/SPRI] WD-1 Wind Design Standards.

1.3 QUALITY ASSURANCE

A. Fabricator/Installer: Company specializing with skilled workers in sheet metal with minimum 5 years documented experience, never been terminated by a manufacturer for workmanship problems and be capable of providing the warranties as specified.

B. Sheet Metal items and installation shall comply with SMACNA's [Architectural Sheet Metal] and NRCA's [Roofing] current manuals.

1.4 COORDINATION

A. Coordinate sheet metal flashing, trim layout installation with adjoining roofing to provide a leakproof, secure non-corrosive installation.

1.5 PERFORMANCE REQUIREMENTS

A. Fire Hazard Classification: Underwriters Laboratories [UL], Use only Class A fire-rated materials as tested in accordance with ASTM E 108 or UL 790 for exterior fire.

B. Install sheet metal items to withstand wind loads, structural movement, by preventing buckling, opening of joints, hole elongation, failure of joint sealant, failure of connections and other detrimental effects.

C. All perimeter metal items [copings and edges] must have been tested to resist the wind design loads for the building.

1.6 DELIVERY, STORAGE and HANDLING

A. Do not overload the structure with storage of materials; verify roof deck weight capacity and location of structural supports, only items needed that day shall be stored on the roof. Limit loads on roof to 25 pounds per square foot for uniformly distributed loads for metal / wood decks, 75 pounds per square foot for uniformly distributed loads for concrete decks. Store and protect products in accordance with manufacturer's instructions.

B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact. Protect sheet metal items during transportation and handling.

C. Store products in weather-protected environment [manufacturer's plastic wrap is accepted for proper protection, unless wrap is broken, torn or removed], clear of ground 4 inches minimum and protected from exposure from direct sunlight. Use breathable tarps for moisture protection as needed. Damaged materials will be marked 'rejected' by the Contractor / Owner or Architect and removed from the site.

D. Storage of flammable liquids in buildings is prohibited. All combustible debris shall be removed from the site daily.

1.7 WEATHER CONDITIONS

A. Do not apply materials during inclement weather, high winds or when the chance of rain is 60% or greater, percentage as listed on www: weather.com for the local area, percentage as listed when read at 7 AM local time or at time of work commencement.

1.8 SEQUENCING and SCHEDULING

A. Building space underneath roof work is utilized by on-going operations. Coordinate all work with Owner including, material storage, scaffolding [as required] and contractor parking. Owner's approval required before proceeding with the work. **Contractor must provide overhead protection for owner's workers from falling materials/debris at building entry points.**

1.9 MANUFACTURERS WARRANTIES

A. Provide a manufacturer's warranty for both repairs/replacements due to any faults in the material and workmanship. Any repairs/replacement due to normal wear and tear, material finish defects and workmanship defects.
   1. Sheet metal items shall be warranted watertight for [20] twenty years by the roof membrane manufacturer.

2. Sheet metal manufacturer of record must provide a [20] twenty-year finish warranty for the metal fascia, coping and edge as outlined herein, Warranty shall cover finish fading, chalking, cracking, peeling or failure of paint to adhere to the base metal. The warranty shall be a lifetime warranty for defects of material or failure to resist wind speeds as outlined.
3. Sheet metal coping and roof edges that terminate into/attach to [incorporated] into the roof membrane shall be warranted for winds up to 120 MPH or higher by the roof membrane manufacturer [part of the roof warranty] or by the metal manufacturer. Pre-manufactured items regardless of their location must be warranted and be tested by the metal manufacturer to resist failure [blow off] for wind speeds up to *120* mph and be certified to meet or exceed the design pressure as stated herein. The installation of these items must be incompliance with the metal manufacturers installation requirements and field condition attachments guidelines and as shown. The roof manufacturer can incorporate this warranty requirement into their roof warranty if approved by their metal manufacturer/fabricator.

B. In the event of a default by the contractor, the manufacturer will provide a new contractor to fulfill the warranty obligation.

1.10 PORTABLE FIRE EXTINGUISHERS

A. Two standard listed multipurpose dry chemical fire extinguisher, NFPA 10, with 10-pound capacity, 4A-60B:C UL rating shall be provided and located near the work area. Additional fire extinguishers shall be provided for different roof levels/work sites [see general requirements]. Contractor to ensure all personnel are trained to use fire extinguishers.

1.11 DEFINITIONS

A. Shop fabricated includes items that will be formed at the fabricators shop predominately by press brake. Prefabricated or manufactured items will be plant manufactured ready for installation and wind rated in compliance with ANSI/SPRI ES-1.

PART 2 - PRODUCTS

General: All products shall be Building Code approved as applicable**.**

2.1 FABRICATION

A. Fabricate sheet metal items to comply with recommendations in SMACNA [architectural Sheet metal manual] and NRCA's [the NRCA roofing manual]. Conceal fasteners and expansion provisions where possible on exposed to view items. Provide expansion provisions as recommended where lapped or bayonet type expansion cannot be used.

2.2 FASTENERS/SPECIALTY ITEMS

General: Fasteners/Anchors: strength, type and configuration must meet the required pull test resistance for each attachment application. Fastener rate and pattern must be Factory Mutual or local code approved to meet the intent of the wind uplift rating specified.

A. The Contractor shall determine fastener lengths,
   1. Minimum embedment:
      a. Steel: 3/4-inch
      b. Concrete/concrete block: 1-1/4 inch
      c. Gypsum: 2-inch,
      d. Tectum: 2-inch
      e. Wood: 1 1/4 inch.
   2. Fastener manufacturers: ITW Buildex, IWT Red Head, OMG and Tru-Fast or equal.
   3. All fasteners shall be corrosion resistant steel in accordance with ASTM F1667 or type 304 -316 stainless.

B. Summary of fasteners and requirements are as follows, see roofing section:
   1. Metal Counterflashing and other LG metal sheets to Wood, ITW Buildex, 'tru-grip', self-piercing, # 9 – 11/64-inch diameter, corrosion resistance steel shank with EPDM washer, if applicable.
   2. Metal Counterflashing and Other LG Sheet Metal [exposed] to Masonry, ITW Red Head, 1/4-inch diameter, 'Scots Tapcon', stainless steel-hex head, HL treads, corrosion resistant steel shank, with EPDM washer.
   3. General Purpose Stainless Steel: Series 304 fasteners, with or w/out EPDM washers as required.

C. Summary of specialty items and requirements as follows:
   General: Sheet Metal Items: All metal components not incorporated into the roof system and not outlined herein or shown on the drawings shall be fabricated with *.032-inch-thick pre-finished aluminum or 24-gauge stainless steel unless otherwise noted.*
   1. Penetration Pockets: 24-gauge stainless steel, soldered together with 4-inch roof flange and 4-inch height or size required for condition, only use if another manufacturer approved detail, field flashing, or liquid flashing system will not work for the conditions.
   2. Continuous Cleats: Galvanized steel, 22 gauge.
   3. Counterflashing: 24 gauge pre-finished metal, fabricated in lengths maximum 12 feet, designed to be removable. Counter flashing to be notched and lapped at inside corners and joints.
   4. Equipment Enclosure shall be 24-gauge galvanized metal, shop or pre-manufactured with top fabricated [angled] to allow no moisture from entering the pipe areas, access to pipes required. Solder all corners, as applicable. Install spray-in foam insulation around the pipes to seal watertight.
   5. Coping, Wind-Rated [pre-manufactured/ES-1 shop fabricated]: pre-finished, 22 or 24 gauge pre-finished metal coping cap as shown, without exposed fasteners cleated on both sides, [continuous cleated or anchor clips configuration cleats] tapered style [toward roof], butt joint. Provide factory-fabricated corners and intersections. Concealed 8-inch-wide splice plates which must allow the cap to expand and contract freely while locked in place, continuous cleats or with a heavy gage metal anchor clips [12 inches wide] anchored to nailer/substrate in accordance with print approvals [maximum spacing three feet on center-two feet in corners]. Size and shape as shown or to match existing wall width, roof membrane manufacturer approved and warranted to meet or exceed design pressures/winds speeds [see manufacturer's warranties]. 20-year leak proof warranty by the roof membrane manufacturer and 20-year finish warranty by the metal manufacturer. Copings shall be ANSI/SPRI/FM 4435 ES-1-17 tested and approved for winds speeds up to *120 MPH* or higher. Pre-Manufactured by Metal Era's 'Perma-Tite tapered Coping or roof manufacturers equivalent.
   6. Drip Edge or Fascia, Wind-Rated [pre-manufactured/shop ES 1 fabricated] – face over 2 1/2 inches long: pre-finished 24 gauge pre-finished metal drip cover over extruded anchor bar, fastened to wood nailer with #10 screws, continuous cleated. Size, length, profile as shown, roof membrane manufacturer approved and warranted to meet or exceed design pressures/winds [see wind warranty] and 20-year finish warranty by the metal manufacturer. ANSI/SPRI/FM 4435 standard ES-1-17 and tested and approved for winds up to *120 MPH* or higher. Pre-Manufactured by Metal Era's, Anchor Tite System [drip or fascia] or roof manufacturer's equivalent.
   7. Drip Edge [shop fabricated-not wind rated] - face under 2 1/2 inches: Does not require a cleat and shall be fabricated with 24 gauge, pre-finished metal.
   8. Scupper Lining: 24-gauge, stainless steel, solder all corners, size and shape as required or shown. Installation [SMACNA FIG.1-30A similar-see drawing].
   9. Skirt [bib] Flashing Metal: 24-gauge stainless steel or pre-finished 24 gauge metal, minimum 4 inch wide. Use stainless steel screws for anchoring.

10. Conductor Head: 24 gauge pre-finished metal, pop riveted and sealed, [SMACNA, style FIG 1-25F], top opening size as existing with other dimensions in accordance with SMACNA sizing recommendations or as required by condition.
11. Downspouts: 24 gauge pre-finished metal, rectangular shape, smooth with flat lock seams, complete with mitered elbows / offsets as required, size 3-inch x 4-inch, unless otherwise noted, see roof plan for locations.
12. Downspout Hangers: 1 inch wide, 1/16-inch thick pre-finished metal [primed and painted] to match downspout color [SMACNA Fig 1-35A]. Install hanger at 10 foot on center maximum intervals. Coordinate placement with building lines and offsets as required.

2.3 SHEET METAL

General: Roof membrane manufacturer supplied and approved components [copings/roof edges - as required/shown] must be used, these sheet metal components must be pre-manufactured and be tested and approved in accordance with ANSI/SPRI/FM 4435/ES-1 test method standard and must be included into the roof warranty [as outlined]. Fabricated by Metal Panel System, Architectural Products, Metal Era, Pac-Clad Peterson, Una-Clad, Drexel Metals or Dimensional Metals, etc. *Some wind rated items may be shop fabricated, if pre-manufactured item is not currently available [a metal fabricator [see above] and roofing material manufacturer may allow the roofing contractor to use their metal/materials/installation methods and shop fabricate and install the items in accordance with their wind rated ANSI/SPRI/FM 4435-ES-1 standard approved tested requirements.] This will only be accepted if the contractor is an NRCA approved installer for ES-1 tested products and the item will comply/match Architect's detail [size/gauge/installation method] and an ES-1 current product certification is provided for each item. In all cases, the roof material manufacturer must approve/warrant the sheet metal items in accordance with meeting/exceeding the wind resistance requirements and finish warranties as outline herein and any other design requirements].* All other metal shall be shop fabricated in accordance with SMACNA 6th Edition or other details or pre-manufactured as shown.

A. Pre-Finished Sheet Steel [Galvalume]: ASTM A792, grade 40, class A250, 24 or 22 gauge [as noted], primed and repainted by coil coating, finished exposed to view side with a fluoropolymer Kynar 500 [PVDF] thermally cured coating and a wash coat .5 mil thick applied to the reverse side; 20-year warranty covering fade, chalking and film integrity. Colors as selected by Owner.

B. Pre-Finished Sheet Steel [Galvanized]: ASTM A755/A653, G90, 24 or 22 gauge [as noted], primed and repainted by coil coating, finished exposed to view side with a fluoropolymer Kynar 500 [PVDF] coating and a wash coat .5 mil thick applied to the reverse side; 20-year warranty covering fade, chalking and film integrity. Colors as selected by Owner.

C. Pre-Finished Aluminum: ASTM B209, 3105 H15 alloy, thickness .032, .040 or .50 inches [as noted], primed and repainted by the coil coating, finished exposed to view side with a fluoropolymer kynar 500 [PVDF] thermally cured coating and a wash coat 0.5 mil thick applied to the reverse side; 20-year warranty covering fade, chalking and film integrity. Colors as selected by the Owner.

D. Galvanized Sheet Steel: ASTM A653, hot dipped, zinc coated, G90, gauges as shown.

E. Stainless Steel: ASTM A240/A 240M, dead soft fully annealed, smooth 24-gauge, Type/Grade 304 [painted or not] and 316 [exposed to view].

2.4 SEALANTS/TAPES

General Use: Provide joint sealants for sheet metal, backing and other materials as required to seal joint that are compatible with each other based upon industry test and field experience.

A. ASTM C920, Type, Grade, Class as required to seal joints, single component, elastomeric silicone polymer, non- staining, non-shrinking, non-sagging and ultra-violet resistant, clear or to match surrounding existing color.

1. Refer to section 079201.

B. Gutter: GE Silicone II, clear in color, or approved equal.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper.

PART 3 - EXECUTION

3.1 EXAMINATION and CONDITIONS

A. Verify that surfaces and site conditions are ready to receive work.

3.2 PROTECTION

A. Protect building surfaces/interior spaces against damage from work.

B. Provide, erect barricades and guardrails as required by applicable regulatory advisory to protect occupants of building and workers.

3.3 INSTALLATION OF SHEET METAL AND SPECIALTY ITEMS

General: Sheet metal items shall be installed in accordance with **manufacturer's and NRCA's/SMACNA** recommendations and details from their current manual. Anchor sheet metal items securely in place with provisions for expansion. Use items as required to complete the sheet metal or drainage system. Where dissimilar metals contact each other, protect against galvanic action by coating material as recommended by the fabricator. Seal joints with sealant as required for a watertight condition.

A. Continuous cleat [for non-pre-manufactured metal components]: Cleats shall not exceed 12 feet in length; allow a 1/4 inch gap between pieces. Fasten cleat to wood nailer top as applicable at 4 inches on center [staggered pattern-1 inch from edge] with corrosion resistant annular threaded nails [3/16-inch head], long enough to penetrate the wood 1-1/4 inch.

B. Penetration pans shall have mortar installed in the bottom of pitch pans with polyurethane pourable sealer [2-inch depth minimum] filled to the top of the pan, then slope.

C. Skirt [Bib] flashing shall be installed around all roof top units/supports and all items that cannot be removed and reinstalled. Position under unit curb and anchor to unit with corrosion resistance fasteners with EPDM washers at 12 inches on center unless otherwise noted.

D. Equipment enclosure shall have mortar installed in the bottom with polyurethane pourable sealer [2-inch depth minimum] filled. Seal pipes that exit enclosure with sealant/foam.

E. Termination bars shall be placed no more than 1-1/2 inches down from the top of the base flashing and be fastened at 6 inches on center with concrete self-tapping [tapcon] or wood fasteners, as applicable, fitted with an EPDM washer. Provide sealant at the top edge of bars.

F. Counterflashing [CF] shall be surfaced mounted [SM] or in existing or new reglets/receivers with lap joints 4 inches. Attach SM with concrete self-tapping [tapcon] or wood fasteners, as applicable fitted with an EPDM washer at 12 inches on center, 1-inch minimum embedment. Apply a bead of sealant on the top of 45% angle lip of the metal flashing if SM type. CF shall overlap base flashing a minimum of three inches, fit tightly to base flashing and shall terminate no lower than 4 inch above finished roof surface, unless approved by the manufacturer.

G. Wind Rated ES-1 approved coping sections shall be jointed together with a butt type joint with 8-inch-wide concealed splice located underneath the 10 to 12-foot-long panels, which must allow to expand and contract freely while locked in place. Provide factory-fabricated corners, intersections and ends. Coping metal anchor clips to be anchored to wood nailer or surface material at splice joints and within the coping panel [approx. every three feet on center-2 feet in corners.] or coping that is installed using continuous cleats on both sides shall have cleats anchored on top of nailer at 12 inches on center. Provide self-adhered or adhered 60 mil thick

EPDM over nailers/substrate to allow moisture to drain off edges without moisture to enter wall under coping cap [provide non-curing dual sealant strips on each side of splice plates], ensure EPDM membrane covers all wood nailers/substrate. Both methods shall use stainless steel fasteners or other fasteners to meet the wind resistance pressures as shown and as recommended by coping manufacturer **printed approvals**. Coping shall have a 4-inch vertical end flange where terminating into wall, counter-flash flanges.

H. Wind Rated, ANSI/SPRI/FM 4435/ES-1 approved roof fascia/drip shall have an extruded anchor bar, face fastened as outlined per the metal manufacturer, 12 inches on center to the nailer with 2-inch-long #10 stainless steel fasteners with the roofing membrane extending under the anchor bar and down face of nailer or wall surface. Fascia/drip cover plate shall be cleated and snapped in place with no exposed fasteners. The formed roof flange/cover plate shall be set in approved sealant/mastic on finished roof surface with the written manufacturer's guidelines. Edge face shall exceed down to overlap and cover nailers onto exterior wall minimum 2 inches or existing metal fascia as shown. Follow manufacturer installation instructions.

I. Conductor heads shall be installed in accordance with Fig 1-25 F SMACNA. Set top of conductor head at 1 inch below scupper to permit overflow. Provide extended face plate around scupper opening as required to cover old profile.

J. Downspouts shall be attached to the conductor with screws. Attach downspout sections to wall with 1-inch-wide, 1/16-inch steel straps [2 per 10-foot section] - Fig 1-35 A SMACNA, with stainless steel screws anchored into solid support members. Down spouts terminating at ground or roof shall be provided with an elbow fitting and a concrete splash block [provide a roof membrane sheet under blocks that terminate on the roof]. If existing receivers are available or new undergrade piping is installed, downspouts shall be inserted into receivers, provide size and shape adapters as necessary.

K. Drip edge [face under 2-1/2 inches in length]. Anchor roof flange onto wood nailers with screws or nails driven flush at 4 inches on center, staggered. Drip edge face to extend into gutter or overlap fascia board minimum 3 inches.

3.4 CLEANING

A. In areas where finished surfaces are soiled by any other source of soiling caused by work of this section, consult manufacturer for cleaning advice.

END OF SECTION

SECTION 07 62 10 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 WORK INCLUDES

A. Installation of new sheet metal flashings and counterflashings for siding / building enclosure components, except for roof related components [Refer to Section 07 62 00].

1.2 SYSTEM DESCRIPTION

A. Sheet Metal System: Conform to criteria of [SMACNA "Architectural Sheet Metal Manual."]

1.3 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, termination, and installation details.

1.4 COORDINATION

A. Coordinate sheet metal flashing, trim layout installation with adjoining building enclosure components such as siding, trim, openings, penetrations, etc. to provide a leakproof, secure non-corrosive installation.

1.5 PERFORMANCE REQUIREMENTS

A. Fire Hazard Classification: Underwriters Laboratories [UL], Use only Class A fire-rated materials as tested in accordance with ASTM E 108 or UL 790 for exterior fire.

B. Install sheet metal items to withstand wind loads, structural movement, by preventing buckling, opening of joints, hole elongation, failure of joint sealant, failure of connections and other detrimental effects.

1.6 DELIVERY, STORAGE and HANDLING

A. Do not overload the structure with storage of materials; verify roof deck weight capacity and location of structural supports, only items needed that day shall be stored on the roof. Limit loads on roof to 25 pounds per square foot for uniformly distributed loads for metal / wood decks, 75 pounds per square foot for uniformly distributed loads for concrete decks. Store and protect products in accordance with manufacturer’s instructions.

B. Deliver products in manufacturer’s original containers, dry, undamaged, with seals and labels intact. Protect sheet metal items during transportation and handling.

C. Store products in weather-protected environment [manufacturer’s plastic wrap is accepted for proper protection, unless wrap is broken, torn or removed], clear of ground 4 inches minimum and protected from exposure from direct sunlight. Use breathable tarps for moisture protection as needed. Damaged materials will be marked ‘rejected’ by the Contractor / Owner or Architect and removed from the site.

D. Storage of flammable liquids in buildings is prohibited. All combustible debris shall be removed from the site daily.

1.7 SEQUENCING and SCHEDULING

A. Building space underneath roof work is utilized by on-going operations. Coordinate all work with Owner including, material storage, scaffolding [as required] and contractor parking. Owner’s approval required before proceeding with the work. **Contractor must provide overhead protection for owner’s workers from falling materials/debris at building entry points.**

1.8 DEFINITIONS

A. Shop fabricated includes items that will be formed at the fabricators shop predominately by press brake.

1.9 WARRANTY

A. Furnish lifetime limited year manufacturer warranty for finishes.

PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

A. Pre-Finished Aluminum Sheet: ASTM B209; 3003 alloy, H15 alloy; mill finish shop pre-coated with acrylic color as selected from full range of manufacturer's standard colors.
   1. 20 gauge [0.032 inch thick] cladding / flashings where intended to be left exposed [including all fascia and rake, trim cladding, etc]. Alternate: install 24 gauge pre-finished metal cladding where needed / outlined on drawings. Coordinate with Section 07 62 00.
   2. 24 gauge [0.020 inch thick] or 26 gauge [0.016 inch thick] flashings at starter strips, concealed flashings, etc.

B. Pre-Finished Galvanized Steel Sheet: ASTM A755/A755M; grade A; structural steel sheet, G90 (Z275) zinc coating; 24 gauge steel, shop pre-coated with two coat fluoropolymer top coat [Kynar 500, 70% formulation]; color as selected from full range of manufacturer's standard colors.

2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers as required to suit conditions.

B. Underlayment: ASTM D226; Type I, No. 15 unperforated asphalt felt.

C. Protective Backing Paint: Bituminous.

D. Slip Sheet: Rosin sized building paper.

E. Sealant: Exterior metal lap joint butyl or polyisobutylene sealant as specified in Section 07 90 00.

F. Plastic Cement: ASTM D4586, Type I.

G. Reglets: As required to suit conditions.

H. Primer and Solvent for Polyvinyl Chloride (PVC): As recommended by manufacturer.

2.3 FABRICATION

A. Fabricate sheet metal items to comply with recommendations in SMACNA [architectural Sheet metal manual], NRCA’s [the NRCA roofing manual], and siding manufacturer details. Conceal fasteners and expansion provisions where possible on exposed to view items. Provide expansion provisions as recommended where lapped or bayonet type expansion cannot be used.

B. Form components to shape indicated on Drawings, accurate in size, square, and free from distortion or defects. Form pieces in longest practical lengths.

C. Fabricate cleats and starter strips of same material as sheet, to interlock with sheet.

D. Hem exposed edges on underside 1/2 inch; miter and seam corners. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

E. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

F. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners in one piece, 18 inch long legs; seam for rigidity, seal with sealant.

2.4 SHOP FINISHING

A. Acrylic coating: Baked enamel system conforming to AAMA 2603.

B. PVDF (polyvinylidene fluoride) coating: Multiple coats, thermally cured, fluoropolymer system conforming to AAMA 2604 or AAMA 2605. (KYNAR 500)

C. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.

B. Verify membrane termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Install starter and edge strips, and cleats.

B. Install surface mounted reglets. Seal top of reglets with sealant. Insert flashings to form tight fit. Seal flashings into reglets with sealant.

C. Secure flashings in place using [concealed] fasteners.

D. Install cladding over existing / new wood substrate. Brake form to profiles required in the longest lengths practical. Hang to minimize oil canning and other unintended movement / twisting, etc. Allow for expansion and contraction.

E. Apply plastic cement compound between metal work and felt flashings.

F. Fit components tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

G. Seal joints watertight.

END OF SECTION

SECTION 07 76 10 – RUBBER PAVING TILES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes resilient, interlocking, architectural rubber paving tiles.

1.2 SUBMITTALS

A. Product Data: Submit data indicating materials, component profiles, jointing details, sizes, surface texture, finishes / colors, and accessories.

B. Samples: Submit two samples illustrating surface texture and color.

1.3 REFERENCES

A. ASTM C 67 – Standard Test Method Methods for Sampling and Testing Brick and Structural Clay Tile.

B. ASTM D 395 – Standard Test Methods for Rubber Property–Compression Set.

C. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers–Tension.

D. ASTM D 573 – Standard Test Method for Rubber-Deterioration in an Air Oven.

E. ASTM D 624 – Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

F. ASTM D 1667 – Standard Specification for Flexible Cellular Materials, Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

G. ASTM D 2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as measured by the James Machine.

H. ASTM D 2859 – Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.

I. ASTM E 108 – Standard Test Methods for Fire Tests of Roof Coverings.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 5 years experience for the manufacturing of rubber paving tiles similar to those specified.

B. Installer Qualifications: Minimum of 3 years' experience with installation of similar products.

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. Remodel mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation in accordance with manufacturer's instructions.

B. Handle products to prevent damage.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Tile Temperature: Ensure surface temperature of rubber paving tiles is a minimum of 40 degrees F at the time of installation.

B. Air Temperature: Ensure ambient air temperature is a minimum of 40 degrees F for a minimum of 24 hours prior to and at the time of installation.

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. Limited lifetime product warranty against manufacturing defects, non pro-rated

PART 2 PRODUCTS

2.1 RUBBER PAVING TILES

A. Description: Resilient, interlocking, architectural rubber paving and ballast tiles.
   1. Basis of Design: DuraSTRONG Rubber Paving Tiles, Plus Series, or Equal.

B. Material: Compression-molded, recycled rubber and binding agents.

C. Tile Locking: U-shaped male and female locking mechanism on all 4 sides of the tile to support tile-to-tile adhesion while ensuring tiles are held in place.

D. Top Edges: Chamfered.

E. Tile Sides: edge-cut system for maximum seam adhesion.

F. Wear Layer: compression molded to obtain optimum density and durability. Combination of elongated SBR rubber and granulated crumb rubber. Pigmented to achieve color.

G. Size: 24” x 24” nominal size.

H. Thickness: 2-inches.

I. Weight: 24 pounds.

J. Color: As selected from the full range of available colors.

K. Testing
   1. Freeze Thaw, ASTM C 67: No deterioration.
   2. Rubber Deterioration/Air Oven, ASTM D 573: No deterioration.
   3. Slip Resistance:
      a. ASTM E 303: Dry: 51 minimum; Wet: 44 minimum.
      b. ASTM D 2047: 0.533.
   4. Tensile Strength, ASTM D 412: 0.661 Mpa
   5. Elongation at Break, ASTM D 412: 68.5 percent
   6. Tear Strength, ASTM D 624: 2.2 kNm
   7. Flammability, Burning Pill, ASTM D 2859 – Pass
   8. Density, ASTM D 3676: 817 kg/m3
   9. Taber Abrasion, Wear Index, ASTM C 501: 205.

2.2 ACCESSORIES

A. Corners:
   1. Prefabricated outside and inside corners.
   2. Material: Same as rubber paving tiles.

B. Adhesive:
   1. Approved and furnished by manufacturer.
   2. Single-component, 100% solids, polyurethane.
   3. Waterproof and supplied in tube format.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive rubber paving tiles. Notify Architect if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Prepare subsurface in accordance with manufacturer's instructions to ensure proper slope, support and drainage for rubber paving tiles.

B. Ensure existing sub-surface is clean and sound with no cracks or loose material.

C. Do not damage EPDM roof membrane during installation.

3.3 INSTALLATION

A. Install rubber paving tiles in accordance with manufacturer's instructions at locations indicated on the Drawings.

B. Apply adhesive in accordance with manufacturer’s instructions for tile-to-tile installation.

C. Cut rubber paving tiles to fit around fixed obstacles.

D. Install additional rubber paving tiles securement at perimeter in accordance with manufacturer’s instructions.

3.4 CLEANING

A. Remove adhesive spills from rubber paving tiles in accordance with manufacturer's instructions.

B. Clean rubber paving tiles in accordance with manufacturer's instructions.

3.5 PROTECTION

A. Protect completed tiles from damage during construction.

B. Protect rubber paving tiles from foot traffic for a minimum of 12 hours after installation.

END OF SECTION

SECTION 07 90 00 - JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes sealants and joint backing.

1.2 SUBMITTALS

A. Product Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.4 QUALITY ASSURANCE

A. Sealant shall be installed by a qualified sealant applicator for any/all joint sealant exposed to view. Owner reserves the right to request a mockup of the quality for the joint sealant installation.

PART 2 PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers:
   1. Tremco [basis of design]
   2. Sika
   3. GE Silicones.
   4. Pecora Corp.
   5. DAP

B. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system 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."

D. Liquid-Applied Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.

E. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Additional Movement Capability: Where additional movement capability is specified, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C920 for uses indicated.

G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range, unless otherwise noted.

2.2 SILICONE JOINT SEALANTS:

A. **Type S-1**: Single component, nonsag, Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use NT

1. Tremco Spectrem 1 or Spectrem 800 or Equal

B. **Type S-2**: Single Component, nonsag, Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 50, use NT
   1. Tremco Spectrem 2 or Spectrem 3 or Equal

C. **Type S-3**: Multi-Component, Nonsag, Silicone Joint Sealant: ASTM C920, Type M, Grade NS, Class 50, Use NT
   1. Tremco Spectrem 4-TS or Equal

D. **Type S-4**: Single Component, nonsag, Traffic-Grade, Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 100/50, Use T
   1. Tremco Spectrem 800 or Equal

E. **Type S-5**: Mildew Resistant, Single Component, Silicone Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT
   1. Tremco Tremsil 200 Sanitary or Equal

2.3 URETHANE JOINT SEALANTS

A. **Type U-1**: Single Component, nonsag, Urethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 25 or 35, Use NT:
   1. Tremco Dymonic or Dymonic FC or Equal

B. **Type U-2**: Single Component, nonsag, Traffic Grade, Urethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use T.
   1. Tremco Vulkem 116 or Equal.

C. **Type U-3**: Multi-Component, nonsag, Urethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T.
   1. Tremco Dymeric 240 or Dymeric 240 FC or Equal

D. **Type U-4**: Multi-Component, nonsag, Urethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, Use NT.
   1. Tremco Vulken 227 or Equal

E. **Type U-5**: Multi-Component, nonsag, Traffic Grade, Urethane Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T.
   1. Tremco Vulken 227 or Equal

2.4 BUTYL JOINT SEALANTS

A. **Type B-1**: Butyl Rubber based Joint Sealants: ASTM C 1311
   1. Tremco General Purpose Butyl Sealant or Equal

2.5 LATEX JOINT SEALANTS

A. **Type L-1**: Latex Joint Sealant: Acrylic latex or Siliconized Acrylic Latex: ASTM C834, Type OP, Grade NF or better
   1. Tremco Tremflex 834 or Equal.

B. **Type L-2**: Paintable Mildew-Resistant Latex Joint Sealant: Acrylic Latex or Siliconized Acrylic Latex: ASTM C834, Type OP, Grade NF or better.
   1. Tremco Tremflex 834 or Equal.

2.6 ACCESSORIES

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and

density to control sealant depth and otherwise contribute to producing optimum sealant performance:
1. Oversized to 30 to 50 percent larger than joint width.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape 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.

E. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated. Non-staining type, recommended by sealant manufacturer to suit application.

F. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

G. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrate surfaces and joint openings are ready to receive work.

B. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. Remove loose materials and foreign matter impairing adhesion of sealant.

B. Clean and prime joints.

C. Perform preparation in accordance with ASTM C1193.

3.3 INSTALLATION

A. Perform installation in accordance with ASTM C1193.

B. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

C. Install bond breaker where joint backing is not used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Tool joints concave.

3.4 SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and non-traffic horizontal surfaces.
1. Joint locations such as, but not limited to:
   a. Construction joints in cast-in-place concrete.
   b. Control joints in unit masonry.
      1) Provide joint sealants slightly darker than the adjacent masonry units. Provide multiple colors as may be required for match.

c. Perimeter joints between masonry, concrete, or stone and frames of doors, windows, storefronts, louvers, and similar openings.
d. Lintels and shelf angles to masonry construction.
e. Butt joints between metal panels.
f. Control and expansion joints in ceiling/soffit and similar overhead surfaces.
g. Exterior joints between dissimilar materials where the joining of the two surfaces leaves a gap between the meeting materials or components as may be dictated by various methods of construction to make building watertight.
h. Other joints as indicated on Drawings.

2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type S-1, Type S-2, Type S-3**
3. Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint locations such as, but not limited to:
a. Isolation joints in cast-in-place concrete slabs.
b. Perimeter of floor slabs or concrete curbs which abut vertical surfaces.
c. Areas around all piping systems that penetrate the slab or foundation walls below grade (utility trenches, electrical conduits, plumbing penetrations, etc.).
d. Control and expansion joints in tile flooring.
e. Other joints as indicated on Drawings.
2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type S-4**
3. Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces, subject to movement, unless otherwise noted.
1. Joint locations such as, but not limited to:
a. Control joints on exposed interior surfaces of exterior walls.
b. Interior joints where interior partitions meet exterior walls of dissimilar materials and components.
c. Other joints as indicated on Drawings.
2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type U-1**
3. Color: As selected by Architect from manufacturer's full range of colors. Paintable Sealant, prep for painted finish.

D. Joint-Sealant Application: Interior joints in vertical surfaces subject to abuse and movement.
1. Joint locations such as, but not limited to:
a. Vertical joints, including control joints and joints between masonry and structural support members, on exposed surfaces of interior unit masonry walls and partitions.
2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type U-2**
3. Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces not subject to movement.
1. Joint locations such as, but not limited to:
a. Interior perimeter joints of exterior openings.
b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
c. Interior joints between dissimilar materials where a gap is created where materials meet, unless otherwise noted.
2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type L-1, Type L-2**
3. Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in non-painted vertical surfaces and horizontal nontraffic surfaces.
   1. Joint locations such as, but not limited to:
      a. Interior joints between plumbing fixtures and adjoining floors and counters.
      b. Joints between countertops and backsplashes.
      c. For interior joints in non-painted vertical and horizontal surfaces where incidental food contact may occur.
      d. Tile control and expansion joints where indicated.
      e. Other joints as indicated on Drawings.
   2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type S-5**
      a. For potable water storage sealant shall be certified by National Sanitation Foundation as conforming to the requirements of NSF Standard 61 – Drinking Water System Components – Health Effect.
      b. For surfaces where incidental food contact may occur sealant must comply with United States Department of Agriculture (USDA) guidelines for incidental food contact with cured sealant.
   3. Color: As selected by Architect from manufacturer's full range of colors.

G. Joint-Sealant Application: Mildew-resistant interior joints in painted vertical surfaces and horizontal non-traffic surfaces.
   1. Joint locations such as, but not limited to:
      a. Interior joints between plumbing fixtures and adjoining painted walls.
      b. Joints where countertops or backsplashes intersect painted walls.
      c. For interior joints in painted vertical and horizontal surfaces where incidental food contact may occur.
   2. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type L-2**
   3. Color: As selected by Architect from manufacturer's full range of colors.

H. Joint-Sealant Application: Interior or exterior joints in vertical surfaces between laps in fabrications of sheet metal.
   1. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type U-1**
   2. Color: As selected by Architect from manufacturer's full range of colors.

I. Joint-Sealant Application: Exterior joints under metal thresholds and saddles, sill plates, or as bedding sealant for sheet metal flashing and frames of metal or wood.
   1. Provide one of the following acceptable sealants as approved by manufacturer for substrates and uses indicated: **Type S-1, Type U-1, Type B-1**
   2. Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 079100 - PREFORMED JOINT SEALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preformed, foam joint seals.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for liquid sealants applied over preformed seals in dual-seal systems.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Preformed, foam joint seals.

B. Samples for Initial Selection: Manufacturer's color sheets, showing full range of available colors for each type of exposed preformed joint seal.

C. Samples for Verification: Actual samples of each type and color of exposed preformed joint seal.

1. Size: **1/2-inch-** wide joints formed between two **6-inch-** long strips of material matching the appearance of exposed surfaces adjacent to joint seals.

1.4 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each preformed joint seal, for tests performed by qualified testing agency.

B. Sample warranties.

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1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace preformed joint seals that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish preformed joint seals to repair or replace those that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PREFORMED, FOAM JOINT SEALS

A. Preformed, Foam Joint Seals: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of **10 lb/cu. ft.** and impregnated with a nondrying, water-repellent agent. Factory produce them in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Willseal LLC, part of Tremco CPG

2. Design Criteria:

a. Nominal Joint Width: As indicated on Drawings.
b. Minimum Joint Width: As indicated on Drawings.
c. Maximum Joint Width: As indicated on Drawings.
d. Movement Capability: [**As indicated on Drawings**][**-25 percent/+25 percent**]<**Insert percentage**>.

3. Joint Seal Color: As selected by Architect from full range of industry colors.

2.2 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by preformed joint seal manufacturer for joint substrates indicated.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to preformed joint seal manufacturer, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces, and formulated to promote best adhesion to joint substrates.

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C. Masking Tape: Nonstaining, nonabsorbent material compatible with preformed joint seals and surfaces adjacent to joints.

D. Sealant for Adhering Extruded-Silicone Joint Seals: Silicone adhesive sealant recommended by extruded-silicone joint seal manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF PREFORMED, FOAM JOINT SEALS

A. General: Comply with preformed joint seal manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

END OF SECTION 079100

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standard steel doors and frames.

B. Related Requirements:

1. Section 083473.13 "Metal Sound Control Door Assemblies" for packaged, acoustically rated hollow-metal door and frame assemblies.
2. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Interior standard steel doors and frames.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

C. 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.

D. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

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E. Samples for Verification:

1. Finishes: For each type of exposed finish required, prepared on Samples of not less than **3 by 5 inches**.

F. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

B. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

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PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

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; AADG, Inc.; ASSA ABLOY
2. Curries, AADG, Inc.; ASSA ABLOY Group
3. Deansteel Manufacturing Company, Inc.
4. Republic Doors and Frames; a Allegion brand
5. Steelcraft; Allegion plc
6. Concept Frames, Inc

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings[**and temperature-rise limits**] indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [**25**]<**Insert value**> percent.

B. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

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. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing);

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consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

H. Glazing: Comply with requirements in Section 088000 "Glazing."

2.4 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum **3/4 inch** beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite and Transom Bar 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 welding[**, or by rigid mechanical anchors**].
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. 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.

4. Terminated Stops (Hospital Stops): Terminate stops [**6 inches**]<**Insert dimension**> above finish floor with a [**45**][**90**]-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.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule on Drawings, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with [**butted**][**or**][**mitered**] hairline joints.

1. Provide stops and moldings flush with face of door, and with [**beveled**][**square**]

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stops unless otherwise indicated.

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. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation 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.

2.5 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.

1. Color and Gloss: [**As indicated by manufacturer's designations**][**Match Architect's sample**][**As selected by Architect from manufacturer's full range**]<**Insert color and gloss**>.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with [**ANSI/SDI A250.11**][**NAAMM-HMMA 840**].

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
b. Install frames with removable stops located on secure side of opening.

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2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
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. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus **1/16 inch**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus **1/16 inch**, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus **1/16 inch**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus **1/16 inch**, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with [**ANSI/SDI A250.8**][**NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated**].
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

A. Inspection Agency: [**Owner will engage**][**Engage**] a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

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D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in [**NFPA 80**][**and**][**NFPA 101**].

END OF SECTION 081113

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SECTION 08 11 15 - PRE-ASSEMBLED METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pre-assembled steel entry doors in wood / composite frames.

1.2 SUBMITTALS

A. Product Data: Submit frame and door configurations, core materials, finishes, fire ratings, and Energy Star Compliance.

1.3 QUALITY ASSURANCE

A. Perform glazing Work in accordance with the following:
   1. Insulated Glass: Fabricate insulated glass units in accordance with GANA (formerly FGMA) Glazing Manual.
   2. Safety Glass: Conform to CPSC 16 CFR 1201 and applicable codes.

B. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.

D. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
   1. Installer shall be certified by Manufacturer.

1.4 WARRANTY

A. Furnish five year manufacturer’s warranty on workmanship and materials.

B. Furnish five year manufacturer’s warranty for insulated glass units from seal failure, interpane dusting or misting, including replacement.

PART 2 PRODUCTS

2.1 PRE-ASSEMBLED STEEL DOORS AND FRAMES

A. Manufacturers:
   1. Masonite: High Definition Steel Entry Doors.
   2. Therma-Tru: Profiles Steel Entry Doors, Equal to Above Style.
   3. Jeldwen: Premium Steel Exterior Door, Equal to Above Style.
   4. Lansing Housing Products

2.2 ENTRY DOORS

A. Construction: Tension-leveled cold rolled steel, zinc-coated, conversion coated to permit paint bond skins:
   1. Thickness: 1-3/4 inch thick; 24 gauge steel sheet face, 0.021 inch minimum.
   2. Door surface: smooth, flush style with glazed openings, design as indicated on Drawings
   3. Door Core Construction: Thermally Broken, wood stiles and rails, with foamed in place insulation.
   4. Door Edges: Machinable kiln-dried pine or engineered composite lumber mechanically locked to door faces, four sided full thermal break provided, lock area reinforced with solid blocking in full area of passage and deadbolt locksets.
   5. Door Bottom Edge: Moisture- and decay-resistant composite.

6. Door Bottom Edge Weatherstripping: Bottom Sweep compatible with accessible threshold; provide corner seal pads as required to seal bottom of door at frame.
7. Core: Foamed-in-place polyurethane, density 1.9 pcf minimum.
8. Finish: White primed. [ready for field paint]
9. Glazing Style: Clear, Full lite insulated glazing.
10. Door Configuration: Frame hinge, inswing patio door – sized to fit existing rough opening / door being removed, left and right hand configurations to match existing.
11. Energy Efficiency: Maximum U-Value of 0.30.

2.3 DOOR FRAMES

A. Composite Frames: Rot-resistant door frame, mullions, and brickmold, as supplied by Door manufacturer. Formed with integral stop for weatherstripping; accessible style threshold.
   1. Jamb Width: +/- 6-9/16 inch; Match existing wall thickness, field verified by Contractor.
   2. Mullion: Storm door ready Mullion [& Adaptor as required]; nominal 2 inch width
   3. Trim: Composite 2” brickmold
   4. Sill: High Dam type unless located in accessible unit
   5. Hinges: Steel, full mortise butt hinges; 4 x 4 inches, finish to match door hardware specified in Section 08 71 00.
   6. Finish: Painted

2.4 COMPONENTS

A. Steel Sheet: Galvanized to ASTM A653/A653M G60 coating class.

B. Insulation: Polyurethane.

C. Insulating Glass: Sealed double pane units with Low E coating with internal grid. Max U-Value of 0.30.
   1. Outer Pane: Clear fully tempered safety glass, Low-E Coating.
   2. Inner Pane: Clear fully tempered safety glass.
   3. Pane Thickness: Minimum 1/8 inch thick.
   4. Minimum Total Unit Thickness: 5/8 inch minimum.
   5. Internal Decorative Pattern: as indicated on Drawings.

2.5 HARDWARE

A. Weatherstripping: Jacketed, thermoset open-cell foam, press-fit in kerfs at jamb stops in frames. Medium Reach Compression type; Bottom sweep compatible with accessible threshold.
   1. Note: insulation shall be installed to fully prevent passage of light and air thru any gaps in the frame and door leaf.

B. Hardware Finish: US 26D [unless directed Otherwise by Owner]

C. Remainder of Hardware: Specified in Section 08 71 00.

2.6 ACCESSORIES

A. Door Casings:
   1. Exterior: 2 inch brickmold or 1x trim
   2. Interior: wood casing.

B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.

C. Primer: Manufacturer's standard rust inhibitive type.

2.7 FABRICATION

A. Fabricate doors and frames as pre-hung single piece jamb units with continuous threshold for each opening.

B. Fabricate pre-hung units with hardware reinforcement welded in place.

C. Configure exterior frames to accept weatherstripping.

D. Factory glaze doors.

E. Attach fire rating label to each fire rated door and frame.

2.8 FACTORY FINISHING

A. Doors and Frames:
   1. Primer: Baked on dry powder.
   2. Finish Coating: Field Applied.

B. Hardware Finish:
   1. Steel Components: Satin chrome finish or with finishes to match door hardware as applicable.
   2. Aluminum Components: Mill finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify framed openings are correct size and thickness and project conditions are acceptable.

3.2 INSTALLATION

A. Install units in accordance with manufacturers installation instructions.

B. Install fire rated assemblies in accordance with NFPA 80.

C. Install doors and frames plumb, level and square.

D. Coordinate installation of hardware specified in Section 08 71 00.

E. Field Finishing: As specified in Section 09 90 00.

F. Adjust door and frame units to ensure smooth and balanced movement.

3.3 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.4 SCHEDULES

A. Exterior Entry Doors: Steel door with wood / composite frame; sized per drawings, style as indicated on drawings; with continuous threshold. Hardware per section 08 71 00.

END OF SECTION

SECTION 08 16 00.00
MOLDED COMPOSITE DOORS
JELD-WEN® Molded Interior Doors

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior Molded Doors: Passage Doors.

1.2 REFERENCES

A. Window & Door Manufacturers Association (WDMA)

1. WDMA TM-7: Cycle Slam.
2. WDMA TM-8: Hinge Loading.

B. National Fire Protection Association (NFPA):

1. NFPA 252: Standard Methods of Fire Tests of Door Assemblies.
2. NFPA 80: Standard Methods for builders' hardware to be used in fire rated swing doors.

C. ASTM International:

1. ASTM E90 – Laboratory measurement of Airborne Sound Transmission of Building Partitions and Elements.
2. ASTM E1332 – Standard Classification for Rating Outdoor – Indoor Sound Attenuation.

1.3 SUBMITTALS

A. Submit under provisions of Section 0 13 00 – Administrative Requirements.

B. Product Data: Submit door manufacturer current product literature, including installation instruction.

C. Samples: Provide finish samples for all products.

D. Quality Assurance Submittals

1. Manufacturer Instructions: Provide manufacturer's written installation instructions.

E. Closeout Submittals: Refer to Section 0 17 00 Execution and Closeout Requirements Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver doors, materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store doors as recommended by manufacturer.

1.5 WARRANTY

A. Manufacturer's Standard Warranty: Assemblies will be free from defects in materials and workmanship from the date of manufacture for the time periods indicated below:

1. Door Slab: Commercial: 5 years.
2. Door Frames: 1 year.
3. Factory Prefinish: 1 year.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Acceptable Manufacturer: JELD-WEN, Inc.; 2645 Silver Crescent Drive, Charlotte, NC 28273; Toll Free Tel: 800-535-3936; Tel: 541-850-2606; Fax: 541-851-4333; Email: ArchitecturalServices@jeldwen.com; Web: http://www.jeld-wen.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 0 16 00 – Product Requirements.

C. Basis of Design: Doors are based on JELD-WEN®'s Molded Interior Doors: Colonist.

2.2 PASSAGE DOORS

A. Door Style:

1. Door Type: All panel.
2. Door Shape: Squared Top.
3. Surface Finish: Textured.
   a. Panels and Sticking Profile: Six panels, with Cove and Bead sticking (Available on Colonist)].Surface Finish: Textured.

B. Core and Frame:

1. Hollow core with all-wood frame.
   a. Thickness: match existing

C. Hardware: None.

1. Prep door for owner supplied hinge and lockset.
2. Face Bore: [2-1/8 inch (54.1 mm) (Standard).
3. Backset: 2-3/8 inch (60.5 mm) (Standard).Edge Bore: 1-inch (25.4 mm) with mortise for 1-inch (25.4 mm) by 2-1/4 inch (57.2 mm) latch faceplate with 1/4 inch (6.4 mm) radius corners.

D. Finish: Preprimed.

2.3 PREHUNG DOORS

A. Profile:

1. System 01, Single Door.
2. System 02, Double Door (SL100 is not available as System 2).

B. Jambs:

1. Jamb Width: match existing. Jamb Type: match existing.
3. Jamb Species: Pine, match existing.

C. Hinges: SAE 1010 Carbon Steel.

1. Size: 3-1/2 inch (88.9 mm) by 3-1/2 inch (88.9 mm) with 5/8 inch (15.9 mm) radius corners (Standard for 1-3/8 inch (35.1 mm) thick doors)
   a. Finish: Bright Brass.

D. Strike Plate: Bright Brass.

E. Door Flush Bolts/Ball Catch: Bright Brass.

PART 3 - EXECUTION

3.1 GENERAL

A. Install doors in accordance with manufacturer's installation guidelines and recommendations.

3.2 EXAMINATION

A. Inspect door prior to installation.

B. Inspect rough opening for compliance with door manufacturer recommendations. Verify rough opening conditions are within recommended tolerances.

3.3 PREPARATION

A. Prepare door for installation in accordance with manufacturer's recommendations.

B. Trim bottom of jamb sides to achieve desired distance between door bottom and finished floor height.

3.4 DOOR INSTALLATION

A. Place door unit into opening and level hinge side of jamb. Use shims fastened through jamb and stop to level and temporarily secure in place.

B. Level latch side of jamb. Use shims fastened through jamb and stop to level and temporarily secure in place.

C. Verify spacing between jamb and door is uniform on all sides. Adjust as necessary.

D. Shim top of jamb in center of opening and fasten with nail.

E. Re-check for square, level and even spacing around door. Nail securely in place through stop, jamb, shims and into studs every 12 inches.

F. Set nails.

G. Install trim on both sides using nails every 12 to 16 inches.

END OF SECTION

SECTION 085313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl windows.

1.2 PREINSTALLATION MEETINGS

A. 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, discuss, and coordinate interrelationship of vinyl windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
3. Review and discuss sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes.

B. Shop Drawings:

1. Plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

D. Samples for Verification: Actual sample of finished products for each type of exposed finish:

1. Exposed Finishes: 2 by 4 inches.

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2. Exposed Hardware: Full-size units.

E. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

F. Sustainable Design Submittals:

1. Product Data: For installation adhesives, indicating VOC content.
2. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
3. Product Data: For indicated products, indicating compliance with requirements for ENERGY STAR product labeling.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of vinyl window, for tests performed by a qualified testing agency.

B. Field Quality-Control Reports: For vinyl windows.

C. Qualification Statements: For manufacturer and Installer.

D. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: Authorized representative who is trained and approved by vinyl window manufacturer.

C. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

D. Testing Agency Qualifications: An FGIA-accredited testing agency for testing indicated.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in

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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, water leakage, and air infiltration.
    c. Faulty operation of movable sash and hardware.
    d. Deterioration of materials and finishes beyond normal weathering.
    e. Failure of insulating glass.

2. Warranty Period:

    a. Window: Five years from date of Substantial Completion.
    b. Glazing Units: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: FGIA or WDMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

C. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:

1. Thermal Transmittance (U-factor): As determined in accordance with NFRC 100:

    a. Fixed Windows: Not more than [**0.50 Btu/sq. ft. x h x deg F**][**0.45 Btu/sq. ft. x h x deg F**][**0.42 Btu/sq. ft. x h x deg F**][**0.36 Btu/sq. ft. x h x deg F**][**0.34 Btu/sq. ft. x h x deg F**][**0.29 Btu/sq. ft. x h x deg F**][**0.26 Btu/sq. ft. x h x deg F**]<**Insert value**>.
    b. Operable Windows: Not more than [**0.62 Btu/sq. ft. x h x deg F**][**0.60 Btu/sq. ft. x h x deg F**][**0.54 Btu/sq. ft. x h x deg F**][**0.45 Btu/sq. ft. x h x deg F**][**0.42 Btu/sq. ft. x h x deg F**][**0.36 Btu/sq. ft. x h x deg F**][**0.32 Btu/sq. ft. x h x deg F**]<**Insert value**>.

2. Solar Heat-Gain Coefficient (SHGC): As determined in accordance with NFRC 200.

    a. Fixed Windows: Not more than [**0.23**][**0.25**][**0.36**][**0.38**][**0.40**]<**Insert value**>.
    b. Operable Windows: Not more than [**0.21**][**0.23**][**0.33**][**0.34**][**0.36**]<**Insert**

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value> as determined in accordance with NFRC 200.

D. Outdoor-Indoor Transmission Class (OITC): Rated for not less than [**22**][**26**][**30**]<**Insert rating**> OITC when tested for laboratory sound transmission loss in accordance with ASTM E90 and determined by ASTM E1332.

E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for [**basic**][**enhanced**] protection.

2.2 VINYL WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. JELD-WEN, Inc.

B. Provide manufacturer's standard vinyl window assemblies consisting of frames, sashes, glass, hardware, fasteners, and all components and accessories as required for a complete installation.

C. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Single hung.

D. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Finish: Integral color, Match existing window color and style.
2. Gypsum Board Returns: Provide at interior face of frame.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: Match existing windows.

G. Hung Window Hardware:

1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.[**Provide custodial locks.**]

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3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Avoid exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 ACCESSORIES

2.4 FABRICATION

A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze vinyl windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.

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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Mullions: Install combination and reinforcing mullions for combination assemblies in accordance with manufacturer's written instructions.

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3.2 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**][**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: Testing and inspecting of installed windows to take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance will be performed in accordance with 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**]<**Insert number**> 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**]<**Insert number**> 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.

4. Testing Extent: [**One**][**Three**]<**Insert number or description**> window(s) of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows will be tested [**immediately after installation**][**at 5, 50, and 90 percent completion**]<**Insert test schedule**>.
5. Test Reports: Prepared in accordance with AAMA 502.

C. Test and Inspections:

1. Windows will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 085313

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes hardware exterior patio doors being replaced as part of this project.
   1. Provide cylinders and keys for all doors.

1.2 SUBMITTALS

A. Shop Drawings:
   1. Indicate locations and mounting heights of each type of hardware, schedule, and catalog cuts.
   2. Submit manufacturer's parts list, and templates.

B. Manufacturer's installation instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of installed cylinders and their master key code.

B. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

C. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following requirements:
   1. ANSI A156 series.
   2. NFPA 80 - Fire Doors and Windows.
   3. NFPA 101 - Life Safety Code.

B. Furnish hardware marked and listed in BHMA Directory of Certified Products.

C. Coordinate work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
   1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.

D. Coordinate Owner's keying requirements during course of work.

1.5 WARRANTY

A. Furnish five year manufacturer warranty for door hardware.

1.6 MAINTENANCE SERVICE

A. Provide special wrenches and tools applicable to each different or special hardware component.

PART 2 PRODUCTS

2.1 DOOR HARDWARE

A. Lockset, Latch Set, and Cylinder Manufacturers:
   1. KwikSet Delta Lever Latchset [match building standard]

B. Deadlock Manufactures:
   1. KwikSet SmartKey – Key Control Deadbolt [match building standard].

C. Cylinders: Match CMHA standards, field verify all requirements.

2.2 COMPONENTS

A. General Hardware Requirements: Where not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
   1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
   2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
   3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
      a. Finish: Match hardware item being fastened.

B. Hinges: ANSI A156.1, full mortise type, template type, ANSI A156.7, complying with following general requirements unless otherwise scheduled.
   1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
   2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for each door leaf.
   3. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior doors, non rising pins at interior doors.
   4. Tips: Flat button tips with matching plug.

C. Locksets: Furnish locksets compatible with specified cylinders. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
   1. Bored (Cylindrical) Locksets: ANSI A156.2, Grade 3 unless otherwise indicated.

D. Latch Sets: Match locksets. Typical 2-3/4” backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt.
   1. Bored (Cylindrical) Latchsets: ANSI A156.2, Grade 3 unless otherwise indicated.

E. Push/Pulls, Gaskets, Thresholds, and Trim: Furnish as indicated in Schedule, with accessories as required for complete operational door installations.
   1. Weatherstripping: Furnish continuous weatherstripping at top and sides of exterior doors.
   2. Thresholds: Standard high dam type at non accessible dwelling units.

F. Cylinders: Match Owner Standard.

G. Keying: Keyed as directed by Owner to integrate with existing Keying Schedule.
   1. Keys: Nickel silver. Stamp keys with “DO NOT DUPLICATE”.
   2. Supply keys in the following minimum quantities
      a. 3 keys per residential unit.

2.3 ACCESSORIES

A. Lock Trim: Furnish levers with 2 3/8” rose.

B. Through Bolts: Through bolts and grommet nuts are not permitted on door faces in occupied areas unless no alternative is possible.
   1. Do not permit through bolts on solid wood core doors.

2.4 FINISHING

A. Finishes: ANSI A156.18; with following finishes except where otherwise indicated in Schedule at end of section.
   1. Hinges: Satin nickel.
   2. Exterior Door Hardware: Satin nickel

3. Thresholds: Finish appearance to match door hardware on exterior face of door.
4. Other Items: Provide manufacturer's standard finishes matching similar hardware types on same door, and maintaining acceptable finish considering anticipated use and BHMA category of finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify doors and frames are ready to receive work and dimensions are as indicated on shop drawings and as instructed by manufacturer.

3.2 INSTALLATION

A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

B. Mounting Heights from Finished Floor to Center Line of Hardware Item: Comply with manufacturer recommendations and applicable codes.
1. Locksets: 38 inches
2. Dead Bolt: 48 inches
3. Top Hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to centerline of hinge.
4. Bottom Hinge: Jamb manufacturer's standard, but not greater than 12-1/2" from floor to centerline of hinge.
5. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.

3.3 ADJUSTING

A. Adjust hardware for smooth operation.

3.4 SCHEDULE

A. The following hardware sets are intended to establish type and standard of quality when used together with these section requirements. Examine Drawings and Specifications and furnish proper hardware for door openings.

1. Each new door requires two (2) of the Rockwood 528 stop. Also provide wall mounted plastic door stop plate at any door adjacent to a gypsum wall.

Hardware Set H-1: Patio Entry Doors

Hinges:	1-1/2 pair, 4x4 butt hinges
Stops:	Rockwood 528, plastic wall plate
Lock Set:	ANSI function F75 [passage latchset]
Dead Bolt	ANSI function E0152 [deadbolt with interior thumbturn]
Weatherstripping	Compression type
Threshold	Standard, high dam threshold

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hinges.
2. Mortise locks.
3. Roller latches.
4. Electric strikes.
5. Delayed-egress electromagnetic locks.
6. Surface closers.
7. Wall- and floor-mounted stops.
8. Thresholds.

B. Related Requirements:

1. Section 064100 "Architectural Wood Casework" for cabinet door hardware provided with cabinets.
2. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
3. Section 081213 "Hollow Metal Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
4. Section 083113 "Access Doors and Frames" for access door hardware, [**except**][**including**] cylinders.
5. Section 102600 "Wall and Door Protection" for plastic door protection units that match wall protection units.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Conference participants must include Installer's Architectural Hardware Consultant[**and Owner's security consultant**].

B. Keying Conference: Conduct conference at Project site.

1. Conference participants must include Installer's Architectural Hardware Consultant[**and Owner's security consultant**].
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system, including, but not limited to, the following:

a. Flow of traffic and degree of security required.

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b. Preliminary key system schematic diagram.
c. Requirements for key control system.
d. Requirements for access control.
e. Address for delivery of keys.
f. <**Insert requirements to suit Project**>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For electrified door hardware.

1. Include diagrams for power, signal, and control wiring.
2. Include details of interface of electrified door hardware and building safety and security systems.

C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.

1. Tag Samples with full product description to coordinate Samples with door hardware schedule.

D. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of product data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

a. Identification number, location, hand, fire rating, size, and material of each door and frame.
b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
e. Fastenings and other installation information.
f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.

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g. Mounting locations for door hardware.
h. List of related door devices specified in other Sections for each door and frame.

E. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of electrified door hardware.

1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Field quality-control reports.

E. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals.

B. Schedules: Final door hardware and keying schedule.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

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1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:

a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
b. Exit Devices: Two years from date of Substantial Completion.
c. Manual Closers: 10 years from date of Substantial Completion.
d. Concealed Floor Closers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.

B. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Means of Egress Doors: Latches do not require more than **15 lbf** to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than **5 lbf**.
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: **5 lbf** applied perpendicular to door.
b. Sliding or Folding Doors: **5 lbf** applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not

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more than **1/2 inch** high.

4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.2 HINGES

A. Hinges: ANSI/BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

2.3 MECHANICAL LOCKS AND LATCHES

A. Mortise Locks: ANSI/BHMA A156.13, Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

B. Roller Latches: ANSI/BHMA A156.16, Grade 1; rolling plunger that engages socket or catch, with adjustable roller projection.

2.4 ELECTRIC STRIKES

A. Electric Strikes: ANSI/BHMA A156.31, Grade 1; with faceplate to suit lock and frame.

2.5 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: ANSI/BHMA A156.3; consisting of active-leaf, hold-open lever, and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release[**; and with internal override**].

B. Carry-Open Bars: ANSI/BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: ANSI/BHMA A156.22.

2.6 SURFACE CLOSERS

A. Surface Closers: ANSI/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 instructions 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.

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2.7 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: ANSI/BHMA A156.16.

2.8 THRESHOLDS

A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

2.9 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-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and ANSI/BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended; however, aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. 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.
2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames[**; use threaded-to-the-head wood screws for wood doors and frames**].
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

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4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.10 FINISHES

A. Provide finishes complying with ANSI/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 INSTALLATION OF DOOR HARDWARE

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every **30 inches** of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

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2. Furnish permanent cores to Owner for installation.

E. Key Control System:

1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
3. Key Control System Software: Set up multiple-index system based on final keying schedule.

F. Boxed Power Supplies:Utilize existing power supplies, refer Electrical Drawings **above accessible ceilings**][**in equipment room**]. .

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. 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.

I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 FIELD QUALITY CONTROL

3.3 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service is to include 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies are to be manufacturer's authorized replacement parts and supplies.

3.4 DEMONSTRATION

A. Engage Installer to train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

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3.5 DOOR HARDWARE SCHEDULE

END OF SECTION 087100

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SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 088000 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
2. Section 102800 "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Mirrors: Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.

C. Samples: For each type of the following:

1. Mirrors: **12 inches** square, including edge treatment on two adjoining edges.
2. Mirror Clips: Full size.
3. Mirror Trim: **12 inches** long.

D. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of mirror[**and mirror mastic**].

B. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.

C. Qualification Statements: For Installer.

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D. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 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.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.

1. Testing is not required if data are submitted based on previous testing of mirror mastic products and mirror backing matching those submitted.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: [**Five**]<**Insert number**> years from date of [**Substantial Completion**][**manufacture**].

PART 2 - PRODUCTS

2.1 MIRROR HARDWARE

A. Mirror Bottom Clips: [**As indicated**]<**Insert description and finish or product designation and manufacturer's name**>.

B. Mirror Top Clips: [**As indicated**]<**Insert description and finish or product**

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designation and manufacturer's name>.

C. Plated Steel Hardware: Formed-steel shapes with plated finish indicated.

1. Profile: As indicated.
2. Finish: <**Insert manufacturer's finish designation and name**>.

D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

E. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.2 FABRICATION

A. Shop fabricate mirrors to greatest extent possible.

B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts, so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: [**Flat polished**][**Rounded polished**][**Flat high polished**][**Rounded high polished**][**Beveled polished edge of width shown**].

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 INSTALLATION OF MIRRORS

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced National Glass Association (NGA) publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

1. NGA Publications: [**"Laminated Glazing Reference Manual,"**]"Glazing Manual" and "Installation Techniques Designed to Prolong the Life of Flat Glass Mirrors."

B. Provide a minimum airspace of **1/8 inch** between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

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C. Install mirrors with [**mastic and**]mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Aluminum J-Channels: Provide setting blocks **1/8 inch** thick by **4 inches** long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than **1/4 inch** wide by **3/8 inch** long at bottom channel.
2. Aluminum J-Channels and Cleat: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
3. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips [**where indicated**][**so they are symmetrically placed and evenly spaced**].
4. Install mastic as follows:

    a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
    b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
    c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of **1/8 inch** between back of mirrors and mounting surface.

END OF SECTION 088300

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SECTION 090190.52 - MAINTENANCE REPAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes maintenance repainting as follows:

1. Removing existing paint.
2. Patching substrates.
3. Repainting.

B. Related Requirements:

1. Section 013516 "Alteration Project Procedures" for general remodeling, renovation, repair, and maintenance requirements.
2. Section 040110 "Masonry Cleaning" for cleaning and removing paint from masonry.
3. Section 050170.51 "Decorative Metal Cleaning" for cleaning and removing paint from decorative metal.
4. Section 099113 "Exterior Painting," Section 099123 "Interior Painting,"

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

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1. Include recommendations for product application and use.
2. Include test data substantiating that products comply with requirements.

B. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.

1.4 INFORMATIONAL SUBMITTALS

A. Color Matching Certificate: For computer-matched colors.

B. Preconstruction Test Reports: For cleaning materials, [**paint removers**][**and**][**paint coatings and systems**].

C. Furnish extra materials, from the same product run, that match products installed and thar are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 PREPARATORY CLEANING MATERIALS

A. Water: Potable.

B. Hot Water: Water heated to a temperature of **140 to 160 deg F**.

C. Detergent Solution: Solution prepared by mixing **2 cups** of tetrasodium pyrophosphate (TSPP), **1/2 cup** of laundry detergent that contains no ammonia, **5 quarts** of 5 percent sodium hypochlorite bleach, and **15 quarts** of warm water for every **5 gal.** of solution required.

D. Mildewcide: Commercial proprietary mildewcide or a job-mixed solution prepared by mixing **1/3 cup** of household detergent that contains no ammonia, **1 quart** of 5 percent sodium hypochlorite bleach, and **3 quarts** of warm water.

E. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.

F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

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2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from full range of industry colors.

1. 10 percent of surface area will be painted with deep tones.

2.3 PAINT MATERIALS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

2.4 PRIMERS/SEALERS

A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based MPI#107.

2.6 WATER-BASED PAINTS

A. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #145 .

B. Latex, Interior, Institutional Low Odor/VOC, Semi-gloss (Gloss Level 5): MPI #147.

PART 3 - EXECUTION

3.1 MAINTENANCE REPAINTING, GENERAL

A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet away from painted surface and from building exterior at 20 feet away from painted surface.

B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:

1. Remove failed coatings and corrosion and repaint.

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2. Verify that substrate surface conditions are suitable for repainting.
3. Allow other trades to repair items in place before repainting.

C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.

D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.

B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:

1. Gypsum Board: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. <**Insert surface to be repainted**>: <**Insert number**> percent.

C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.

E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.3 PREPARATORY CLEANING

A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.

B. Comply with manufacturer's written instructions and recommendations in "MPI Manual"

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applicable to substrates indicated.

C. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

D. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and bristle brushes. Scrub surface with detergent solution and bristle brush until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet. Rinse with water applied by clean rags or sponges.

E. Solvent Cleaning: Use solvent cleaning to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before other preparation work. Wipe surfaces with solvent using clean rags and sponges. If necessary, spot-solvent cleaning may be employed just prior to commencement of paint application, provided enough time is allowed for complete evaporation. Use clean solvent and clean rags for the final wash to ensure that all foreign materials have been removed. Do not use solvents, including primer thinner and turpentine, that leave residue.

F. Mildew: Clean off existing mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. Rinse with water applied by clean rags or sponges.

G. Chemical Rust Removal:

1. Remove loose rust scale with specified abrasives for ferrous-metal cleaning.
2. Apply rust remover with brushes or as recommended in writing by manufacturer.
3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing. Do not allow extended dwell time.
4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

H. Mechanical Rust Removal:

1. Remove rust with specified abrasives for ferrous-metal cleaning. Clean to bright metal.
2. Wipe off residue with mineral spirits and either steel wool or soft rags.
3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

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3.4 PAINT APPLICATION, GENERAL

A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.

B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

C. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.

D. Apply a transition coat over incompatible existing coatings.

E. Metal Substrate: Stripe paint corners, crevices, bolts, welds, and sharp edges before applying full coat. Apply two coats to surfaces that are inaccessible after completion of the Work. Tint stripe coat different than the main coating and apply with brush.

F. Blending Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 SURFACE-PREPARATION SCHEDULE

A. General: Before painting, prepare surfaces where indicated on Drawings for painting according to applicable requirements specified in this schedule.

1. Examine surfaces to evaluate each surface condition according to paragraphs below.
2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
3. Repair substrate defects according to "Substrate Repair" Article.

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B. Surface Preparation for MPI DSD 0 Degree of Surface Degradation:

1. Surface Condition: Existing paint film in good condition and tightly adhered.
2. Paint Removal: Not required.
3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.

C. Surface Preparation for [**MPI DSD 1**]<**Insert designation**> Degree of Surface Degradation:

1. Surface Condition: Paint film cracked or broken but adhered.
2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.
3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.

D. Surface Preparation for [**MPI DSD 2**]<**Insert designation**> Degree of Surface Degradation:

1. Surface Condition: Paint film loose, flaking, or peeling.
2. Paint Removal: Remove loose, flaking, or peeling paint film by hand-tool or chemical paint-removal methods.
3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Use other cleaning methods for small areas of bare substrate if required. Sand surfaces to smooth remaining paint film edges. Prepare bare cleaned surface to be painted according to paint manufacturer's written instructions for substrate construction materials.

E. Surface Preparation for [**MPI DSD 3**]<**Insert designation**> Degree of Surface Degradation:

1. Surface Condition: Paint film severely deteriorated.
2. Paint Removal: Completely remove paint film by hand-tool or chemical paint-removal methods. Remove rust.
3. Preparation for Painting: Prepare bare cleaned surface according to paint manufacturer's written instructions for substrate construction materials.

F. Surface Preparation for [**MPI DSD 4**]<**Insert designation**> Degree of Surface Degradation:

1. Surface Condition: Missing material, small holes and openings, and deteriorated or corroded substrate.
2. Substrate Preparation: Repair, replace, and treat substrate according to "Substrate Repair" Article[**and requirements in other Specification Sections**].
3. Preparation for Painting: Sand substrate surfaces to smooth remaining paint film edges and prepare according to paint manufacturer's written instructions for substrate construction materials. Remove rust.
4. Painting: Paint as required for MPI DSD 2 degree of surface degradation.

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G. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145.

3.7 EXTERIOR MAINTENANCE REPAINTING SCHEDULE

A. Ferrous Metal Substrates: [**Iron railing and gate**]<**Insert item description or drawing designation, or both**>:

1. Alkyd System: [**MPI REX 5.1D**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[**, MPI #23**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[**, MPI #23**].

b. Intermediate Coat: [**Alkyd, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Alkyd, exterior, semigloss (Gloss Level 5)[**, MPI #94**].
2) Alkyd, exterior, gloss (Gloss Level 6)[**, MPI #9**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. High-Performance, Pigmented-Polyurethane-over-Epoxy System: [**MPI REX 5.1H**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Epoxy, Anti-Corrosive, for Metal[**, MPI #101**].

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3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Epoxy, Anti-Corrosive, for Metal[**, MPI #101**].

b. Intermediate Coat in Primed Areas: Epoxy, High Build, Low Gloss[**, MPI #108**].
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[**, MPI #72**].
d. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[**, MPI #72**].
e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

B. Wood [**Columns**][**Beams**][**Ceilings**][**Siding**][**and**][**Fencing**]<**Insert item description or drawing designation, or both**>:

1. Latex System: [**MPI REX 6.2A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex for Exterior Wood[**, MPI #6**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].
5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex for Exterior Wood[**, MPI #6**].

b. Intermediate Coat: [**Latex, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, exterior flat (Gloss Levels 1-2)[**, MPI #10**].
2) Latex, exterior, low sheen (Gloss Levels 3-4)[**, MPI #15**].
3) Latex, exterior semigloss (Gloss Level 5)[**, MPI #11**].
4) Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd System: [**MPI REX 6.2C**]<**Insert system description**> system[**over a**

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transition coat].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].

b. Intermediate Coat: [**Latex, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Alkyd, exterior flat (Gloss Level 1)[**, MPI #8**].
2) Alkyd, exterior semigloss (Gloss Level 5)[**, MPI #94**].
3) Alkyd, exterior gloss (Gloss Level 6)[**, MPI #9**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

C. Wood [**Doors**][**Windows**][**Frames**][**Casings**][**and**][**Smooth Fasciae**]<**Insert item description or drawing designation, or both**>:

1. Latex System: [**MPI REX 6.3A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].

b. Intermediate Coat: [**Latex, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, exterior flat (Gloss Levels 1-2)[**, MPI #10**].
2) Latex, exterior, low sheen (Gloss Levels 3-4)[**, MPI #15**].
3) Latex, exterior semigloss (Gloss Level 5)[**, MPI #11**].
4) Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

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d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd System: [**MPI REX 6.3B**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].

b. Intermediate Coat: [**Alkyd, exterior, matching topcoat**]<**Insert requirement or coating designation**>.

c. Topcoat:

1) Alkyd, exterior flat (Gloss Level 1)[**, MPI #8**].
2) Alkyd, exterior semigloss (Gloss Level 5)[**, MPI #94**].
3) Alkyd, exterior gloss (Gloss Level 6)[**, MPI #9**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Varnish System (Clear): [**MPI REX 6.3F**]<**Insert system description**>.

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with topcoat.
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with topcoat.

b. Intermediate Coat: [**Exterior varnish matching topcoat**]<**Insert requirement or coating designation**>.

c. Topcoat:

1) Varnish, with UV inhibitor, exterior, semigloss (Gloss Level 5)[**, MPI #30**].
2) Varnish, with UV inhibitor, exterior, gloss (Gloss Level 6)[**, MPI #29**].
3) Varnish, marine spar, exterior, gloss (Gloss Level 6)[**, MPI #28**].

D. Wood [**Deck**][**and**][**Stairs**]<**Insert item description or drawing designation, or**

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both>:

1. Latex Porch and Floor System over Alkyd Primer: [**MPI REX 6.5A**]<**Insert system description**> system[**over a transition coat**].

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd/Oil for Exterior Wood[**, MPI #5**].
        3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd/Oil for Exterior Wood[**, MPI #5**].

    b. Intermediate Coat: [**Floor Paint, Latex, matching topcoat**]<**Insert requirement or coating designation**>.
    c. Topcoat:

        1) Floor paint, latex, low gloss[**, MPI #60**].
        2) Floor paint, latex, gloss[**, MPI #68**].

    d. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
    e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd Floor Enamel System: [**MPI REX 6.5B**]<**Insert system description**> system[**over a transition coat**].

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with topcoat.
        3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with topcoat.

    b. Intermediate Coat: [**Floor enamel matching topcoat**]<**Insert requirement or coating designation**>.
    c. Topcoat:

        1) Floor paint, alkyd, low gloss[**, MPI #59**].
        2) Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].

    d. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
    e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System**

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#8da399][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

E. Wood [**Shingle**][**Shake**] Siding <**Insert item description or drawing designation, or both**>:

1. Latex System: [**MPI REX 6.6A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].

b. Intermediate Coat: [**Latex, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, exterior flat (Gloss Levels 1-2)[**, MPI #10**].
2) Latex, exterior, low sheen (Gloss Levels 3-4)[**, MPI #15**].
3) Latex, exterior semigloss (Gloss Level 5)[**, MPI #11**].
4) Latex, exterior gloss (Gloss Level 6)[**, MPI #119**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd System: [**MPI REX 6.6B**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd for Exterior Wood[**, MPI #5**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd for Exterior Wood[**, MPI #5**].

b. Intermediate Coat: [**Latex, exterior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

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1) Alkyd, exterior flat (Gloss Level 1)[**, MPI #8**].
2) Alkyd, exterior semigloss (Gloss Level 5)[**, MPI #94**].
3) Alkyd, exterior gloss (Gloss Level 6)[**, MPI #9**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3.8 INTERIOR MAINTENANCE REPAINTING SCHEDULE

A. Ferrous Metal Substrates: [**Iron railing**]<**Insert item description or drawing designation, or both**>:

1. Latex System: [**MPI RIN 5.1N**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[**, MPI #23**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[**, MPI #79**].
4) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Rust-Inhibitive, Water Based[**, MPI #107**].
5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[**, MPI #23**].
6) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[**, MPI #79**].
7) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Rust-Inhibitive, Water Based[**, MPI #107**].

b. Intermediate Coat: [**Latex matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior, flat (Gloss Level 1)[**, MPI #53**].
2) Latex, interior (Gloss Level 2)[**, MPI #44**].
3) Latex, interior (Gloss Level 3)[**, MPI #52**].
4) Latex, interior (Gloss Level 4)[**, MPI #43**].
5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
6) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

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d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd System: [**MPI RIN 5.1E**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Metal, Surface Tolerant[**, MPI #23**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal[**, MPI #79**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Metal, Surface Tolerant[**, MPI #23**].
5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal[**, MPI #79**].

b. Intermediate Coat: [**Alkyd, matching topcoat**]<**Insert requirement or coating designation**>.

c. Topcoat:

1) Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
2) Alkyd, interior (Gloss Level 3)[**, MPI #51**].
3) Alkyd, interior, semigloss (Gloss Level 5)[**, MPI #47**].
4) Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. High-Performance, Pigmented-Polyurethane-over-Epoxy System: [**MPI RIN 5.1H**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with Epoxy, Gloss[**, MPI #77**].
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Zinc Rich, Organic[**, MPI #18**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Zinc Rich, Epoxy[**, MPI #20**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Organic[**, MPI #18**].

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5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Zinc Rich, Epoxy[**, MPI #20**].

b. Intermediate Coat in Primed Areas: Epoxy, Gloss[**, MPI #77**].
c. Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[**, MPI #72**].
d. Second Topcoat: Polyurethane, two-component, pigmented, gloss (Gloss Level 6)[**, MPI #72**].
e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

B. Wood [**Columns**][**Beams**][**and**][**Ceilings**]<**Insert item description or drawing designation, or both**>:

1. Latex System over Latex Primer: [**MPI RIN 6.2D**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[**, MPI #39**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[**, MPI #39**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior flat (Gloss Level 1)[**, MPI #53**].
2) Latex, interior (Gloss Level 2)[**, MPI #44**].
3) Latex, interior (Gloss Level 3)[**, MPI #52**].
4) Latex, interior (Gloss Level 4)[**, MPI #43**].
5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
6) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Latex System over Alkyd Primer: [**MPI RIN 6.2A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface

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degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior flat (Gloss Level 1)[**, MPI #53**].
2) Latex, interior (Gloss Level 2)[**, MPI #44**].
3) Latex, interior (Gloss Level 3)[**, MPI #52**].
4) Latex, interior (Gloss Level 4)[**, MPI #43**].
5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
6) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Alkyd System: [**MPI RIN 6.2C**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Alkyd, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
2) Alkyd, interior (Gloss Level 3)[**, MPI #51**].
3) Alkyd, interior, semigloss (Gloss Level 5)[**, MPI #47**].
4) Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

C. Wood [**Doors**][**Windows**][**Frames**][**and**][**Moldings**]<**Insert item description or drawing designation, or both**>:

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1. Latex System over Latex Primer: [**MPI RIN 6.3U**]<**Insert system description**> system[**over a transition coat**].

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[**, MPI #39**].
        3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[**, MPI #39**].

    b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.

    c. Topcoat:

        1) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
        2) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

    d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Low-Odor Latex System over Latex Primer: [**MPI RIN 6.3V**]<**Insert system description**> system[**over a transition coat**].

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[**, MPI #39**].
        3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[**, MPI #39**].

    b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.

    c. Topcoat:

        1) Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[**, MPI #143**].
        2) Latex, interior, institutional low odor/VOC (Gloss Level 2)[**, MPI #144**].
        3) Latex, interior, institutional low odor/VOC (Gloss Level 3)[**, MPI #145**].
        4) Latex, interior, institutional low odor/VOC (Gloss Level 4)[**, MPI #146**].

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5) Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[**, MPI #147**].
6) Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[**, MPI #148**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Latex System over Alkyd Primer: [**MPI RIN 6.3A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
2) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

4. Alkyd System: [**MPI RIN 6.3B**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Alkyd, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Alkyd, interior, semigloss (Gloss Level 5)[**, MPI #47**].

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2) Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

5. Alkyd Varnish System (Clear): [**MPI RIN 6.3J**]<**Insert system description**>.

a. Prime Coat:
b. For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.

1) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Shellac[**, MPI #88**].
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Alkyd, Sanding Sealer, Clear[**, MPI #102**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Shellac[**, MPI #88**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Alkyd, Sanding Sealer, Clear[**, MPI #102**].

c. Intermediate Coat: [**Interior varnish matching topcoat**]<**Insert requirement or coating designation**>.
d. Topcoat:

1) Varnish, interior, flat (Gloss Level 1)[**, MPI #73**].
2) Varnish, interior, semigloss (Gloss Level 5)[**, MPI #74**].
3) Varnish, interior, gloss (Gloss Level 6)[**, MPI #75**].

D. Wood [**Paneling**][**Casework**][**and**][**Millwork**]<**Insert item description or drawing designation, or both**>:

1. Latex System over Latex Primer: [**MPI RIN 6.4T**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[**, MPI #39**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[**, MPI #39**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

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1) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
2) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Low-Odor Latex System over Latex Primer: [**MPI RIN 6.4D**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Latex, for Interior Wood[**, MPI #39**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood[**, MPI #39**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[**, MPI #143**].
2) Latex, interior, institutional low odor/VOC (Gloss Level 2)[**, MPI #144**].
3) Latex, interior, institutional low odor/VOC (Gloss Level 3)[**, MPI #145**].
4) Latex, interior, institutional low odor/VOC (Gloss Level 4)[**, MPI #146**].
5) Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[**, MPI #147**].
6) Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[**, MPI #148**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Latex System over Alkyd Primer: [**MPI RIN 6.4A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].

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3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Latex, interior, matching topcoat**]<**Insert requirement or coating designation**>.

c. Topcoat:

1) Latex, interior flat (Gloss Level 1)[**, MPI #53**].
2) Latex, interior (Gloss Level 2)[**, MPI #44**].
3) Latex, interior (Gloss Level 3)[**, MPI #52**].
4) Latex, interior (Gloss Level 4)[**, MPI #43**].
5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].
6) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

4. Alkyd System: [**MPI RIN 6.4C**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Undercoat, Enamel, Interior[**, MPI #46**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior[**, MPI #46**].

b. Intermediate Coat: [**Alkyd, matching topcoat**]<**Insert requirement or coating designation**>.

c. Topcoat:

1) Alkyd, interior flat (Gloss Level 1)[**, MPI #49**].
2) Alkyd, interior (Gloss Level 3)[**, MPI #51**].
3) Alkyd, interior, semigloss (Gloss Level 5)[**, MPI #47**].
4) Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

5. Alkyd Varnish System over Stain: [**MPI RIN 6.4F**]<**Insert system description**>.

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.

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2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[**, MPI #90**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[**, MPI #90**].

b. Intermediate Coat: [**Interior varnish matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Varnish, interior, flat (Gloss Level 1)[**, MPI #73**].
2) Varnish, interior, semigloss (Gloss Level 5)[**, MPI #74**].
3) Varnish, interior, gloss (Gloss Level 6)[**, MPI #75**].

d. Stain Color: Match [**adjacent, cleaned wood of same type**][**existing color**][**color indicated on Drawings**]<**Insert color or requirement**>.

E. Wood [**Floors**][**and**][**Stairs**]<**Insert item description or drawing designation, or both**>:

1. Latex Porch and Floor System over Alkyd Primer: [**MPI RIN 6.5J**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[**, MPI #45**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer Sealer, Alkyd, Interior[**, MPI #45**].

b. Intermediate Coat: [**Floor Paint, Latex, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Floor paint, latex, low gloss[**, MPI #60**].
2) Floor paint, latex, gloss[**, MPI #68**].

d. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Alkyd Floor Enamel System: [**MPI RIN 6.5A**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

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1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with topcoat.
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with topcoat.

b. Intermediate Coat: [**Floor enamel matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Floor paint, alkyd, low gloss[**, MPI #59**].
2) Floor enamel, alkyd, gloss (Gloss Level 6)[**, MPI #27**].

d. Topcoat Additive: Manufacturer's standard additive to increase skid resistance of painted surface.
e. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Polyurethane Varnish System (Clear): [**MPI RIN 6.5C**]<**Insert system description**>.

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with topcoat.
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with topcoat.

b. Intermediate Coat: [**Interior varnish matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat: Varnish, interior, polyurethane, oil modified, gloss[**, MPI #56**].

4. Two-Component Aliphatic Polyurethane System (Clear): [**MPI RIN 6.5G**]<**Insert system description**>.

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with topcoat.
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with topcoat.

b. Intermediate Coat: [**Aliphatic polyurethane varnish matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat: Varnish, aliphatic polyurethane, two-component[**, MPI #78**].

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5. Moisture-Cured Polyurethane System (over Stain): [**MPI RIN 6.5L**]<**Insert system description**>.

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Stain, Semi-Transparent, for Interior Wood[**, MPI #90**].
        3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Stain, Semi-Transparent, for Interior Wood[**, MPI #90**].

    b. Intermediate Coat: [**Moisture-cured polyurethane varnish matching topcoat**]<**Insert requirement or coating designation**>.
    c. Topcoat: Varnish, polyurethane, moisture cured, gloss (Gloss Level 6)[**, MPI #31**].
    d. Stain Color: Match [**adjacent, cleaned wood of same type**][**existing color**][**color indicated on Drawings**]<**Insert color or requirement**>.

F. [**Plaster**]<**Insert item description or drawing designation, or both**>:

1. Latex System over Waterborne Primer: [**MPI RIN 9.2A**]<**Insert system description**> system[**over a transition coat**].

    a. Prime Coat:

        1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
        2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[**, MPI #50**].
        3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[**, MPI #137**].
        4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[**, MPI #50**].
        5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[**, MPI #137**].

    b. Intermediate Coat: [**Latex matching topcoat**]<**Insert requirement or coating designation**>.
    c. Topcoat:

        1) Latex, interior, flat (Gloss Level 1)[**, MPI #53**].
        2) Latex, interior (Gloss Level 2)[**, MPI #44**].
        3) Latex, interior (Gloss Level 3)[**, MPI #52**].
        4) Latex, interior (Gloss Level 4)[**, MPI #43**].
        5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].

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6) Latex, interior, gloss (Gloss Level 6)[**, MPI #114**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

2. Low-Odor Latex System over Waterborne Primer: [**MPI RIN 9.2M**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[**, MPI #50**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[**, MPI #137**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[**, MPI #50**].
5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[**, MPI #137**].

b. Topcoat:

1) Latex, interior, institutional low odor/VOC flat (Gloss Level 1)[**, MPI #143**].
2) Latex, interior, institutional low odor/VOC (Gloss Level 2)[**, MPI #144**].
3) Latex, interior, institutional low odor/VOC (Gloss Level 3)[**, MPI #145**].
4) Latex, interior, institutional low odor/VOC (Gloss Level 4)[**, MPI #146**].
5) Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5)[**, MPI #147**].
6) Latex, interior, institutional low odor/VOC, gloss (Gloss Level 6)[**, MPI #148**].

c. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

3. Latex System over Alkyd Primer: [**MPI RIN 9.2K**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.

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2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer Sealer, Alkyd, Interior[**, MPI #45**].
3) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat Primer Sealer, Alkyd, Interior[**, MPI #45**].

b. Intermediate Coat: [**Latex matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Latex, interior, flat (Gloss Level 1)[**, MPI #53**].
2) Latex, interior (Gloss Level 2)[**, MPI #44**].
3) Latex, interior (Gloss Level 3)[**, MPI #52**].
4) Latex, interior (Gloss Level 4)[**, MPI #43**].
5) Latex, interior, semigloss (Gloss Level 5)[**, MPI #54**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

4. Alkyd System: [**MPI RIN 9.2C**]<**Insert system description**> system[**over a transition coat**].

a. Prime Coat:

1) For [**MPI DSD 1**]<**Insert designation**> degree of surface degradation, touch up with topcoat.
2) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer Sealer, Latex, Interior[**, MPI #50**].
3) For [**MPI DSD 2**]<**Insert designation**> degree of surface degradation, spot prime with Primer, Stain Blocking, Water Based[**, MPI #137**].
4) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer Sealer, Latex, Interior[**, MPI #50**].
5) For [**MPI DSD 3**]<**Insert designation**> degree of surface degradation, fully prime coat with Primer, Stain Blocking, Water Based[**, MPI #137**].

b. Intermediate Coat: [**Alkyd, matching topcoat**]<**Insert requirement or coating designation**>.
c. Topcoat:

1) Alkyd, interior, flat (Gloss Level 1)[**, MPI #49**].
2) Alkyd, interior (Gloss Level 3)[**, MPI #51**].
3) Alkyd, interior, semigloss (Gloss Level 5)[**, MPI #47**].
4) Alkyd, interior, gloss (Gloss Level 6)[**, MPI #48**].

d. Color: Match [**Munsell Color 10 G 8/2**][**Plochere Color System #8da399**][**existing colors**][**colors indicated on Drawings**]<**Insert color(s) or requirement**>.

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END OF SECTION 090190.52

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 079219 "Acoustical Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
3. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for steel shaft wall framing, gypsum shaft liners, and other components of shaft wall assemblies.
4. Section 092216 "Non-Structural Metal Framing" for nonstructural steel framing and suspension systems that support gypsum board panels.
5. Section 092613 "Gypsum Veneer Plastering" for gypsum base for veneer plaster and for other components of gypsum-veneer-plaster finishes.
6. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Locations and installation of control and expansion joints, including plans, elevations, sections, and attachment details.

C. Samples for Initial Selection:

1. Trim Accessories: For [**aluminum**][**and**][**base-of-wall PVC moisture-barrier**]<**Insert requirements**> trim.
2. Texture Finish: For each type required.

D. Samples for Verification: Actual sample of finished products for the following:

1. Trim Accessories: Actual sample of finished products for each profile of [**aluminum**][**and**][**base-of-wall PVC moisture-barrier**]<**Insert requirements**> trim required.

a. Size: Full size profile, [**12 inches**]<**Insert dimension**> long,

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2. Textured Finishes: [**Manufacturer's standard size**]<**Insert requirements**> for each textured finish required and on same backing indicated for Work.

E. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or manufacturer's written instructions, 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, moisture damaged, or 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 on Drawings in accordance with ASTM E119; tested by a qualified testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E90 and classified in accordance with ASTM E413; tested by a qualified testing agency.

C. Verify ceiling and wall materials comply with requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 16.5 mcg/cu. m or 13.5 ppb, whichever is less.

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2.2 GYPSUM BOARD, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent.

B. Regional Materials: Verify materials were 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. If materials are transported by rail or water, multiply the distance by 0.25 to determine the distance to Project site.

C. Size: Provide panel products in maximum lengths and widths available that will minimize joints in each area and that correspond with support system specified or indicated on Drawings.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

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. Georgia-Pacific Gypsum LLC
    b. PABCO Gypsum
    c. USG Corporation

2. Thickness: As indicated on Drawings.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Georgia-Pacific Gypsum LLC
    b. PABCO Gypsum
    c. USG Corporation

2. Thickness: [**As indicated on Drawings**][**5/8 inch**][**3/4 inch**].
3. Long Edges: [**Tapered**][**Tapered and featured (rounded or beveled) for prefilling**]<**Insert requirements**>.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include,

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but are not limited to, the following:

a. James Hardie Building Products, Inc.
b. USG Corporation

2. Thickness: As indicated on Drawings.
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

B. Water-Resistant Gypsum Backing Board: ASTM C1396/C1396M, 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; SAINT-GOBAIN
c. Gold Bond Building Products, LLC provided by National Gypsum Company

2. Core: As indicated on Drawings.

2.5 Joint Tape

A. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

1. CertainTeed; Saint-Gobain North America:

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.

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 in writing 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[**, rounded or beveled panel edges,**] and damaged surface areas, use setting-type taping compound.

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2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use [**setting-type taping**][**drying-type, all-purpose**] compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use [**setting-type, sandable topping**][**drying-type, all-purpose**] compound.
4. Finish Coat: For third coat, use [**setting-type, sandable topping**][**drying-type, all-purpose**] compound.
5. Skim Coat: For final coat of Level 5 finish, use [**setting-type, sandable topping compound**][**drying-type, all-purpose compound**][**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 in writing by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended in writing by backing panel manufacturer.
2. Cementitious Backer Units: As recommended in writing by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 Paperless Wallboard

A. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

1. USG Corporation:

2.8 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended in writing by manufacturer for directly adhering gypsum panels to continuous substrate.

1. Verify adhesives have a VOC content of 50 g/L or less.

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C. Steel Drill Screws: ASTM C1002 unless otherwise specified or indicated on Drawings.

1. Use screws complying with ASTM C954 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 in writing by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers as follows:

1. Non-Fire-Resistance-Rated Assemblies: [**Glass**][**or**][**slag or rock wool**].
2. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
3. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent.

E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

1. Product Data: Verify architectural sealant has a VOC content of 250 g/L or less.

F. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840 requirements.

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

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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. 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 C919 requirements and with manufacturer's written instructions 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.

3.2 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Gypsum Wallboard: [**As indicated on Drawings**][**Vertical surfaces unless otherwise indicated**].
2. Lightweight Gypsum Wallboard: [**As indicated on Drawings**][**Vertical surfaces unless otherwise indicated**].
3. Gypsum Board, Type X: [**As indicated on Drawings**][**Where required for fire-resistance-rated assembly**][**Vertical surfaces unless otherwise indicated**]<**Insert requirements**>.
4. Lightweight Gypsum Board, Type X: [**As indicated on Drawings**][**Where required for fire-resistance-rated assembly**][**Vertical surfaces unless otherwise indicated**]<**Insert requirements**>.
5. Gypsum Board, Type C: [**As indicated on Drawings**][**Where required for specific fire-resistance-rated assembly indicated**]<**Insert requirements**>.
6. Flexible Gypsum Board: [**As indicated on Drawings**][**Apply in double layer at curved assemblies**]<**Insert requirements**>.
7. Gypsum Ceiling Board: [**As indicated on Drawings**][**Ceiling surfaces**]<**Insert requirements**>.

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8. Foil-Backed Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
9. Abuse-Resistant Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
10. Impact-Resistant Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
11. Mold-Resistant Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
12. Lightweight Mold-Resistant Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
13. Glass-Mat Interior Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.
14. Acoustically Enhanced Gypsum Board: [**As indicated on Drawings**]<**Insert requirements**>.

B. 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 on Drawings.
2. On partitions/walls, apply gypsum panels [**vertically (parallel to framing)**][**horizontally (perpendicular to framing)**] unless otherwise specified or indicated on Drawings 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 on Drawings or required by fire-resistance-rated assembly.

3. On Z-shaped 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.

C. 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 on Drawings 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 studs or furring members and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated on Drawings or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped 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

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joints of base layer over furring members.

4. Fastening Methods: Fasten base layers [**and face layers separately to supports with screws**][**with screws; fasten face layers with adhesive and supplementary fasteners**].

D. 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 instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. 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.

3.3 INSTALLATION OF 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 on Drawings**][**locations indicated to receive tile**]. Install with **1/4-inch** gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at [**showers, tubs, and where indicated on Drawings**][**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.

3.4 APPLICATION OF JOINT TREATMENT MATERIALS

A. Finishing Panel Products: Treat joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare panel 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 panel joints, except for trim products specifically indicated as not intended to receive tape.

D. Interior Gypsum Board: Finish panels to levels indicated below and in accordance with ASTM C840:

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1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: [**Panels that are substrate for tile**][**Panels that are substrate for acoustical tile**][**Where indicated on Drawings**]<**Insert locations**>.
3. Level 3: [**Where indicated on Drawings**]<**Insert locations**>.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

4. Level 4: [**At panel surfaces that will be exposed to view unless otherwise indicated**]<**Insert locations**>.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: [**Where indicated on Drawings**]<**Insert locations**>.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Exterior Gypsum Board for Ceilings and Soffits: Finish in accordance with manufacturer's written instructions.

F. Glass-Mat Faced Panels: Finish in accordance with manufacturer's written instructions.

G. Cementitious Backer Units: Finish in accordance with manufacturer's written instructions.

END OF SECTION 092900

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SECTION 09 30 50
TILE SETTING MATERIALS AND ACCESSORIES

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Uncoupling membrane.

B. Waterproofing Membrane.

C. Floor drain, with integrated bonding flange.

D. Prefabricated shower components.

E. Edge-protection and transition profiles for floors.

F. Setting materials.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 06 10 00 - Rough Carpentry.

C. Section 07 91 00 – Preformed Joint Seals.

D. Section 06 16 00 - Cementitious Backing Units, Walls.

E. Section 09 30 13 - Ceramic Tiling. Shower trays, curbs, ramps, bench, niche, sealing compound, waterproofing membrane, drainage panels, drainage membrane compatible with floor drains.

F. Section 10 26 13 - Corner Guards.

G. Section 22 13 19.13 - Sanitary Drains.

1.3 REFERENCES

A. CSA B79-08: Floor, Area, and Shower Drains, and Cleanouts for Residential Construction.

B. IAPMO IGC 195: Interim Guide Criteria for Floor Drain with Integrated Bonding Flange.

C. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

D. Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual.

E. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. 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.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Warranty document showing duration and scope to be submitted with product submittals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years' experience.

B. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

D. Preinstallation Conference: Conduct conference at the Project site.
   1. Convene one week prior to commencing work of this section.
   2. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
   3. Meeting agenda includes but is not limited to:
      a. Surface preparation.
      b. Tile and installation material compatibility.
      c. Manufacturer and installer warranty duration and scope covered by warranty.
      d. Edge protection, transition, and pre-fabricated movement joint profiles.
      e. Waterproofing techniques.
      f. Crack isolation techniques.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

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. Provide sample warranty during submittal process.

B. Acknowledge warranty duration and scope covered by warranty.

C. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

D. Obtain products of a uniform quality for each premanufactured tile profile, and mortar and waterproofing and uncoupling membrane from a single manufacturer, to maintain the installation system and provide multi-product warranty from selected manufacturer.

1.9 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Schluter Systems L.P., which is located at: 194 Pleasant Ridge Road.; Plattsburgh, NY 12901-5841; ASD Toll Free Tel: 800-472-4588; Fax: 800-477-9783; Email:specassist@schluter.com; Web:www.schluter.com/schluter-us/en_US/.

B. Acceptable Manufacturer: Schluter Systems (Canada) Inc., 21100 Chemin Ste-Marie, Ste-Anne-de-Bellevue, QC H9X 3Y8. Tel: (800) 667-8746. Fax (514) 336-2410. Email:specassist@schluter.com; Web:www.schluter.ca.

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 UNCOUPLING MEMBRANE

A. Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.

B. Schluter-DITRA: 1/8 inch (3 mm) thick, orange, high-density polyethylene membrane.
   1. Grid Structure: 1/2 x 1/2 inch (12 x 12 mm) square cavities, each cut back in a dovetail configuration.
   2. Anchoring Fleece: Polypropylene laminated to its underside.
   3. Standards Compliance:
      a. Conforms to definition for uncoupling membranes in the Tile Council of North America Handbook for Ceramic Tile Installation.
      b. Meets or exceeds the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.
      c. Listed by cUPC and is evaluated by ICC-ES. See Report No. ESR-2467.
   4. Waterproofing Seaming Membrane: KERDI BAND Seams and Corners. Material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.

2.3 WATERPROOFING MEMBRANE

A. Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.

B. Schluter-KERDI: Polyethylene Membrane: 0.008 inch (0.2 mm) thick, orange with polypropylene fleece laminated on both sides.
   1. Meets or exceeds requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10.
   2. Listed by cUPC.
   3. Evaluated by ICC-ES. See Report No. ESR-2467.
   4. Corners and seals: Matching preformed inside corners. Color: Orange.
   5. Corners and seals: Matching preformed outside corners. Color: Orange.
   6. Corners and seals: Matching preformed pipe seals. Color: Orange.
   7. Corners and seals: Matching preformed mixing valve seals. Color: Orange.

C. Schluter-KERDI-BAND: Seams and Corners material to be 0.004 inch (0.1 mm) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides. Width: As required.

2.4 FLOOR DRAIN WITH INTEGRATED BONDING FLANGE

A. Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.

B. Schluter-KERDI-DRAIN-F: Floor drain 5-1/2 inch (140 mm) nominal wide, flat bonding flange with integrated laminated Schluter-KERDI Waterproof Membrane and vertical height adjustment collar.
   1. Grate Assembly: Includes 4 x 4 inch (102 x 102 mm) square grate, vertical height adjustment collar.
   2. Listed by ICC-ES (Report No. 1204), UPC and CSA.
   3. Drain Housing Material: Polypropylene with ABS and PVC couplings.
   4. Grate Type, Material, and Finish:

a. Classic: Arc-shaped and trapezoid-shaped openings.
1) ET: Stainless Steel Type 304, Nickel.

5. Nominal Grate Size: 4 x 4 inch (100 x 100 mm) square.

C. Schluter-KERDI-LINE DRAIN, Brushed Stainless Steel: Linear floor drain consisting of a formed stainless steel channel body and grate assembly that can be seamlessly adjusted to tile or stone covering thickness from 1/8 inch (3 mm) to 1 inch (25 mm).
1. Channel Body: Trough Width: 2-1/4 inch (57 mm). No-Hub Outlet: 2 inch (50 mm). Bonding Flange: 7/8 inch (22 mm) wide laminated with a collar made of the Schluter-KERDI waterproofing membrane.
2. Drain Type: As referenced in methods B422 and B422 STONE in the Tile Council of North America Handbook for Ceramic, Glass, and Stone Tile Installation.
3. Channel Body Material: Stainless Steel 304 (1.4301 equals V2A).
4. Channel Body and Grate Nominal Length: 56 inch (140 cm).
5. Grate Frame Height: 3/4 inch (19 mm).
6. Grate Design: To be determined.
7. Drain Outlet: To be determined.

2.5 PREFABRICATED SHOWER COMPONENTS

A. Project specific warranty to be provided from Schluter Systems L.P. by Tile Contractor.

B. Schluter-KERDI-SHOWER-L/-LS: Prefabricated, sloped shower tray base with integrated KERDI waterproofing.
1. Material: Expanded Polystyrene. 3.75 lbs per cu ft (60 kg per cu m) density.
2. Removable recessed section for drain placement.
3. In compliance with IAPMO PS 106-2015el.
4. Listed by cUPC.
5. Evaluated by ICC-ES; see Report No. PMG - 1204.
6. Tray for Wall or Entrance Linear Drain Placement:
a. KSLT1930/965S: 76 x 38 x 1-5/8 inch (193 x 97 x 41 mm).

C. Schluter-KERDI-SHOWER-SR: Prefabricated shower ramp base with integrated KERDI waterproofing.
1. Expanded Polystyrene. 3.75 lbs per cu ft (60 kg per cu m) density.
2. Ramp Dimensions: 48 x 12 inch (1220 x 30.5 cm) with slope from maximum thickness of 1-1/4 inch (32 mm) to minimum thickness of 1/4 inch (6 mm).

2.6 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

A. Schluter-RENO-U: Profile with sloped exposed surface, 5/32 inch (4 mm) tall leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
1. Profile Height: As required to coordinate with tile selection and setting system.

2.7 SETTING MATERIALS

A. Schluter-ALL SET Modified Thin Set Mortar: Specialized sag-resistant modified thin-set mortar specifically formulated for use with Schluter membranes and boards. Engineered for use both under and over DITRA and KERDI products. Suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter-Systems' uncoupling and waterproofing membranes. Meets the requirements of ANSI A118.4T, A118.11, and A118.15T.
   1. Color: White.

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.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl base.
2. Vinyl stair treads.
3. Rubber molding accessories.
4. Vinyl molding accessories.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096516 "Resilient Sheet Flooring" for resilient rolled flooring.
3. Section 096519 "Resilient Tile and Plank Flooring" for modular resilient flooring.
4. Section 096543 "Linoleum Flooring" for modular and sheet linoleum flooring.
5. Section 096813 "Tile Carpeting" for modular carpet tile flooring.
6. Section 096816 "Sheet Carpeting" for tufted and woven carpet flooring.
7. Section 104513 "Photoluminescent Egress Path Markings" for luminous stair accessories.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference [**at Project site**][**by web conference**]<**Insert location**>.

1. Review methods and procedures related to resilient base and accessory installation including, but not limited to, the following:

a. Delivery, storage, and handling procedures.
b. Ambient conditions and ventilation procedures.
c. Subfloor preparation procedures for resilient stair accessories.
d. <**Insert agenda items**>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation instructions for each type of substrate.

B. Samples: For each exposed product and for each color and texture specified, not less

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than **12 inches** long.

C. Samples for Initial Selection: For each type of exposed product.

D. Samples for Verification: For each type of exposed product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than **12 inches** long.

E. Product Schedule: For resilient base and accessory products.[**Use same designations indicated on Drawings.**]

F. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): For each product.
2. Environmental Product Declaration (EPD): For each product.
3. Third-Party Certifications: For each product.
4. Third-Party-Certified Life-Cycle Assessment: For each product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For resilient base and accessory products, for tests performed by a qualified testing agency.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than [**70 deg F**]<**Insert temperature**> or more than [**95 deg F**]<**Insert temperature**>, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than [**55 deg F**]<**Insert temperature**> or more than [**95 deg F**]<**Insert temperature**>.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical products in accordance with ASTM E648 or ASTM E662 by a qualified testing agency.

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1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Verify flooring products comply with requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 16.5 mcg/cu. m or 13.5 ppb, whichever is less.

2.2 RESILIENT BASE

A. Vinyl Base:

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. Roppe Corporation; Roppe Holding Company
    b. Shaw Industries Group, Inc.; Berkshire Hathaway Company
    c. Tarkett USA

2. Classification: ASTM F1861, Type TV (vinyl, thermoplastic), Group I (solid, homogeneous).
3. Style and Location:

    a. Style B, Cove: Provide in areas with resilient floor coverings.

4. Minimum Thickness: 0.125 inch.
5. Height: As indicated on Drawings.
6. Lengths: Coils in manufacturer's standard length.
7. Outside Corners: Job formed.
8. Inside Corners: Job formed.
9. Colors and Patterns: Match Architect's sample.

2.3 RESILIENT STAIR ACCESSORIES

A. Vinyl Stair Treads:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Roppe Corporation; Roppe Holding Company
    b. Tarkett USA

2. Classification: ASTM F2169, Type TV (vinyl, thermoplastic).

    a. Class: [**1 (smooth, flat)**][**2 (pattern; embossed, grooved, or ribbed)**].
    b. Group: 2 (with contrasting color for the visually impaired).

3. Nosing Style: [**Square, adjustable to cover angles between 60 and 90 degrees**][**Square**][**Round**].

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4. Nosing Height: [**1-1/2 inches**][**2 inches**][**2-3/16 inches**]<**Insert dimension**>.
5. Thickness: [**1/4 inch and tapered to back edge**]<**Insert thickness**>.
6. Size: Lengths and depths to fit each stair tread in [**one piece**][**one piece or, for treads exceeding maximum lengths manufactured, in equal-length units**].

B. Integral Risers: Smooth, flat; in height that fully covers substrate.

C. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer who produced treads and recommended by manufacturer for installation with treads.

1. Style: [**Coved toe, 7 inches high by length matching treads**][**Toeless, by length matching treads**].
2. Thickness: [**0.125 inch**][**Manufacturer's standard**]<**Insert thickness**>.

D. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers, produced by same manufacturer who produced treads, and recommended by manufacturer for installation with treads.

1. Thickness: [**0.125 inch**][**0.080 inch**][**Manufacturer's standard**]<**Insert thickness**>.

E. Landing Tile: [**Matching treads; produced by same manufacturer who produced treads and recommended by manufacturer for installation with treads**]<**Insert requirements**>.

F. Locations: [**Provide resilient stair accessories in areas indicated**]<**Insert requirements**>.

G. Colors and Patterns: [**As indicated by manufacturer's designations**][**Match Architect's sample**]<**Insert colors and patterns**>.

2.4 RESILIENT MOLDING ACCESSORIES

A. Rubber Molding Accessories :

1. Accessory Description: [**Stair-tread nosing**][**cap for cove carpet**][**cap for cove resilient floor covering**][**carpet bar for tackless installations**][**carpet edge for glue-down applications**][**nosing for carpet**][**nosing for resilient floor covering**][**reducer strip for resilient floor covering**][**joiner for tile and carpet**][**transition strips**]<**Insert description**>.
2. Profile and Dimensions: [**As indicated**]<**Insert profile and dimensions**>.

B. Vinyl Molding Accessories :

1. Accessory Description: [**Stair-tread nosing**][**cap for cove carpet**][**cap for cove resilient floor covering**][**carpet bar for tackless installations**][**carpet edge for glue-down applications**][**nosing for carpet**][**nosing for resilient floor covering**][**reducer strip for resilient floor covering**][**joiner for tile and carpet**][**transition strips**]<**Insert description**>.

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2. Profile and Dimensions: [**As indicated**]<**Insert profile and dimensions**>.

C. Locations: [**Provide resilient molding accessories in areas indicated**]<**Insert requirements**>.

D. Colors and Patterns: [**As indicated by manufacturer's designations**][**Match Architect's sample**]<**Insert colors and patterns**>.

2.5 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended in writing by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Verify adhesive complies with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: [**Extruded aluminum with mill finish**]<**Insert requirements**>, nominal **2 inches** wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

2.6 Corner Guard Accessories

A. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

1. [**Roppe Corporation; Roppe Holding Company**]
2. <**Insert manufacturer's name**>

PART 3 - EXECUTION

3.1 INSTALLATION OF RESILIENT BASE

A. Comply with manufacturer's written instructions for installing resilient base.

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B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than [**3 inches**]<**Insert dimension**> in length.

   a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than [**3 inches**]<**Insert dimension**> in length.

   a. [**Miter**][**Cope**][**Miter or cope**] corners to minimize open joints.

3.2 INSTALLATION OF RESILIENT STAIR ACCESSORIES

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

END OF SECTION 096513

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Section 09.65.19
RESILIENT TILE/PLANK FLOORING

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. Resilient Luxury Vinyl Tile Flooring

1.3 SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives, include printed statement of VOC content and chemical components.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

E. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is “qualified” if trained, or a certified by Tarkett or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.

B. Mockups: Provide resilient products with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 - PRODUCTS

2.1 RESILIENT SHEET FLOORING

Manufacturer:
Tarkett North America Phone: (800) 899-8916

30000 Aurora Rd.
Solon, OH 44139
Web: www.tarkettna.com

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 EVENT LUXURY VINYL TILE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tarkett Company; Wood] or comparable product.

B. Tile Standard: ASTM F 1700, Class III, Type B, printed film vinyl tile , embossed surface.

C. Wearing Surface: Embossed.

D. Thickness/Wearlayer: 0.120 inch (3.0 mm).

E. Sizes:

1. For Wood, specify: 6 by 48 inches (15.2 by 121.9 cm)

F. Colors and Patterns: As indicated in drawings.

G. Test data:

1. Techtonic™ scratch, scuff, and abrasion resistance surface
2. Wear layer: 0.030 inches (0.76 mm)
3. Size, Squareness, ASTM F2055: Passes
4. Flexibilty, ASTM F137: Passes
5. Chemical Resistance, ASTM E925: Passes
6. Static Load Limit, ASTM F970: 250 psi, ≤ 0.005 inches
7. Resistance to Heat, ASTM F1514: $\Delta E \leq 8$
8. Resistance to Light, ASTM F1515: $\Delta E \leq 8$
9. Residual Indentation, ASTM F1914: Passes
10. Static Coefficient of Friction (SCOF), ASTM D2047: ≥ 0.5 SCOF
11. Dimensional Stability, ASTM F2199: Passes
12. Flamability, ASTM E648 Critical Radiant Flux: Class 1 (≥ 0.45 W/cm^2)
13. Limited Commercial Warranty: 20 years

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

B. Adhesives: As recommended by Tarkett to meet site conditions

1. Resilient Vinyl Floor Tile
    a. Tarkett RollSmart™
    b. Tarkett 959 HM Adhesive
    c. Tarkett 975 Two-Part Urethane Adhesive

2.5 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to Tarkett written instructions to ensure proper adhesion of Resilient Flooring.
   1. Prepare concrete substrates in accordance with ASTM F 710.
      a. Concrete floors must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitence, mold, mildew, and other foreign materials that may affect dissipation rate of moisture from the concrete, discoloration or adhesive bonding.
      b. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
      c. Perform moisture testing as recommended by manufacturer. Proceed with installation only after substrates have been tested and meet the minimum requirements from the manufacturer in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride or ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
      d. A pH test for alkalinity must be conducted on the concrete floor prior to installation with results conforming to manufacturer requirements. If the test results are not within the acceptable range, then installation must not proceed until the problem has been corrected.
   2. Wood subfloors must have a minimum 18" (45.7 cm) of cross-ventilated space beneath the bottom of the joist.
      a. The floor must be rigid, free of movement.
      b. Single wood and tongue and groove subfloors should be covered with ¼" (6.4 mm) or ½" (12.7 mm) APA approved underlayment plywood.
         1) Use ¼" (6.4 mm) thick underlayment panels for boards with a face width of 3" (76 mm) or less.
         2) Use ½" (12.7 mm) thick underlayment panels for boards with a face width wider than 3" (76 mm).

c. Do not install over OSB (Oriented Strand Board), particle board, chipboard, lauan or composite type underlayments.

B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Floor covering shall not be installed over expansion joints.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT TILE FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient tile flooring.

B. Luxury Vinyl Tile Flooring:
1. Install with Tarkett adhesive specified for the site conditions and follow adhesive label for proper use.
2. Follow Tarkett’s recommendation for tile orientation.
3. Open enough cartons of floor tiles to cover each area, and mix tile to ensure shade variations do not occur within any one area.
4. Roll the flooring in both directions using a 100 pound three-section roller.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
1. No traffic for 24 hours after installation.
2. No heavy traffic, rolling loads, or furniture placement for 48 hours after installation.

D. Wait 48 hours after installation before performing initial cleaning.

E. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09.65.19

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation of interior substrates and application of the following:

1. Primers.
2. Water-based finish coatings.
3. Solvent-based finish coatings.
4. Floor sealers and paints.

B. Related Requirements:

1. Section 055213 "Pipe and Tube Railings" for shop [**priming**][**painting**] pipe and tube railings.
2. Section 099000" Painting & Coating."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in applicable interior painting schedule articles to cross-reference paint systems specified in this Section. Include color designations.

E. Sustainable Design Submittals:

1. Product Data: For paints and coatings, indicating VOC content.
2. Environmental Product Declaration (EPD): For each product.
3. Environmental Product Declaration (EPD): For each product.
4. Third-Party Certifications: For each product.
5. Third-Party-Certified Life-Cycle Assessment: For each product.

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1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match paint products applied and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 MOCKUPS

A. Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least **100 sq. ft.**.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 95 deg F**.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than **5 deg F** above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 INTERIOR PAINTS, GENERAL

A. Interior Paints: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products listed in product types below and applicable interior painting schedule articles for the paint category indicated.

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B. Material Compatibility:

1. Materials for use within each paint system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

C. Material Emissions and Pollutant Control: Verify not less than 85 percent of field-applied paints and coatings that are inside the weatherproofing system comply with either of the following:

1. Low-Emitting Materials: Verify VOC emissions comply with requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
2. Verify VOC content does not exceed limits of authorities having jurisdiction and the following:

a. Flat Coatings: 50 g/L.
b. Nonflat Coatings: 100 g/L.
c. Nonflat - High-Gloss Coatings: 150 g/L.
d. Concrete/Masonry Sealers: 100 g/L.
e. Floor Coatings: 100 g/L.
f. Industrial Maintenance Coatings: 250 g/L.
g. Low-Solids Coatings: 120 g/L.
h. Mastic Texture Coatings: 100 g/L.
i. Metallic Pigmented Coatings: 500 g/L.
j. Pretreatment Wash Primers: 420 g/L.
k. Primers, Sealers, and Undercoaters: 100 g/L.
l. Reactive Penetrating Sealers: 350 g/L.
m. Recycled Coatings: 250 g/L.
n. Rust-Preventive Coatings: 250 g/L.

D. Colors: [**As selected by Architect from manufacturer's full range**][**Match Architect's samples**][**As indicated in a color schedule**]<**Insert requirements**>.

1. [**10**][**20**][**30**]<**Insert number**> percent of surface area will be painted with deep tones.

2.2 PRIMERS

A. Interior Latex Primer Sealer: Pigmented, water-based latex sealer; formulated to reduce porosity of substrate for finish coats; for use on new interior plaster, concrete, and gypsum board substrates. Not intended for use on wood or previously painted surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include,

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but are not limited to, the following:

a. Sherwin-Williams Company (The)
b. The Pittsburgh Paints Company
c. Benjamin Moore & Co

B. Interior, Latex Primer for Wood: Waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on interior wood substrates.

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. [**Behr Paint Company (Behr Process LLC)**]
b. [**Benjamin Moore & Co.**]
c. [**KILZ (Behr Paint Company)**]
d. [**Rodda Paint Co.**]
e. [**Sherwin-Williams Company (The)**]
f. [**The Pittsburgh Paints Company**]
g. [**Valspar; a brand of The Sherwin-Williams Company**]
h. <**Insert manufacturer's name**>

2.3 WATER-BASED FINISH COATINGS

A. Interior Latex Paint: Pigmented, water-based coating for use on interior primed/sealed plaster and gypsum board, and on primed wood and metals.

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. Sherwin-Williams Company (The)
b. The Pittsburgh Paints Company
c. Benjamin Moor & Co

2. Gloss and Sheen Level: Manufacturer's standard [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

B. Interior, Latex, Institutional Low-Odor/VOC Paint: White or colored latex coating with low-odor characteristics and a VOC of less than 10 grams per liter, for use in areas, such as hospitals and other occupied buildings, where the odor and VOC levels of conventional latex products would preclude their use.

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

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a. [**Behr Paint Company (Behr Process LLC)**]
b. [**Benjamin Moore & Co.**]
c. [**McCormick Paints**]
d. [**Rodda Paint Co.**]
e. [**Sherwin-Williams Company (The)**]
f. [**The Pittsburgh Paints Company**]
g. <**Insert manufacturer's name**>

2. Gloss and Sheen Level: Manufacturer's standard .

2.4 FLOOR SEALERS AND PAINTS

A. Water-Based Concrete Floor Sealer: Clear, water-based, acrylic-copolymer-emulsion sealer formulated for oil, gasoline, alkali, and water resistance and for use on concrete traffic surfaces.

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. [**Behr Paint Company (Behr Process LLC)**]
b. [**H&C Decorative Concrete Products; a brand of Sherwin-Williams Co.**]
c. [**Sherwin-Williams Company (The)**]
d. [**The Pittsburgh Paints Company**]
e. <**Insert manufacturer's name**>

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Masonry (Clay and CMU): 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent. Verify that finishing compound is dry and sanded smooth.

C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

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3.2 APPLICATION OF INTERIOR PAINT PRODUCTS

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in the applicable interior painting schedule articles may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view in equipment rooms:

a. Equipment, including panelboards[**and switch gear**].
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. <**Insert mechanical items to be painted**>.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.3 INTERIOR PAINTING SCHEDULE, CONCRETE SUBSTRATES

A. Vertical (Nontraffic) Surfaces:

1. Latex System :

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a. Prime Coat: [**Alkali-resistant, water-based primer**][**Matching topcoat**].
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

2. Latex over Latex Aggregate System :

a. Prime Coat: Textured latex coating, flat.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

3. Latex Aggregate System :

a. Prime Coat: As recommended in writing by topcoat manufacturer.
b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
c. Topcoat: Textured latex coating, [**flat**][**nonflat**].

4. Institutional Low-Odor/VOC Latex System :

a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

5. High-Performance Architectural Latex System :

a. Prime Coat: Alkali-resistant, water-based primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, high-performance architectural latex, [**low sheen**][**eggshell**][**satin**][**semigloss**].

6. Antiviral/Antibacterial Latex System :

a. Prime Coat: Alkali-resistant, water-based primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, antiviral/antibacterial coating, [**eggshell**][**semigloss**].

7. Water-Based Light Industrial Coating System :

a. Prime Coat: Alkali-resistant, water-based primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, water-based, light industrial coating, [**eggshell**][**semigloss**][**gloss**].

8. Alkyd System :

a. Prime Coat: Alkali-resistant, water-based primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior alkyd paint, [**flat**][**low sheen**][**semigloss**][**gloss**].

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9. Water-Based Alkyd System :

    a. Prime Coat: Alkali-resistant, water-based primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior, water-based alkyd paint, [**low sheen**][**semigloss**][**gloss**].

10. Concrete Stain System :

    a. First Coat: Matching topcoat.
    b. Topcoat: Interior concrete stain.

B. Horizontal (Traffic) Surfaces:

1. Latex Floor Enamel System :

    a. Prime Coat: Matching topcoat
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Latex floor enamel, [**low gloss**][**gloss**].

2. Alkyd Floor Enamel System :

    a. Prime Coat: Matching topcoat.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Alkyd floor enamel, [**low gloss**][**gloss**].

3. Concrete Stain System :

    a. First Coat: Matching topcoat.
    b. Topcoat: Interior concrete stain.

4. Solvent-Based Concrete Floor Sealer System :

    a. First Coat: Matching topcoat.
    b. Topcoat: Solvent-based concrete floor sealer.

5. Water-Based Concrete Floor Sealer System :

    a. First Coat: Matching topcoat.
    b. Topcoat: Water-based concrete floor sealer.

6. Latex Zone/Traffic-Marking Paint System :

    a. Traffic-marking paint, latex.

7. Alkyd Zone/Traffic-Marking Paint System :

    a. Traffic-marking paint, solvent based.

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3.4 INTERIOR PAINTING SCHEDULE, CEMENTITIOUS SUBSTRATES
3.5 INTERIOR PAINTING SCHEDULE, WOOD SUBSTRATES

A. Exposed Wood Framed Substrates:

1. Latex over Latex Primer System :

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, satin.

2. Latex over Alkyd Primer System :

a. Prime Coat: Interior alkyd primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, satin.

3. Institutional Low-Odor/VOC Latex System :

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, satin.

4. Water-Based Alkyd System :

a. Prime Coat: Interior alkyd primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, water-based alkyd paint, [**low sheen**][**semigloss**][**gloss**].

B. Finish Carpentry Substrates: Wood trim Doors.

1. Latex over Latex Primer System :

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, semigloss.

2. Latex over Alkyd Primer System :

a. Prime Coat: Interior alkyd primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex paint, semigloss.

3. Institutional Low-Odor/VOC Latex System :

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, semigloss.

C. Wood Traffic Substrates: [**Floors**][**and**][**stairs**].

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1. Latex Porch and Floor Enamel System :

    a. Prime Coat: Interior alkyd primer sealer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Latex floor enamel, low gloss.
    d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

2. Alkyd Floor Enamel System :

    a. Prime Coat: Interior alkyd primer sealer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Alkyd floor enamel, gloss.
    d. Additive: Manufacturer's standard additive to increase skid resistance of painted surface.

3.6 INTERIOR PAINTING SCHEDULE, GYPSUM-BASED SUBSTRATES

A. Gypsum Board and Plaster Substrates:

1. Latex over Latex Sealer System :

    a. Prime Coat: Interior latex primer sealer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior latex paint, eggshell.

2. Latex over Alkyd Primer System (for Plaster Only) :

    a. Prime Coat: Interior alkyd primer sealer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior latex paint, eggshell.

3. Institutional Low-Odor/VOC Latex System :

    a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior, latex, institutional low odor/VOC, eggshell.

3.7 INTERIOR PAINTING SCHEDULE, MISCELLANEOUS SUBSTRATES

A. Plastic Trim Fabrication Substrates:

1. Latex System :

    a. Prime Coat: [**Solvent-based bonding primer**][**Water-based bonding primer**].
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior latex paint, [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

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2. Institutional Low-Odor/VOC Latex System :

    a. Prime Coat: Water-based bonding primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Interior, latex, institutional low odor/VOC, [**flat**][**low sheen**][**eggshell**][**satin**][**semigloss**][**gloss**].

END OF SECTION 099123

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SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dimensional characters.

a. Molded-plastic dimensional characters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

F. Delegated Design Submittal: For signs indicated in "Performance Requirements" Article.

1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

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1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of [**rooftop**][**dimensional character**]<**Insert description**> sign type(s) <**Insert drawing designation of sign(s)**> according to structural performance requirements.

B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.

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1. Uniform Wind Load: [**As indicated on Drawings**]<**Insert design load**>.
2. Concentrated Horizontal Load: [**As indicated on Drawings**]<**Insert design load**>.
3. Other Design Load: [**As indicated on Drawings**]<**Insert design load**>
4. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movements: For exterior [**fabricated channel dimensional characters**]<**Insert item**>, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: [**120 deg F, ambient; 180 deg F, material surfaces**]<**Insert temperature change**>.

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.

2.2 DIMENSIONAL CHARACTER MATERIALS

A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

B. Aluminum Sheet and Plate: **ASTM B209**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Aluminum Extrusions: **ASTM B221**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

D. Brass Castings: ASTM B584, [**alloy recommended by manufacturer and finisher for finish indicated**][**lead-free alloy recommended by manufacturer and finisher for finish indicated**][**Alloy UNS No. C85200 (high-copper yellow brass)**]<**Insert requirement**>.

E. Brass Sheet (Yellow Brass): ASTM B36/B36M, [**alloy recommended by manufacturer and finisher for finish indicated**][**lead-free alloy recommended by manufacturer and finisher for finish indicated**][**Alloy UNS No. C26000 (yellow brass)**]<**Insert requirement**>.

F. Bronze Castings: ASTM B584, [**alloy recommended by manufacturer and finisher for finish indicated**][**lead-free alloy recommended by manufacturer and finisher for finish indicated**][**Alloy UNS No. C86500 (No. 1 manganese bronze)**]<**Insert requirement**>.

G. Bronze Plate: ASTM B36/B36M, [**alloy recommended by manufacturer and finisher for finish indicated**][**lead-free alloy recommended by manufacturer and finisher for finish indicated**][**Alloy UNS No. C22000 (commercial bronze)**]<**Insert requirement**>.

H. Copper Sheet: ASTM B152/B152M.

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I. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, [**Type 304,**][**Type 316,**] stretcher-leveled standard of flatness.

J. Zinc Castings: ASTM B240, alloy and temper recommended by sign manufacturer for type of use and finish indicated.

K. Zinc Sheet: [**ASTM B69**]<**Insert standard**>, alloy and temper recommended by sign manufacturer for type of use and finish indicated.

L. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

M. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish [**nonferrous-metal**][**stainless steel**][**or**][**hot-dip galvanized**]<**Insert requirement**> devices unless otherwise indicated.
3. Exposed Metal-Fastener Components, General:

    a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
    b. Fastener Heads: For nonstructural connections, use [**flathead**][**or**][**oval countersunk**]<**Insert shape**> screws and bolts with tamper-resistant [**Allen-head**][**spanner-head**][**or**][**one-way-head**]<**Insert slot design**> slots unless otherwise indicated.

4. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
    c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

B. Adhesive: As recommended by sign manufacturer.

1. Adhesives shall have a VOC content of [**70**]<**Insert value**> g/L or less.

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2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, **0.045 inch** thick, with adhesive on both sides.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish [**to match sign-background color**][**to match Architect's sample**]<**Insert requirement**> color unless otherwise indicated.
2. Stainless Steel Brackets: Factory finish brackets [**to match sign background**][**to match Architect's sample**][**with No. 4**]<**Insert finish**> finish unless otherwise

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indicated.

2.5 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, [**Class I, 0.018 mm**][**Class II, 0.010 mm**] or thicker.

B. Color Anodic Finish: AAMA 611, [**Class I, 0.018 mm**][**Class II, 0.010 mm**] or thicker.

C. 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.

2.7 STAINLESS STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
2. Directional Satin Finish: No. 4.
3. Dull Satin Finish: No. 6.
4. Reflective, Directional Polish: No. 7.
5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

2.8 LACQUER COATING FOR COPPER-ALLOY FINISHES

A. Lacquer Coating: Clear, organic, waterborne, air-drying, acrylic lacquer called "Incralac"; specially developed for coating copper-alloy products; consisting of a solution of acrylic resin, methyl methacrylate copolymer, leveling agent, and corrosion

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inhibitor benzotriazole.

PART 3 - EXECUTION (Not Used)

END OF SECTION 101419

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SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corner guards.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for [**steel angle corner guards**][**pipe guards**][**and**][**wheel guards**].
2. Section 057300 "Decorative Metal Railings" for metal handrails without plastic bumpers.
3. Section 064023 "Interior Architectural Woodwork for solid-wood handrails, bumper rails, chair rails, or corner moldings without plastic bumpers.
4. [**Section 087100 "Door Hardware"**][**Section 087111 "Door Hardware (Descriptive Specification)"**] for metal[**and plastic**] protective trim units, according to BHMA A156.6, used for armor, kick, mop, and push plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Sustainable Design Submittals:

1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
2. Product Data: For adhesives, indicating VOC content.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.

C. Shop Drawings: For each type of wall and door protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.[**Show handrail design and support spacing required to withstand structural loads.**]

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D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.

1. Include Samples of accent strips and accessories to verify color selection.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of handrail.

B. Material Certificates: For each type of exposed plastic material.

C. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.5 QUALITY ASSURANCE

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: [**Five**]<**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a

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qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in [**the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities**][**and**][**ICC A117.1**]<**Insert requirement**>.

2.2 CORNER GUARDS

A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard[**, PVC-free**] assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

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. Koroseal Interior Products, LLC
   b. WallGuard.com
   c. Wallprotex

2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; [**as follows:**][**in dimensions and profiles indicated on Drawings.**]

   a. Profile: Nominal [**2-inch- long leg and 1/4-inch corner radius**][**3-inch- long leg and 1/4-inch corner radius**][**3-inch- long leg and 1-1/4-inch corner radius**]<**Insert dimensions**>.
   b. Height: 4 feet.
   c. Color and Texture: Clear Lexan.

2.3 MATERIALS

A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of **15 ft.-lbf/in.** of notch when tested according to ASTM D256, Test Method A.

C. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.

1. Certified Wood: Wood products shall be labeled according to the AF&PA's Sustainable Forestry Initiative, be certified as "FSC Pure" according to FSC STD-

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01-001 and FSC STD-40-004, or be certified and labeled according to the standards of the Programme for Endorsement of Forest Certification.

D. Composite Wood Products: Formaldehyde emission rates shall not be greater than the following when tested according to ASTM D 6007 or ASTM E 1333:

1. Hardwood Plywood: 0.05 ppm.
2. Particleboard: 0.09 ppm.
3. MDF More Than **5/16 Inch** Thick: 0.11 ppm.
4. MDF **5/16 Inch** or Less in Thickness: 0.13 ppm.

E. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

F. Adhesive: As recommended by protection product manufacturer.

1. Adhesives shall have a VOC content of [**70**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.4 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Curved Panels: Preform curved semirigid, abuse-resistant sheet wall covering in factory for radius and sheet thickness as follows:

1. Sheet Thickness of **0.040 Inch**: **24-inch** radius.
2. Sheet Thickness of **0.060 Inch**: **36-inch** radius.
3. <**Insert thickness and radius**>.

C. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

D. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

E. Wood Handrails: Miter corners and ends of wood handrails for returns.

2.5 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary

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protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.[**If not indicated on Drawings, install at heights indicated below:**]

1. Crash Rails: <**Insert dimension**> above finished floor.
2. Bumper Rails: <**Insert dimension**> above finished floor.
3. Rub Rails: <**Insert dimension**> above finished floor.
4. Chair Rails: <**Insert dimension**> above finished floor.
5. Handrails: <**Insert dimension**> above finished floor.
6. Bed Locators: <**Insert dimension**> above finished floor.

C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than **20 feet**, splice aluminum retainers and plastic covers at different locations along the run, but no closer than **12 inches** apart.
3. Adjust [**end**][**and**][**top**] caps as required to ensure tight seams.

D. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

E. Door-Frame Protectors: Install on both door jams.

F. Fire Doors: Install protection according to the listing of each item.

END OF SECTION 102600

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.

B. Related Requirements:

1. Section 088300 "Mirrors" for frameless mirrors.
2. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.
3. Section 102813.63 "Detention Toilet Accessories" for accessories designed for installation in detention facilities.

1.2 ACTION SUBMITTALS

A. Product Data: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

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 accessories using designations indicated.

C. Delegated Design Submittals: For grab bars.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

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1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: [**10**][**15**]<**Insert number**> years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: [**Five**]<**Insert number**> years from date of Substantial Completion.

C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: [**Two**][**Five**][**10**]<**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist **250 lbf** concentrated load applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Grab Bar:

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. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc

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c. Bradley Corporation

2. Basis-of-Design Product: Subject to compliance with requirements, provide **<Insert manufacturer's name; product name or designation>** or comparable product by one of the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation

3. Mounting: Flanges with concealed fasteners.
4. Material: Stainless steel, **0.05 inch** thick.

a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin)[**on ends and slip-resistant texture in grip area**].

5. OD: 1-1/2 inches.
6. Configuration and Length: As indicated on Drawings.

B. Mirror Unit:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **<Insert manufacturer's name; product name or designation>** or comparable product by one of the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation

2. Frame: Stainless steel angle, 0.05 inch thick.

a. Corners: Mitered and mechanically interlocked.

3. Size: As indicated on Drawings.

C. Source Limitations: Obtain [**public-use shower room accessories**][**each type of public-use shower room accessory**] from single source from single manufacturer.

2.3 PRIVATE-USE BATHROOM ACCESSORIES

A. Source Limitations: Obtain [**private-use bathroom accessories**][**each type of private-use bathroom accessory**] from single source from single manufacturer.

B. Private-Use Toilet Tissue Dispenser:

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. Bobrick Washroom Equipment, Inc

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b. Bradley Corporation
c. Franklin Brass; Liberty Hardware Manufacturing Corporation; Masco Corporation

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. Bobrick Washroom Equipment, Inc
b. Bradley Corporation
c. Franklin Brass; Liberty Hardware Manufacturing Corporation; Masco Corporation

3. Description: Single-roll dispenser with the following features:

a. Hood.
b. <**Insert requirements**>.

4. Mounting: Surface mounted.
5. Capacity: Designed for **4-1/2- or 5-inch-** diameter tissue rolls.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

C. Private-Use Shower Curtain Rod:

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. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. ASI-American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc
c. Bradley Corporation

3. Description: 1-1/4-inch- OD, straight rod.
4. Configuration: As indicated on Drawings.
5. Mounting Flanges: Exposed fasteners; in [**manufacturer's standard material and finish**][**material and finish matching rod**]<**Insert requirements**>.
6. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
7. Features: Integral chrome-plated brass glide hooks.

D. Private-Use Medicine Cabinet:

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available**

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manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a. [**ASI-American Specialties, Inc.**]
b. [**Basco, Inc**]
c. [**Bobrick Washroom Equipment, Inc**]
d. [**Bradley Corporation**]
e. [**Brey-Krause Manufacturing Co.**]
f. [**Gamco Commercial Restroom Accessories; Bobrick Washroom Equipment, Inc.**]
g. [**Ketcham Medicine Cabinets & Accessories; Fred Silver & Company, Inc.**]
h. [**Seachrome Corporation**]
i. [**Tubular Specialties Manufacturing, Inc.**]
j. <**Insert manufacturer's name**>

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

a. [**ASI-American Specialties, Inc.**]
b. [**Basco, Inc**]
c. [**Bobrick Washroom Equipment, Inc**]
d. [**Bradley Corporation**]
e. [**Brey-Krause Manufacturing Co.**]
f. [**Gamco Commercial Restroom Accessories; Bobrick Washroom Equipment, Inc.**]
g. [**Ketcham Medicine Cabinets & Accessories; Fred Silver & Company, Inc.**]
h. [**Seachrome Corporation**]
i. [**Tubular Specialties Manufacturing, Inc.**]
j. <**Insert manufacturer's name**>

3. Mounting: [**Recessed, for nominal 4-inch wall depth**][**Surface mounted**].
4. Size: [**18 by 24 inches**]<**Insert dimensions**>.
5. Door: [**Framed mirror door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch**]<**Insert description**>.
6. Shelves: [**Three, adjustable**]<**Insert requirements**>.
7. Material and Finish:

a. Cabinet: [**Stainless steel, ASTM A480/A480M No. 4 finish (satin)**][**Steel with corrosion-resistant finish**].
b. Mirror Frame: <**Insert material and finish**>.
c. Door: <**Insert material and finish**>.
d. Hinge: <**Insert material and finish**>.
e. Shelves: <**Insert material and finish**>.

E. Private-Use Robe Hook:

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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. ASI-American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc
    c. Bradley Corporation

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. ASI-American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc
    c. Bradley Corporation

3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

F. Private-Use Towel Bar:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Bobrick Washroom Equipment, Inc
    b. Bradley Corporation
    c. Franklin Brass; Liberty Hardware Manufacturing Corporation; Masco Corporation

2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Insert manufacturer's name; product name or designation**> or comparable product by one of the following:

    a. Bobrick Washroom Equipment, Inc
    b. Bradley Corporation
    c. Franklin Brass; Liberty Hardware Manufacturing Corporation; Masco Corporation

3. Description: [**3/4-inch- square tube with rectangular end brackets**][**3/4-inch-round tube with circular end brackets**]<**Insert description**>.
4. Mounting: Flanges with [**concealed**][**exposed**] fasteners.
5. Length: [**18 inches**][**24 inches**][**30 inches**]<**Insert dimension**>.
6. Material and Finish: Polished Chrome.

G. Source Limitations: Obtain [**healthcare accessories**][**each type of healthcare accessory**] from single source from single manufacturer.

H. Source Limitations: Obtain [**childcare accessories**][**each type of childcare accessory**] from single source from single manufacturer.

I. Source Limitations: Obtain [**custodial accessories**][**each type of custodial accessory**] from single source from single manufacturer.

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2.4 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, **0.031-inch-** minimum nominal thickness unless otherwise indicated.

B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), **0.036-inch-** minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A653/A653M, with **G60** hot-dip zinc coating.

D. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.

F. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.5 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.

PART 3 - EXECUTION

3.1 INSTALLATION OF TOILET, BATH, AND LAUNDRY ACCESSORIES

A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

1. Remove temporary labels and protective coatings.

B. Grab Bars: Install to comply with specified structural-performance requirements.

C. Shower Seats: Install to comply with specified structural-performance requirements.

END OF SECTION 102800

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SECTION 102819 - TUB AND SHOWER ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framed shower doors and enclosures.
2. Frameless shower doors and enclosures.

1.2 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 shower doors and enclosures.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For tub and shower doors and enclosures.

1. Include plans, elevations, sections, and attachment details.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For tub and shower doors and enclosures.

1. Each type of mounting and operating hardware; full size.
2. Glass and glazing; **12 inches** square.
3. Trim; **12-inch** lengths.

F. Product Schedule: For tub and shower doors and enclosures.[**Use same designations indicated on Drawings.**]

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

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1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tub and shower doors and enclosures to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of tub and shower doors and enclosure as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

A. Verify dimensions by field measurements before fabrication and indicate on Shop Drawings.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tub and shower doors and enclosures that fail in materials or workmanship within specified warranty period, without monetary limitation.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection.
b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: [**Two**][**Three**]<**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare and install per manufacturer's written instructions unless more stringent requirements are contained in NGA's "GANA Glazing Manual."

B. Clean substrates, removing projections, filling voids, and sealing joints.

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C. Set units level, plumb, and true to line, without warp or rack of frames and panels, and anchor securely in place.

D. Fasten components securely in place, with provisions for thermal movement. Install with concealed fasteners unless otherwise indicated.

E. Install components to drain and return water to tub or shower.

F. Install doors to produce smooth operation and tight fit at contact points.

G. Repair, refinish, or replace components damaged during installation.

3.2 TUB AND SHOWER DOOR AND ENCLOSURE HARDWARE SCHEDULE

A. <**Insert schedule**>.

END OF SECTION 102819

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SECTION 105500.16 - PRIVATE-DELIVERY POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of postal specialty.

B. Shop Drawings: For postal specialties.

1. Include plans, elevations, sections, and attachment details.
2. Include identification sequence for compartments.
3. Include layout of identification text.
4. Include setting drawings, templates, and installation instructions for anchor bolts and other anchorages installed as part of the Work of other Sections.

C. Samples for Verification: For each type of exposed finish, prepared on **6-by-6-inch-** square Samples.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For postal specialties and finishes to include in maintenance manuals.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.
b. Faulty operation of hardware[**including electrical components**].
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: [**Five**]<**Insert number**> years from date of Substantial

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Completion.

PART 2 - PRODUCTS

2.1 FABRICATION

A. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.

C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.

D. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.

E. Weld in concealed locations to greatest extent possible without distorting or discoloring exposed surfaces. Remove weld spatter and welding oxides from exposed surfaces.

F. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support loads.

G. Fabricate rack ladders to support indicated number of units to form a column of units.

H. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

2.2 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" 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.

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PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install postal specialties level and plumb, according to manufacturer's written instructions and roughing-in drawings.

1. Where dissimilar metals are in permanent contact with each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer for this purpose.
2. Where aluminum contacts grout, concrete, masonry, or wood, protect against corrosion by painting contact surfaces with bituminous coating.

B. Horizontal Mail Receptacles: Install horizontal mail receptacles with center of tenant-door lock cylinders not more than **48 inches** and bottom of receptacles not less than **15 inches** above finished floor.

1. Install removable-core and keyed-in door lock cylinders as required for each type of cylinder lock.
2. Install and align two rack ladders for the first column of mail receptacles and one rack ladder for each additional adjacent column of mail receptacles.

C. Vertical Mail Receptacles: Install vertical mail receptacles with center of master lock cylinder not more than **48 inches** and bottom of receptacles not less than **15 inches** above finished floor.

D. Pedestal-Mounted Postal Specialties: Anchor units with **1/2-inch-** diameter, [**galvanized**][**stainless**]-steel anchor bolts with hooked ends.

E. Mail Collection Boxes: Install collection boxes with [**centerline of mail slots**][**handle of hopper doors**] not more than **48 inches** above finished floor.

F. Freestanding Data Distribution Boxes: Locate freestanding data distribution boxes at locations indicated[**or, if not indicated, as directed by Architect**].

G. Rack-Ladder Data Distribution Boxes: Install and align two rack ladders for the first column of data distribution boxes and one rack ladder for each additional adjacent column of data distribution boxes.

END OF SECTION 105500.16

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2.2 TEXTILE FOR TENSIONED FABRIC STRUCTURES

A. Textile: Soltis Proof 502
   1. Manufacturing Process: Serge Ferrari Precontraint. Equally tension high-tenacity polyester weave in warp and weft directions before and during coating process.
   2. Non recyclable Textile
   3. Surface Treatment: Varnish both sides
   4. Yarn: PES HT 280 Dtex
   5. Total Mass: 14.4 oz/yd^2
   6. Width: 105”
   7. Tensile Strength, EN ISO 1421:
      a. Warp: 140 daN/ 5cm
      b. Weft: 140 daN/ 5cm
   8. Tear Strength, DIN 53.363:
      a. Warp: 12 daN
      b. Weft: 12 daN
   9. Flame Retardancy:
      a. NFPA 701method 1 and method 2: Passed
      b. California State Fire Marshal: Passed
   10. Thickness: 0.43 mm
   11. Light Transmission: depends on color.
   12. Withstand Extreme Intermittent Temperatures by Installed Membrane: Minus 22 degrees F, plus 158 degrees F

2.3 FABRICATION

A. Textile manufacturer shall instruct fabricator of fabric structures in proper methods of shop assembly of panels by use of high-frequency welding by overlapping edges; and or method deemed most appropriate for that project.

PART 3 EXECUTION

(Not Used)

END OF SECTION

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal louver blinds, aluminum slats.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include rated capacities, operating characteristics,[**electrical characteristics,**] and furnished accessories.
3. <**Insert requirements**>.

B. Shop Drawings: For horizontal louver blinds.

1. Fabrication and installation details.
2. Diagrams for power, signal, and control wiring for motorized units.
3. <**Insert requirements**>.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type and color of horizontal louver blind.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: Actual sample of finished products for each type and color of horizontal louver blind.

1. Size: [**Manufacturers' standard size**]<**Insert size**>.

E. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

F. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material

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manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For horizontal louver blinds with polymer slats that have been tested for compliance with NFPA 701, for tests performed by [**a qualified testing agency**][**manufacturer and witnessed by a qualified testing agency**].

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For horizontal louver blinds.

1.5 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of motorized products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

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a. Faulty operation of motorized operating system components.

2. Warranty Period: [**5**]<**Insert number**> year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Window Covering Safety Standard: Provide horizontal louver blinds that comply with WCMA A100.1[**and are listed and labeled as "Best for Kids" by a qualified testing agency**].

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

A. Horizontal Louver Blinds, Aluminum Slats:

1. Manufacturers: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:

a. [**CACO, Inc.**]
b. [**Hunter Douglas Architectural**]
c. [**Springs Window Fashions; SWFcontract**]
d. <**Insert manufacturer's name**>

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent.

C. Slats: Aluminum; alloy and temper recommended in writing by producer for type of use and finish indicated; with crowned profile and radius corners.

1. Width: [**1/2 inch**][**1 inch**][**1-3/8 inches**][**2 inches**]<**Insert dimension**>.
2. Thickness: [**Manufacturer's standard**][**Not less than 0.006 inch**][**Not less than 0.008 inch**]<**Insert thickness**>.
3. Spacing: [**Manufacturer's standard**]<**Insert dimension**>.
4. Finish: [**Ionized antistatic, dust-repellent, baked polyester finish**][**Reflective finish on outside-facing surface of slat to enhance reflection of solar energy**]<**Insert finish**>.
5. Features:

a. Privacy Slats: Manufacturer's standard privacy slats with no inner lift-cord route holes or with minimum size inner lift-cord route holes located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
b. Perforated Slats: Openness factor of [**7 to 8**]<**Insert number(s)**> percent.
c. Inverted slats.

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d. <**Insert description**>.

D. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.

1. Type: [**Braided cord**][**Reinforced vinyl tape, manufacturer's standard width**][**Cloth tape, manufacturer's standard width**]<**Insert description**>.

E. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose control mechanisms on three sides.

1. Capacity: [**One**][**Two**] blind(s) per headrail unless otherwise indicated.
2. Ends: [**Manufacturer's standard**][**Capped or plugged**]<**Insert description**>.

F. Manual Corded Operation:

1. Lift Mechanism:

a. Lift-Cord Lock: [**Variable; stops lift cord at user-selected position within blind full operating range**][**Top locking; stops lift cord when blind is in fully opened or fully closed positions only; equipped with ring pull not more than 4 inches long**].

2. Lift Operator: Extension of inner lift cord(s) through lift-cord lock mechanism to form lift cord.
3. Lift Cord: Manufacturer's standard braided cord.
4. Lift-Cord Length: [**Short cord, not greater than 8 inches when blind is fully closed**][**Inaccessible cord, not greater than 12 inches when blind is fully closed**].
5. Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
6. Tilt Position:

a. Full.
b. [**One**][**Two**]-direction, positive stop or lockout limited at an angle of [**20**][**60**][**80**]<**Insert number**> degrees from horizontal[**, both directions**].

7. Tilt Operator: [**Clear-plastic wand**][**Corrosion-resistant steel rod**][**Inaccessible dual cord**]<**Insert description**>.
8. Tilt Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over-rotation of gear.
9. Tilt-Operator Length, Wand or Rod: [**12 inches**][**24 inches**][**30 inches**][**36 inches**][**48 inches**]<**Insert length**>.
10. Tilt-Operator Length, Cord: Inaccessible dual cord, not greater than **12 inches** in length in all phases of operation.
11. Lift-Cord and Tilt-Operator Locations: [**Manufacturer's standard**][**Right side and left side of headrail, respectively,**][**Left side and right side of headrail, respectively,**][**Right side of headrail**][**Left side of headrail**] unless otherwise indicated.

G. Manual Cordless Operation:

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1. Lift Mechanism: Manufacturer's standard lift- or tension-control mechanism that allows blinds to be raised or lowered into position by manually pushing the bottom rail up or pulling it down.
2. Lift Operator: [**Plastic lip on bottom rail for manually raising/lowering blinds**][**Standard bottom rail, no lip**][**Manufacturer's standard**].
3. Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
4. Tilt Position:

    a. Full.
    b. [**One**][**Two**]-direction, positive stop or lockout limited at an angle of [**20**][**60**][**80**]<**Insert number**> degrees from horizontal[**, both directions**].

5. Tilt Operator: [**Clear-plastic wand**][**Corrosion-resistant steel rod**]<**Insert description**>.
6. Tilt Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over-rotation of gear.
7. Tilt-Operator Length: [**12 inches**][**24 inches**][**30 inches**][**36 inches**][**48 inches**]<**Insert length**>.
8. Tilt-Operator Location: [**Manufacturer's standard**][**Right side of headrail**][**Left side of headrail**] unless otherwise indicated.

H. Motorized Operation: Provide factory-assembled motorized blinds with blind-operator systems of size and capacity, and with features, characteristics, and accessories required for conditions indicated. Coordinate electrical requirements with building electrical system.

1. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN FDDR; including UL 325.
3. Function: [**Lift and tilt**][**Tilt**].
4. Power: [**Single phase, 120 V, 60 Hz ac**][**Battery, 12 V dc**][**Manufacturer's standard**]<**Insert requirements**>.
5. Motor Type: Radio frequency.
6. Operation, Radio Frequency: [**Two**]<**Insert number**> manufacturer's standard [**multichannel**][**single-channel**] remote-control handheld transmitter for operation of up to [**12**]<**Insert number**> individual blinds or up to [**6**]<**Insert number**> groups of blinds and with operating features as follows:

    a. Tilt slats open and lift blinds; tilt slats closed and lower blinds.
    b. Tilt slats open; tilt slats closed both directions.
    c. Tilt slats up at 45 degrees from horizontal; tilt slats down at 45 degrees from horizontal.
    d. Tilt slats to stop at any angle.
    e. Tilt slats to programmable preset tilt position.
    f. Phone- or tablet-control app integration with automated timed programming capability.
    g. Override switch.

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h. Color: [**Manufacturer's standard**][**White**][**Black**].
i. <**Insert description**>.

7. Travel Limit/Stop: Adjustable control, interlocked with motor controls and set to stop blind automatically at slats fully closed tilted down and slats fully closed tilted up.
8. Provide power disconnect switch.
9. Lift Mechanism:

a. Lift-Cord Lock: [**Variable; stops lift cord at user-selected position within blind full operating range**][**Top locking; stops lift cord when blind is in fully opened or fully closed positions only; equipped with ring pull not more than 4 inches long**].

10. Lift Operator: Extension of inner lift cord(s) through lift-cord lock mechanism to form lift cord.
11. Lift Cord: Manufacturer's standard braided cord.
12. Lift-Cord Length: [**Short cord, not greater than 8 inches when blind is fully closed**][**Inaccessible cord, not greater than 12 inches when blind is fully closed**].
13. Lift-Cord Location: [**Manufacturer's standard**][**Right side of headrail**][**Left side of headrail**] unless otherwise indicated.

I. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and inner lift cords and has plastic- or metal-capped ends.

1. Type: [**Manufacturer's standard**][**Top contoured to match crowned shape of slat**][**Bottom contoured to minimize light gaps**]<**Insert description**>.

J. Integrated Headrail/Valance: [**Curved face**]<**Insert description**>.

K. Valance: [**Two slats**][**PVC strip**][**Manufacturer's standard**]<**Insert description**>.

L. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

1. Type: [**Wall**][**Overhead**][**End**][**Wall extension**][**Two piece for pocket installation**][**As indicated**]<**Insert description**>.
2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by horizontal louver blind manufacturer for weight and size of blind.

M. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.

N. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.

O. Colors, Textures, Patterns, and Gloss:

1. Slats: [**Match Architect's samples**][**Match Architect's samples for custom color and other characteristics**][**As selected by Architect from manufacturer's full range**][**As indicated**]<**Insert description**>.

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2. Components: [**Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated**]<**Insert description**>.

2.3 FABRICATION OF HORIZONTAL LOUVER BLINDS

A. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at **74 deg F**:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less **1/4 inch** per side or **1/2 inch** total, plus or minus **1/8 inch**. Length equal to head-to-sill dimension of opening in which blind is installed less **1/4 inch**, plus or minus **1/8 inch**.
2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.

1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

C. Mounting Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind mounting method indicated.

D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.

E. Color-Coated Finish:

1. Metal: For components exposed to view, unless anodized or plated finish is indicated, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
2. Wood: Apply [**manufacturer's standard**]<**Insert description**> factory-applied finish complying with manufacturer's written instructions for surface preparation, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION OF HORIZONTAL LOUVER BLINDS

A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units in accordance with manufacturer's written instructions.

1. Locate so exterior slat edges are not closer than [**1 inch**][**2 inches**]<**Insert**

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dimension> from interior faces of glass and not closer than [**1/2 inch**][**1-1/2 inches**]<**Insert dimension**> from interior faces of glazing frames [**at top and bottom**][**at one side and bottom**] through full operating ranges of blinds.

2. Install mounting brackets to prevent deflection of headrails.
3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

B. Electrical Connections: Connect motorized operators to building electrical system.

3.2 DEMONSTRATION

A. [**Engage a factory-authorized service representative to train**][**Train**] Owner's maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION 122113

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SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Residential stock cabinets.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 092216 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
3. Section 123623.13 "Plastic-Laminate-Clad Countertops."
4. Section 123640 "Stone Countertops."
5. Section 123661 "Simulated Stone Countertops."

1.2 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 casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

B. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
3. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
4. Laboratory Test Reports: For composite wood products, indicating compliance with the formaldehyde emissions evaluation.

C. Shop Drawings:

1. Include plans, elevations, details, and attachments to other work.
2. Show materials, finishes, filler panels, and hardware.
3. Indicate manufacturer's catalog numbers for casework.

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D. Samples: For casework and hardware finishes.

E. Samples for Initial Selection: For casework and hardware finishes.

F. Samples for Verification: For the following:

1. Casework Finishes: **8-by-10-inch** Samples for each type of casework finish.
2. Hardware: One full-size Sample of each type of exposed hardware in each finish required.
3. Base Cabinet: One full-size, [**16-inch-**]<**Insert dimension**> wide, finished base cabinet complete with hardware, doors, and drawers but without countertop.
4. Wall Cabinet: One full-size, [**12-inch-**]<**Insert dimension**> wide, finished wall cabinet complete with hardware, doors, and adjustable shelves.
5. Full-Size Samples: Maintain at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For casework.

1.4 QUALITY ASSURANCE

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.

C. Field Measurements: Where casework is indicated to fit to other construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.

1. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

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PART 2 - PRODUCTS

2.1 RESIDENTIAL STOCK CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Smart Cabinetry; Cabinetworks Group

B. Quality Standard: Provide cabinets that comply with KCMA A161.1.

1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.
2. Interior trim.
3. Interior plywood paneling.
4. Shelving[**and clothes rods**].
5. Interior [**stairs**][**and**][**railings**].

C. Regional Materials: Verify the following wood products are manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If materials are transported by rail or water, multiply the distance by 0.25 to determine the distance to Project site.

1. Interior trim.
2. Interior plywood paneling.
3. Shelving[**and clothes rods**].
4. Interior [**stairs**][**and**][**railings**].

D. Exposed Cabinet End Finish: Wood veneer.

E. Cabinet End Construction: [**5/8-inch- thick particleboard or 1/2-inch- thick plywood**][**1/2-inch- thick particleboard or 3/8-inch- thick plywood**].

F. Cabinet Tops and Bottoms: 1/2-inch - thick plywood.

1. Fully support in rabbets in and secure to end panels, front frame, and back rail.

G. Back, Top, and Bottom Rails: **3/4-by-2-1/2-inch** solid wood, interlocking with end panels and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with mechanical fasteners.

H. Wall-Hung-Unit Back Panels: **3/16-inch-** thick plywood fastened to rear edge of end panels and to top and bottom rails.

I. Base-Unit Back Panels: 3/16-inch- thick plywood fastened to rear edge of end panels and to top and bottom rails.

J. Front Frame Drawer Rails: **3/4-by-1-1/4-inch** solid wood mortised and fastened into

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face frame.

K. Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.
2. Subfronts, Backs, and Sides: 1/2-inch plywood.
3. Bottoms: 1/4-inch- thick plywood.

L. Shelves: [**3/4-inch- thick particleboard or 5/8-inch- thick plywood**][**5/8-inch- thick particleboard or 1/2-inch- thick plywood**].

M. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.

N. Factory Finishing: Finish cabinets at factory.

2.2 CABINET MATERIALS

A. Hardwood Lumber: Kiln dried to 7 percent moisture content.

B. Softwood Lumber: Kiln dried to 10 percent moisture content.

C. Composite Wood Products: Verify formaldehyde emission rates are not greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

1. Hardwood Plywood: 0.05 ppm.

D. Hardwood Plywood: HPVA HP-1.

E. Hardboard: ANSI A135.4, Class 1 tempered.

1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert number**> percent.

F. Adhesives: Do not use adhesives that contain urea formaldehyde.

G. Exposed Materials:

1. Exposed Wood Species: Refer drawings.

a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
b. Staining and Finish: As indicated by manufacturer's designations.

2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A

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faces and Grade C backs of same species as faces.

4. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with ISO 4586, Grade VGS and edgebanded.

    a. Colors, Textures, and Patterns: As indicated by manufacturer's designations.
    b. Plastic-Laminate Edgebanding: Of same grade, pattern, color, and texture of plastic laminate as for faces.

5. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.

    a. Provide material finished on both sides for doors and drawer fronts.
    b. Provide PVC edge molding on components with exposed or semiexposed edges.
    c. Colors: As indicated by manufacturer's designations.

H. Semiexposed Materials: Unless otherwise indicated, provide the following:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces[**or stained to be compatible with exposed surfaces**].
2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces[**or stained to be compatible with exposed surfaces**].
3. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with ISO 4586, Grade VGS.

    a. For backs of doors and drawer fronts faced with plastic laminate, provide same grade, pattern, color, and texture of plastic laminate as for faces.
    b. For face frames faced with plastic laminate, provide plastic-laminate edges of same grade, pattern, color, and texture of plastic laminate as for faces.
    c. For shelves faced with plastic laminate, provide [**plastic-laminate edges of same grade, pattern, color, and texture of plastic laminate as for faces**][**PVC edge molding, 1 mm thick**].
    d. Colors, Textures, and Patterns: [**As indicated by manufacturer's designations**][**Match Architect's sample**][**As selected by Architect from cabinet manufacturer's full range**]<**Insert requirements**>.

4. Thermally Fused Laminate Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.

    a. Provide material finished on both sides for shelves, dividers, drawer bodies, and other components with two semiexposed surfaces.
    b. Provide [**PVC or polyester edgebanding**][**PVC edge molding**] on components with semiexposed edges.
    c. Colors: [**As indicated by manufacturer's designations**][**Match Architect's sample**][**As selected by Architect from cabinet manufacturer's full range**]<**Insert requirements**>.

I. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species,

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with no defects affecting strength or utility; particleboard; MDF; or hardboard.

PART 3 - EXECUTION

3.1 INSTALLATION OF RESIDENTIAL CASEWORK

A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.

B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.

C. Install casework level and plumb to a tolerance of **1/8 inch in 8 ft.**.

D. Fasten casework to adjacent units and to backing.

1. Fasten wall cabinets through back, near top and bottom, and at ends not more than **16 inches** o.c.

a. Fasteners: [**No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips**][**No. 10 wafer-head sheet metal screws through the metal backing or metal framing behind the wall finish**][**Toggle bolts through the metal backing or metal framing behind the wall finish**].

END OF SECTION 123530

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SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.
2. Environmental Product Declaration: For each product.
3. Third-Party Certifications: For each product.
4. Third-Party Certified Life Cycle Assessment: For each product.
5. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
6. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
7. Product Data: For installation adhesives, indicating VOC content.
8. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
9. Product Data: For composite wood products, indicating compliance with requirements for formaldehyde emissions.

C. Shop Drawings: For plastic-laminate-clad countertops.

1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
3. Apply [**AWI Quality Certification**][**WI Certified Compliance**] Program label to Shop Drawings.

D. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.

E. Samples for Initial Selection: For plastic laminates.

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F. Samples for Verification: As follows:

1. Plastic Laminates: For each type, color, pattern, and surface finish required, [**8 by 10 inches**][**12 by 12 inches**] in size.
2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, [**12 by 24 inches**][**24 by 24 inches**] in size.
3. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For [**Installer**][**fabricator**].

B. Product Certificates: For the following:

1. Composite wood products.
2. High-pressure decorative laminate.
3. Chemical-resistant, high-pressure decorative laminate.
4. Adhesives.

C. Quality Standard Compliance Certificates: [**AWI Quality Certification Program**][**WI Certified Compliance Program**].

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: [**AWI's Quality Certification Program accredited participant**][**WI's Certified Compliance Program licensee**].

B. Installer Qualifications: [**Fabricator of products**][**AWI's Quality Certification Program accredited participant**][**WI's Certified Compliance Program licensee**].

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.

B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

C. Keep surfaces of countertops covered with protective covering during handling and installation.

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1.6 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations with Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F** and relative humidity between [**25 and 55**][**43 and 70**][**20 and 50**]<**Insert numbers**> percent during the remainder of the construction period.

C. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 FABRICATORS

A. Fabricators: Subject to compliance with requirements, [**provide products by the following**][**provide products by one of the following**][**available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following**]:

1. <**Insert, in separate subparagraphs, names and contact information for preapproved woodworking firms**>.

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated. Provide moisture resistant high density fiberboard substrate.

1. Wood Moisture Content: 8 to 13 percent.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives: Do not use adhesives that contain urea formaldehyde.

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B. Adhesive for Bonding Plastic Laminate: [**Unpigmented contact cement**][**Contact cement**][**PVA**][**Resorcinol**][**As selected by fabricator to comply with requirements**].

1. Adhesive for Bonding Edges: Hot-melt adhesive[**or adhesive specified above for faces**].

C. Installation Adhesive:

1. Adhesives shall have a VOC content of [**70**]<**Insert value**> g/L or less.
2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.4 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of **1 inch** over base cabinets. Ease edges to radius indicated for the following:

1. Solid-Wood (Lumber) Members: **1/16 inch** unless otherwise indicated.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of cutouts by saturating with varnish.

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PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
2. Seal edges of cutouts by saturating with varnish.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in countertops with concealed clamping devices located within **6 inches** of front and back edges and at intervals not exceeding **24 inches**. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a **1/8-inch-in-96-inches** variation from a straight, level plane.
2. Secure backsplashes [**to tops with concealed metal brackets at 16 inches o.c.**][**and**][**to walls with adhesive**].
3. Seal joints between countertop and backsplash, if any, and joints where

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countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces.

C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of **48 inches** o.c. Remove protection at Substantial Completion.

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SECTION 123661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid surface material countertops.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for cantilever supports.
2. Section 224100 "Residential Plumbing Fixtures" and Section 224200 "Commercial Plumbing Fixtures" for non-integral sinks and plumbing fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of countertop material and sink.

B. Shop Drawings:

1. Plans, sections, details, edge and backsplash profiles, and attachment to other work.
2. Locations and details of joints.
3. Locations, quantity, and type of supports/brackets.
4. Direction of directional pattern, if any.
5. Locations and sizes of cutouts and holes for items installed in countertop.
6. Apply AWI's Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification:

1. Countertop material, **6 inches** square.
2. One full-size countertop, with front edge and backsplash, **8 by 10 inches**, of construction and in configuration specified.

E. Sustainable Design Submittals:

1. Product Data: For adhesives, indicating VOC content.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Indicate locations and sizes of cutouts and holes for items installed in countertops or backsplashes.

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B. Qualification Statements: For fabricator.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include product data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.6 MOCKUPS

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as indicated on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work..

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Quality Standard: Unless otherwise indicated, comply with [**ANSI/AWI 1236**][**NAAWS**] for grades of simulated stone countertops indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grade specified.
2. The Contract Documents contain more stringent requirements than that of the

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referenced quality standard. Comply with requirements of the Contract Documents in addition to those of referenced quality standard.

2.2 SOLID SURFACE MATERIAL COUNTERTOPS

A. Solid Surface Countertop Type :

1. Grade: Economy.

B. Solid Surface Material: Homogeneous fabrication of mineral fillers and pigments bound together with a matrix of polymers and resins, complying with ISFA 2-01.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. COrian Design

2. Colors and Patterns: [**As indicated by manufacturer's designations**][**Match Architect's samples**][**As selected by Architect from manufacturer's full range**].
3. Countertop:

   a. Type: [**Standard**][**Special Purpose**][**Veneer**].
   b. Thickness:

      1) [**1/2-inch-**][**3/4-inch-**] thick, solid surface material[**with front edge built up with same material**].

   c. Exposed Edge Treatment: [**Bevel**][**Ogee**][**Radius**][**As selected by Architect from manufacturer's full range**]<**Insert style**>.
   d. Provide drip groove [**1/8 inch by 1/8 inch set back 3/8 inch**]<**Insert groove size and location**> from front edge of countertop.
   e. Backsplash: [**Integral coved**][**Detached straight**].

      1) Height: [**4 inches**]<**Insert height**>.
      2) Thickness: [**1/2 inch**][**Matching countertop**].

   f. End Splash: [**Matching backsplash**][**None**].

4. Sink Bowls:

   a. [**Integral**][**Top Mounted**][**Separate unit for under-counter mounting**].
   b. Material: [**PMMA**][**Acrylic**][**Composite**][**Enameled cast iron**][**Enameled steel**][**Solid surface**][**Stainless steel**][**Vitreous china**]<**Insert type**>.
   c. Shape: [**Oval**][**Rectangle**]<**Insert type**>.
   d. Color: [**White**][**Match countertop**]<**Insert color**>.

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2.3 FABRICATION

A. Fabricate countertops in sizes and shapes required to comply with requirements indicated.

B. Fabricate tops with shop-applied edges[**and backsplashes**] unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.
2. Install integral sink bowls in countertops in the shop.

C. Joints:

1. Fabricate countertops without joints.
2. Fabricate countertops in sections for joining in field[**, with joints at locations indicated**].

a. Joint Locations: Not within **18 inches** of a sink or cooktop and not where a countertop section less than **36 inches** long would result, unless unavoidable.
b. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints[**where indicated**]. Make width of cuts slightly more than thickness of splines to provide snug fit.[**Provide at least three splines in each joint.**]

D. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures[**in shop**] using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting **3/16 inch** into fixture opening.
b. Provide vertical edges, rounded to **3/8-inch** radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting **3/16 inch** into fixture opening.
c. Provide **3/4-inch** full bullnose edges projecting **3/8 inch** into fixture opening.

2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Fittings: Drill countertops in shop for grommets, plumbing fittings, undercounter soap dispensers, and similar items.
4. Counter-Mounted Cooktops: Prepare countertops in shop for field cutting openings for cooktops. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

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2.4 INSTALLATION MATERIALS

A. Particleboard: ANSI A208.1, [**Grade M-2**][**Grade M-2-Exterior Glue**].

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

1. Laboratory Test Reports: For composite wood products, indicating compliance with the formaldehyde emissions evaluation.
2. Composite Wood Products: Verify formaldehyde emission rates are not greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

a. Hardwood Plywood: 0.05 ppm.
b. Particleboard: 0.09 ppm.
c. MDF More Than 5/16 Inch (8 mm) Thick: 0.11 ppm.
d. MDF 5/16 Inch (8 mm) or Less in Thickness: 0.13 ppm.

C. Adhesive: Product recommended by manufacturer.

1. Verify adhesive complies with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

D. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION OF SIMULATED STONE COUNTERTOPS

A. Grade: Install countertops to comply with specified grade.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts not finished in the shop. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

C. Countertop Installation:

1. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
3. Anchor wall cleating necessary for proper setting for countertops not supported by casework.

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4. Install countertops level to a tolerance of **1/8 inch in 8 ft.**, **1/4 inch** maximum. Do not exceed **1/64-inch** difference between planes of adjacent units.
5. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
6. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
7. Secure countertops to subtops with adhesive according to manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
8. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

    a. Install metal splines in kerfs in countertop edges at joints[**where indicated**]. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
    b. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

9. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
10. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
11. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls. Comply with Section 079200 "Joint Sealants."

END OF SECTION 123661

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Section 23 05 00 - plumbing GENERAL CONDITIONS

PART 1 GENERAL

SECTION INCLUDES

Common administrative, procedural, and general installation requirements applicable to all plumbing work.

General material and workmanship requirements for plumbing equipment and systems.

PLumbing system coordination and general design intent.

RELATED REQUIREMENTS

Section 01 33 00 – Submittal Procedures.

Section 22 07 00 – Plumbing Insulation.

Section 22 10 00 – Plumbing Piping.

Section 22 40 00 – Plumbing Fixtures.

Section 22 11 16 – Domestic Water Piping.

Section 22 13 16 – Sanitary Waste and Vent Piping.

DEFINITIONS

Plumbing Systems: Includes domestic cold water, domestic hot water, sanitary waste, vent piping, storm drainage, and associated components.

Accessible: Readily accessible without the use of tools, ladders, or special access equipment.

NSF: National Sanitation Foundation.

UPC/IPC: Uniform Plumbing Code / International Plumbing Code, as adopted by local authority.

REFERENCE STANDARDS

ASME A112.1.2 – Air Gaps in Plumbing Systems.

ASME A112.18.1 – Plumbing Supply Fittings.

ASTM B88 – Seamless Copper Water Tube.

ASTM D1785 – PVC Plastic Pipe, Schedules 40 and 80.

ASTM F876 – PEX Tubing.

NSF 61 – Drinking Water System Components.

NSF 14 – Plastic Piping System Components and Related Materials.

ASSE 1015 – Backflow Preventers.

ADA Standards for Accessible Design – Current Edition.

SUBMITTALS

Product Data: manufacturer's data sheets for piping, valves, fittings, fixtures, and equipment.

Shop Drawings: include isometric piping diagrams, fixture locations, and equipment connections.

Test Reports: results of pressure and leak testing for all systems.

Certificates: installer certifications, backflow device testing certifications.

Operation and Maintenance Manuals: for plumbing equipment, controls, and specialty systems.

QUALITY ASSURANCE

Installer Qualifications: Minimum five years’ experience installing commercial plumbing systems.

Regulatory Requirements:

Conform to applicable local plumbing code (UPC, IPC, or as adopted).

Comply with all federal, state, and local requirements for potable water, sanitary sewer, and stormwater systems.

Health and Safety Compliance: Work shall comply with OSHA standards and local health department regulations.

PART 2 PRODUCTS

Materials

Domestic Water Piping:

Copper Tubing: ASTM B88, Type L.

PEX Tubing: ASTM F876, with ASTM F1960 or F1807 fittings.

PVC: ASTM D1785 (cold water only, underground or non-potable).

Drainage and Waste Piping:

Cast Iron Soil Pipe: ASTM A74, service or no-hub type.

PVC: ASTM D2665 or D3034, DWV-rated.

Valves:

Ball Valves: Full-port bronze body, ANSI B16.33, NSF 61 certified.

Check Valves: Swing type, bronze or cast iron.

Backflow Preventers: ASSE 1015-certified devices, as required.

Supports and Hangers:

Comply with MSS SP-58 and SP-69.

Provide vibration isolation for pipe hangers near noise-sensitive areas.

Identification:

Color-coded labels for all piping systems per ANSI A13.1.

Permanent valve tags and engraved nameplates.

PART 3 EXECUTION

GENERAL INSTALLATION

Install all plumbing systems in accordance with applicable codes and manufacturer's instructions.

Coordinate layout with architectural, structural, electrical, and HVAC disciplines to avoid conflicts.

Provide cleanouts, unions, and access panels at all serviceable points.

Slope drainage piping per code.

Protect piping against freezing, physical damage, and corrosion.

FIELD QUALITY CONTROL

Perform hydrostatic testing on domestic water piping at 150% working pressure or as required by code.

Air test sanitary drainage and vent piping per code (5 psi minimum for 15 minutes).

Submit signed test reports to Architect and Owner.

SYSTEM STARTUP

Flush domestic water piping thoroughly prior to final connection of fixtures.

Disinfect potable water systems per AWWA C651 and local code.

Confirm operation of all control valves, mixing valves, and pumps (if any).

Coordinate commissioning with Section 22 08 00.

ADJUSTING

Adjust balancing valves and flow regulators to design flow rates.

Verify final pressure at plumbing fixtures meets design requirements.

CLEANING

Clean and remove all construction debris and foreign materials from within piping.

Flush out and sanitize water systems before final testing and Owner acceptance.

Clean exposed fixture surfaces and polish chrome prior to substantial completion.

DEMONSTRATION AND TRAINING

Provide on-site demonstration of key systems to Owner's maintenance personnel.

Submit written instructions for maintenance and troubleshooting.

WARRANTY

Provide a minimum one-year warranty covering labor and materials.

Extended manufacturer warranties for valves, piping, and fixtures shall be passed on to Owner.

END OF SECTION 22 05 00

Section 22 05 17 - Sleeves and Sleeve Seals for Plumbing Piping

PART 1 GENERAL

SECTION INCLUDES

Pipe sleeves.

Pipe sleeve-seals.

RELATED REQUIREMENTS

Section 07 84 00 - Firestopping.

Section 22 07 16 - Plumbing Equipment Insulation.

Section 22 07 19 - Plumbing Piping Insulation.

REFERENCE STANDARDS

ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022.

ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

SUBMITTALS

See Section 01 30 00 - Administrative Requirements for submittal procedures.

Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

QUALITY ASSURANCE

Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

Installer Qualifications: Company specializing in performing work of the type specified this section.

DELIVERY, STORAGE, AND HANDLING

Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

PART 2 PRODUCTS

PIPE SLEEVES

Manufacturers:

Flexicraft Industries; Pipe Wall Sleeve: www.flexicraft.com/#sle.

Hilti.

Holdrite.

Vertical Piping:

Sleeve Length: 1 inch above finished floor.

Provide sealant for watertight joint.

Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

Pipe Passing Through Below Grade Exterior Walls:

Zinc coated or cast iron pipe.

Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:

Galvanized steel pipe or black iron pipe with asphalt coating.

Connect sleeve with floor plate except in mechanical rooms.

Clearances:

Provide allowance for insulated piping.

Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.

All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

PIPE-SLEEVE SEALS

Sealing Compounds:

Provide packing and sealing compound to fill pipe to sleeve thickness.

Combined packing and sealing compounding to match partition fire-resistance hourly rating.

Pipe Sleeve Material:

Bearing Walls: Steel, cast iron, or terra-cotta pipe.

Masonry Structures: Sheet metal or fiber.

Wall Sleeve: PVC material with waterstop collar, and nailer end-caps.

PART 3 EXECUTION

PREPARATION

Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

Remove scale and foreign material, from inside and outside, before assembly.

INSTALLATION

Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

Install piping to conserve building space, to not interfere with use of space and other work.

Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

Aboveground Piping:

Pack solid using mineral fiber complying with ASTM C592.

Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.

All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

Manufactured Sleeve-Seal Systems:

Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.

Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.

Locate piping in center of sleeve or penetration.

Install field assembled sleeve-seal system components in annular space between sleeve and piping.

Tighten bolting for a water-tight seal.

Install in accordance with manufacturer's recommendations.

When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION 22 05 17

SECTION 22 05 19 - METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pressure Gauges:
   1. Bourdon tube for liquids and gases.

B. Thermometers.

1.2 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).

D. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance; 2012, with Addendum (2018).

PART 2 PRODUCTS

2.1 PRESSURE GAUGES

A. Manufacturers:
   1. Ashcroft, Inc: www.ashcroft.com/#sle.
   2. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
   3. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Bourdon Tube for Liquids and Gases:
   1. Accuracy: ASME B40.100, adjustable commercial grade (D) with 5 percent of span.
   2. Process Connection: Lower-back, 1/4 inch NPT male except where noted.

2.2 THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
   2. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
   3. Watts Water Technologies, Inc: www.watts.com/#sle.

B. General:
   1. Product Compliance: ASTM E1.
   2. Lens: Clear glass, except where stated.
   3. Accuracy: One percent, when tested in accordance with ASTM E77, except where stated.
   4. Scale: Black markings depicting single scale in degrees F where expected process value falls half-span of standard temperature range.

C. Thermometers - Dial Type:
   1. Adjustable Angle: 5 inch diameter dial with black pointer, stainless steel case, silicone damping bimetal element, hermetically sealed shatterproof-lens, recalibrating screw, and 2-1/2 inch NPT stem.
   2. Manufacturers:
      a. Marshall Instruments, Inc: www.marshallinstruments.com/#sle.
      b. Reotemp Instruments Corp: reotemp.com/#sle.
      c. Wika Instrument, LP: www.wika.us/#sle.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install metering products in accordance with manufacturer's instructions for intended fluid type and service.

B. Install water meters with inlet and outlet isolation valves in compliance with AWWA M6.

C. Install pressure gauges as follows:
   1. At Pumps: Place single gauge before strainer, suction side and discharge side.
   2. Include gauge cock to isolate each gauge and extend nipples for insulation clearance.
   3. Include siphons on high temperature systems and select type according to service rating.
   4. Adjust gauges to selected viewing angle, clean thoroughly, and calibrate to zero.

D. Install thermometers as follows:
   1. Hot Water Heaters: Place upstream and downstream of heater. Add one on the inlet end when using steam as the water heating medium.
   2. Piping: Install thermometers in branch butt weld connection fitting or socket-weld thermowell. Enlarge pipes smaller than 2-1/2 inch to accommodate sockets. Ensure sockets are above insulation clearance.

3.2 SCHEDULES

A. Pressure Gauge Tappings, Location:
   1. Control valves 3/4 inch & larger - inlets and outlets.

B. Thermometer Sockets, Location:
   1. Control valves 1 inch & larger - inlets and outlets.

END OF SECTION 22 05 19

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Ball valves.

1.2 REFERENCE STANDARDS

A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).

B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.

D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022.

E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

F. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.

G. ASME B31.9 - Building Services Piping; 2020.

H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2021.

I. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2019).

J. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984, with Editorial Revision (2019).

K. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.

L. MSS SP-67 - Butterfly Valves; 2022.

M. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends; 2011.

N. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.

O. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service; 2010a.

P. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.

Q. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends; 2011.

R. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

S. NSF 61 - Drinking Water System Components - Health Effects; 2021.

T. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.3 QUALITY ASSURANCE

A. Manufacturer:
   1. Obtain valves for each valve type from single manufacturer.
   2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
   2. Protect valve parts exposed to piped medium against rust and corrosion.
   3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
   4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.

B. Use the following precautions during storage:
   1. Maintain valve end protection and protect flanges and specialties from dirt.
   2. Store valves in shipping containers and maintain in place until installation.
      a. Store valves indoors in dry environment.
      b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. See drawings for specific valve locations.

B. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C. Provide the following valves for the applications if not indicated on drawings:
   1. Shutoff: Ball, butterfly, gate.
   2. Dead-End: Single-flange butterfly (lug) type.
   3. Throttling: Provide globe, angle, ball, or butterfly.
   4. Swing Check (Pump Outlet):
      a. 2 inch and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
      b. 2-1/2 inch and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves.

D. Domestic, Hot and Cold Water Valves:
   1. 2 inch and Smaller:
      a. Bronze and Brass: Provide with solder-joint ends.
      b. Bronze Angle: Class 125, bronze disc.
      c. Ball: One piece, full port, brass with brass trim.

d. Bronze Swing Check: Class 125, bronze disc.
e. Bronze Gate: Class 125, NRS.
f. Bronze Globe: Class 125, bronze disc.

2. 2-1/2 inch and Larger:
a. Iron, 2-1/2 inch to 4 inch: Provide with flanged ends.
b. Iron Ball: Class 150.
c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, ductile-iron disc.
d. Iron Swing Check: Class 125, metal seats.
e. Iron Gate: Class 125, NRS.
f. Iron Globe: Class 125.

2.2 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve Actuator Types:
1. Handwheel: Valves other than quarter-turn types.
2. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.
3. Wrench: Plug valves with square heads.

D. Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.

E. General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Solder-joint Connections: ASME B16.18.
3. Building Services Piping Valves: ASME B31.9.

F. Potable Water Use:
1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

2.3 BRASS, BALL VALVES

A. One Piece, Full Port with Brass Trim and Threaded Connections:
1. Comply with MSS SP-110.
2. CWP Rating: 200 psi.
3. Body: Forged brass.
4. Seats: PTFE.

5. Stem: Brass.
6. Ball: Chrome-plated brass.
7. Operator: Handle.

PART 3 EXECUTION

3.1 EXAMINATION

A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B. Verify valve parts to be fully operational in all positions from closed to fully open.

C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D. Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Prefabricated trapeze-framed systems.

B. Strut systems for pipe or equipment support.

C. Beam clamps.

D. Pipe hangers.

E. Pipe supports, guides, shields, and saddles.

F. Anchors and fasteners.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 05 50 00 - Metal Fabrications.

1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2014 (Reapproved 2020).

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2018).

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

N. UL (DIR) - Online Certifications Directory; Current Edition.

O. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
   1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

1.6 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Installer Qualifications for Field-Welding: As specified in Section 05 50 00.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.

C. Materials for Metal Fabricated Supports: Comply with Section 05 50 00.
   1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
   2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

D. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.2 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

A. Prefabricated Trapeze-Framed Metal Strut Systems:
   1. Manufacturers:
      a. Anvil International, LLC: www.asc-es.com/#sle.
      b. Gripple, Inc; Fast Track - Standard: www.gripple.com/#sle.
      c. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
   2. Strut Channel or Bracket Material:
   3. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

2.3 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

A. Strut Channels:
   1. Manufacturers:
      a. ABB Installation Products: electrification.us.abb.com/#sle.
      b. Gripple, Inc; Universal Bracket: www.gripple.com/#sle.
      c. Unistrut, a brand of Atkore International Inc: www.unistrut.com/#sle.
   2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
   3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

B. Hanger Rods:
   1. Threaded zinc-plated steel unless otherwise indicated.
   2. Minimum Size, Unless Otherwise Indicated or Required:
      a. Equipment Supports: 1/2 inch diameter.

b. Piping up to 1 inch: 1/4 inch diameter.
c. Piping larger than 1 inch: 3/8 inch diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch in length.

C. Channel Nuts:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
b. FNW; 7821: www.fnw.com/#sle.
c. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
2. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring as indicated on drawings.

2.4 BEAM CLAMPS

A. Manufacturers:
1. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
2. FNW; 7201: www.fnw.com/#sle.
3. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.

B. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

C. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.5 PIPE HANGERS

A. Clevis Hangers, Adjustable:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
b. FNW; 7005: www.fnw.com/#sle.
c. nVent Caddy, a brand of nVent: www.erico.com/#sle.
2. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
3. Light-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
4. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

2.6 PIPE CLAMPS

A. Riser Clamps:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
b. FNW; 7020: www.fnw.com/#sle.
c. nVent Caddy, a brand of nVent: www.erico.com/#sle.
2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

B. Strut Clamps:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
b. FNW; 7815: www.fnw.com/#sle.
c. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
2. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
3. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.
4. Service Temperature Range: Minus 65 to 275 degrees F.

C. Insulation Coupling:
1. Manufacturers:
a. FNW; 7897: www.fnw.com/#sle.
b. nVent Caddy, a brand of nVent: www.erico.com/#sle.
c. Unistrut, a brand of Atkore International, Inc: www.unistrut.com/#sle.
d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Two bolt-type clamps designed for installation under insulation.
3. Material: Carbon steel with epoxy copper or zinc finish.

2.7 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

A. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

B. Stanchions:
1. Manufacturers:
a. Anvil International: www.anvilintl.com/#sle.
b. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
c. nVent Caddy, a brand of nVent: www.erico.com/#sle.
2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
4. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.

C. U-Bolts:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.

b. FNW; 7610: www.fnw.com/#sle.
c. nVent Caddy, a brand of nVent: www.erico.com/#sle.

2. MSS SP-58 type 24, carbon steel u-bolt for pipe support or anchoring.

D. Pipe Shields for Insulated Piping:
1. Manufacturers:
a. Anvil International: www.anvilintl.com/#sle.
b. FNW; 7753: www.fnw.com/#sle.
c. Gregory Industries, Inc: www.gregorycorp.com/#sle.
d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
3. General Construction and Requirements:
a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
b. Shields Material: UV-resistant polypropylene with glass fill.
c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
d. Service Temperature: Minus 40 to 178 degrees F.
e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

E. Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Liquid Temperatures Up to 122 degrees F:
a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
b. Support From Below: MSS SP-58 types 35 through 38.

F. Pipe Supports, Thermal Insulated:
1. General Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Provide pipe supports for 1/2 to 30 inch iron pipes.
d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided with ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.

c. Minimum Thickness: 60 mil, 0.06 inch.

G. Copper Pipe Supports:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation: www.eaton.com/#sle.
b. HoldRite, a brand of Reliance Worldwide Corporation : www.holdrite.com/#sle.
c. Substitutions: See Section 01 60 00 - Product Requirements.
d. Source Limitations: Furnish supports, associated fittings, accessories, and hardware produced by single manufacturer.

2.8 ANCHORS AND FASTENERS

A. Manufacturers - Mechanical Anchors:
1. FNW; 7502: www.fnw.com/#sle.
2. Hilti, Inc: www.us.hilti.com/#sle.
3. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com/#sle.
4. Powers Fasteners, Inc: www.powers.com/#sle.

B. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

C. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

D. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.

E. Hollow Masonry: Use toggle bolts.

F. Hollow Stud Walls: Use toggle bolts.

G. Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.

H. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.

I. Sheet Metal: Use sheet metal screws.

J. Wood: Use wood screws.

K. Plastic and lead anchors are not permitted.

L. Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
1. Channel Material: Use galvanized steel.
2. Manufacturer: Same as manufacturer of metal strut channel framing system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

1.2 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Identification painting.

1.3 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Schedules:

1. Submit plumbing component identification schedule listing equipment, piping, and valves.
2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
3. Valve Data Format: Include id-number, location, function, and model number.

PART 2 PRODUCTS

2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A. Nameplates:

1. Control panels, transducers, and other related control equipment products.

B. Tags:

1. Piping: 3/4 inch diameter and smaller.
2. Manual operated and automated control valves.

C. Pipe Markers: 3/4 inch diameter and higher.

2.2 NAMEPLATES

A. Manufacturers:

1. Brimar Industries, Inc: www.pipemarker.com/#sle.
2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.

B. Description: Laminated piece with up to three lines of text.

1. Letter Color: White.
2. Letter Height: 1/4 inch.
3. Background Color: Black.
4. Nameplate Height: 3/4 inch.

2.3 TAGS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com/#sle.
   2. Craftmark Pipe Markers: www.craftmarkid.com/#sle.
   3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

B. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.

2.4 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com/#sle.
   2. Brimar Industries, Inc: www.pipemarker.com/#sle.
   3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

B. Comply with ASME A13.1.

C. Identification Scheme, ASME A13.1:
   1. Primary: External Pipe Diameter, Uninsulated or Insulated.
      a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
      b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
      c. 2-1/2 to 6 inches: Use 12 inch field-length with 1-1/4 inch text height.
      d. 8 to 10 inches: Use 24 inch field-length with 2-1/2 inch text height.
      e. Over 10 inches: Use 32 inch field-length with 3-1/2 inch text height.
   2. Secondary: Color scheme per fluid service.
      a. Combustible Fluids: White text on brown background.
      b. Compressed Air: White text on blue background.
      c. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
   3. Tertiary: Other Details.
      a. Directional flow arrow.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive identification products.

3.2 INSTALLATION

A. Apply ASME A13.1 Pipe Marking Rules:
   1. Place pipe marker adjacent to changes in direction.
   2. Place pipe marker adjacent each valve port and flange end.
   3. Place pipe marker at both sides of floor and wall penetrations.
   4. Place pipe marker every 25 to 50 feet interval of straight run.

END OF SECTION 22 05 53

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flexible elastomeric cellular insulation.

B. Glass fiber insulation.

C. Jacketing and accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

1.3 REFERENCE STANDARDS

A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2020a.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.

D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER INSULATION

A. Manufacturers:

1. CertainTeed Corporation: www.certainteed.com/#sle.

2. Johns Manville Corporation: www.jm.com/#sle.
3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: www.knaufinsulation.com/#sle.
4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: www.ocbuildingspec.com/#sle.

B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
1. K Value: ASTM C177, 0.24 at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F.
3. Maximum Moisture Absorption: 0.2 percent by volume.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturers:
1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT): www.aeroflexusa.com/#sle.
2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
1. Minimum Service Temperature: Minus 40 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

2.4 JACKETING AND ACCESSORIES

A. PVC Plastic Jacket:
1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
a. Minimum Service Temperature: 0 degrees F.
b. Maximum Service Temperature: 150 degrees F.
c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
d. Thickness: 10 mil, 0.010 inch.
e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

C. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.
   1. Install seal over seams with factory-approved room temperature vulcanization (RTV) silicone sealant to ensure a positive vapor barrier seal in outdoor and sanitary washdown environments.

D. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

G. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

H. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

K. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULES

A. Plumbing Systems:
   1. Domestic Hot Water Supply:
      a. Glass Fiber Insulation:
         1) Thickness: 1.5 inch.
   2. Domestic Cold Water:
      a. Glass Fiber Insulation:
         1) Thickness: 0.5 inch.
   3. Roof Drainage Run Horizontal at Roof Level:

END OF SECTION 22 07 19

SECTION 22 07 19.11 - UNDER-LAVATORY PIPE AND SUPPLY COVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Under-lavatory pipe and supply covers.

1.2 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Owner-furnished fixtures.

B. Section 22 10 05 - Plumbing Piping.

1.3 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2021.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.5 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Manufacturers:
   1. Plumberex Specialty Products, Inc: www.plumberex.com/#sle.

B. General:
   1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Adhesives, sewing threads, and two-ply laminated materials are prohibited.
   3. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
   4. Construction: 1/8 inch PVC with antimicrobial, antifungal, and ultraviolet light (UV) resistant properties.
      a. Comply with ASTM C1822 for covers on accessible lavatory piping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that walls, floor finishes, lavatories, and piping are prepared and ready for installation of under-lavatory guards.

B. Confirm location and size of fixtures and piping before installation.

3.2 INSTALLATION

A. Install under-lavatory guards according to manufacturer's written instructions..

END OF SECTION 22 07 19.11

SECTION 22 10 05 - PLUMBING PIPING
PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sanitary waste piping, above grade.

B. Domestic water piping, above grade.

C. Natural gas piping, above grade.

D. Pipe flanges, unions, and couplings.

E. Pipe hangers and supports.

F. Ball valves.

G. Pressure Relief Valves

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.

C. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.

D. Section 22 07 19 - Plumbing Piping Insulation.

E. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems.

1.3 REFERENCE STANDARDS

A. ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing; 2019.

B. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).

C. ANSI Z223.1 - National Fuel Gas Code; 2021.

D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.

E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.

F. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

G. ASME B31.1 - Power Piping; 2020.

H. ASME B31.9 - Building Services Piping; 2020.

I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2021.

J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).

K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.

L. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.

M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2019.

N. ASTM B32 - Standard Specification for Solder Metal; 2020.

O. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

P. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

Q. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.

R. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.

S. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

T. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

U. ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

V. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2020.

W. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2020.

X. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.

Y. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2021.

Z. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

AA. AWWA C606 - Grooved and Shouldered Joints; 2015.

BB. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2018.

CC. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2018.

DD. FM 1680 - Approval Standard for Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/ Commercial and Residential; 1989.

EE. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

FF. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

GG. NSF 61 - Drinking Water System Components - Health Effects; 2021.

HH. NSF 372 - Drinking Water System Components - Lead Content; 2022.

II. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

C. Manufacturers:
1.

2.2 SANITARY WASTE PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
1. Fittings: Cast iron.

2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

C. Edge HP Iron Hubbless
1. Fittings; ASTM A888 and CISPI 301.
2. Joints: Couplings: Standard Duty Hubless Couplings shall conform to CISPI Standard 310, shall be manufactured in the United States, and be certified by NSF® International. Heavy Duty couplings shall conform to ASTM C 1540 and shall be manufactured in the United States.

2.3 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, alloy Sn95 solder.

2.4 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
2. Joints: Threaded or welded to ASME B31.1.

B. Flexible Gas Piping:
1. Corrugated Stainless Steel Tubing: Comply with ANSI LC 1/CSA 6.26.
2. Comply with ASTM E84.
3. Fittings: Provided by piping system manufacturer.
4. Provide piping with integral lightning protection.
5. Manufacturers:
a. Omega Flex, Inc; TracPipe CounterStrike: www.omegaflex.com/#sle.

2.5 PIPE FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 2 inch and Under:

B. Flanges for Pipe Sizes Over 2 1/2 inch:

C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA C606.
2. Housing Material: Provide , galvanized.
3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
4. When pipe is field grooved, provide coupling manufacturer's grooving tools.

D. No-Hub Couplings:
   1. Testing: In accordance with ASTM C1277 and CISPI 310.
   2. Gasket Material: Neoprene complying with ASTM C564.
   3. Band Material: Stainless steel.
   4. Eyelet Material: Stainless steel.

E. Shielded, Heavy Duty No-Hub Couplings:
   1. Testing: In accordance with ASTM C1540 and FM 1680.
   2. Gasket Material: Neoprene complying with ASTM C564.
   3. Band Material: Stainless steel.
   4. Eyelet Material: Stainless steel.

2.6 PIPE HANGERS AND SUPPORTS

A. See Section 22 05 29 for additional requirements.

B. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

C. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.

D. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 6 inch and Larger: Adjustable steel yoke, cast iron pipe roll, double hanger.

2.7 BALL VALVES

A. Manufacturers:
   1. Anvil International: www.anvilintl.com/#sle.
   2. Apollo Valves: www.apollovalves.com/#sle.
   3. Nibco, Inc: www.nibco.com/#sle.
   4. Viega LLC: www.viega.us/#sle.

B. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.8 PRESSURE RELIEF VALVES

A. Manufacturers:
   1. Cla-Val Co: www.cla-val.com/#sle.
   2. Watts Regulator Company: www.wattsregulator.com/#sle.

B. ANSI Z21.22, AGA certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 22 05 16.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

I. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

J. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Place hangers within 12 inches of each horizontal elbow.

4. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.4 FIELD TESTS AND INSPECTIONS

A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.

B. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.5 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with Section 33 01 10.58.

3.6 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inch to 1-1/4 inch:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inch to 2 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inch to 3 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inch to 6 inch:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.
      e. Pipe Size: 8 inch to 12 inch:
         1) Maximum hanger spacing: 14 ft.
         2) Hanger Rod Diameter: 7/8 inch.
      f. Pipe Size: 14 inch and Over:
         1) Maximum Hanger Spacing: 20 ft.
         2) Hanger Rod Diameter: 1 inch.
   2. Plastic Piping:

a. All Sizes:
    1) Maximum Hanger Spacing: 6 ft.
    2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION 22 10 05

SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Commercial gas-fired water heaters.

1.2 REFERENCE STANDARDS

A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.

B. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less; 2019, with Errata (2020).

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

1.4 QUALITY ASSURANCE

A. Certifications:
   1. Water Heaters: NSF approved.
   2. Gas Water Heaters: AHRI Directory of Certified Product Performance.

PART 2 PRODUCTS

2.1 WATER HEATERS

A. Manufacturers:
   1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. Commercial Gas-Fired Water Heaters:
   1. Type: Automatic, natural gas-fired, vertical storage.
   2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
   3. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
   4. Accessories:
      a. Water Connections: Brass.
      b. Dip Tube: Brass.
      c. Drain valve.
      d. Anode: Magnesium.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Confirm with Owner if BAS connection is required for equipment.

C. Coordinate with plumbing piping and related electrical work to achieve operating system.

END OF SECTION 22 30 00

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lavatories.

B. Sinks.

C. Showers.

1.2 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).

C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.

E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.

F. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2017, with Errata.

G. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2017.

H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.

I. NSF 61 - Drinking Water System Components - Health Effects; 2021.

J. NSF 372 - Drinking Water System Components - Lead Content; 2022.

K. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.2 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

B. Comply with UL (DIR) requirements.

C. Perform work in accordance with local health department regulations.

D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.3 LAVATORIES

A. Manufacturers:
   1. Acorn, www.acorneng.com
   2. American Standard, Inc: www.americanstandard-us.com/#sle.
   3. Kohler Company: www.kohler.com/#sle.
   4. Zurn Industries, LLC: www.zurn.com/#sle.

B. Drop-In Basin:
   1. Vitreous China: ASME A112.19.2; self-rimming, white, square shape, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket, and white finish. Size as indicated on drawings with 4 inch centerset spacing.

C. Under-Mount Basin:
   1. Vitreous China: ASME A112.19.2; white, oval shape, front overflow, seal of putty, calking, or concealed vinyl gasket, and white finish. Size as indicated on drawings.

D. Supply Faucet:
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/#sle.
      b. Chicago faucet, www.chicagofaucets.com
      c. Kohler Company: www.kohler.com/#sle.
      d. Zurn Industries, LLC; Aqua Sense Series: www.zurn.com/#sle.
   2. ASME A112.18.1; chrome plated combination supply fitting with pop-up waste, water economy aerator with maximum flow of 2.2 gpm, indexed handles.

2.4 SINKS

A. Manufacturers:
   1. Advance tabco, www.advancetabco.com
   2. Eagle group, www.eaglegrp.com
   3. Elkay, www.Elkay.com
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Two Compartment Bowl
   1. ASME A112.19.3; 20 gauge, 0.0359 inch thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.

2.5 SHOWERS

A. Manufacturers:
   1. American Standard, www.americanstandard.com
   2. Kohler, www.kohler.com
   3. Moen, www.moen.com

4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Tub and Shower Trim Package: Polished Chrome

C. Accessories: In-Line Vacuum Breaker, 59” Full Metal Hose, FloWise Showerhead, Diverter Trim Kit, and 36” Side Bar.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome-plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

3.2 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.3 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

3.4 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
   1. Water Closet:
      a. Standard: 15 inches to top of bowl rim.
      b. Accessible: 18 inches to top of seat.
   2. Water Closet Flush Valves:
      a. Standard: 11 inches min. above bowl rim.
      b. Recessed: 10 inches min. above bowl rim.
   3. Urinal:
      a. Standard: 22 inches to top of bowl rim.
      b. Accessible: 17 inches to top of bowl rim.
   4. Lavatory:
      a. Standard: 31 inches to top of basin rim.
      b. Accessible: 34 inches to top of basin rim.
   5. Drinking Fountain:
      a. Child: 30 inches to top of basin rim.
      b. Standard Adult: 40 inches to top of basin rim.
      c. Accessible: 36 inches to top of spout.

B. Fixture Rough-In
   1. Water Closet (Flush Valve Type):
      a. Cold Water: 1 Inch.

b. Waste: 4 Inch.
c. Vent: 2 Inch.

2. Urinal (Flush Valve Type):
   a. Cold Water: 3/4 Inch.
   b. Waste: 2 Inch.
   c. Vent: 1-1/2 Inch.
3. Lavatory:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 1-1/2 Inch.
   d. Vent: 1-1/2 Inch.
4. Sink:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 1-1/2 Inch.
   d. Vent: 1-1/2 Inch.
5. Drinking Fountain:
   a. Cold Water: 1/2 Inch.
   b. Waste: 1-1/4 Inch.
   c. Vent: 1-1/4 Inch.

END OF SECTION 22 40 00

SECTION 23 01 30.51 - HVAC AIR-DISTRIBUTION SYSTEM CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cleaning of HVAC duct system, equipment, and related components.

1.2 RELATED REQUIREMENTS

A. Section 23 08 00 - Commissioning of HVAC.

1.3 DEFINITIONS

A. HVAC System: For purposes of this section, the surfaces to be cleaned include all interior surfaces of the heating, air-conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system, including the inside of air distribution equipment, coils, and condensate drain pans; see NADCA ACR for more details.
   1. Above-ceiling plenum for supply air is required to be cleaned.
   2. Above-ceiling plenum for return air is required to be cleaned.
   3. Makeup air system is required to be cleaned.
   4. Exhaust-only system is required to be cleaned.

1.4 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

B. NADCA ACR - The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC System; 2021.

C. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

D. UL 181A - Closure Systems for Use with Rigid Air Ducts; Current Edition, Including All Revisions.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used.

B. Project Cleanliness Evaluation and Cleaning Plan, as specified.

C. Material Safety Data Sheets (MSDS): For all chemical products proposed to be used in the cleaning process; submit directly to Owner.

D. Project Closeout Report: Include field quality control reports, evidence of satisfactory cleaning, and documentation of items needing further repair.

1.6 QUALITY ASSURANCE

A. Information Available to Contractor: No existing system documentation is available.

B. Cleaning Contractor Qualifications: Company specializing in the cleaning and restoration of HVAC systems as specified in this section.

1. Certified by one of the following:
   a. NADCA, National Air Duct Cleaners Association: www.nadca.com.
   b. Nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.
2. Having minimum of three years documented experience.
3. Employing for this project a supervisor certified by same organization that certified the cleaning contractor.

C. Testing and Inspection Agency Qualifications: Experienced in inspection and testing using methods defined in NADCA ACR.

PART 2 PRODUCTS

2.1 TOOLS AND EQUIPMENT

A. Vacuum Devices and Other Tools: Exceptionally clean, in good working order, and sealed when brought into the facility.

B. Vacuum Devices That Exhaust Air Inside Building, Including Hand-Held and Wet Vacuums: Equipped with HEPA filtration with 99.97 percent collection efficiency for minimum 0.3-micron size particles and DOP test number.

C. Vacuum Devices That Exhaust Air Outside Building, Including Truck- and Trailer-Mounted Types: Equipped with particulate collection including adequate filtration to contain debris removed from the HVAC system; exhausted in manner that prevents contaminant re-entry to building; compliant with applicable regulations as to outdoor environmental contamination.

2.2 REPLACEMENT PRODUCTS

A. Fibrous Glass Insulation: Provide material complying with UL 181 equivalent to existing material in quality and thickness.

2.3 SURFACE TREATMENTS

A. Anti-Microbial Materials: EPA registered specifically for use on non-porous HVAC system surfaces and applied per manufacturer's instructions.

B. Surface Coating for Fibrous Glass Materials: Water-based, zero VOC; flame spread index less that 25, smoke developed index less than 450, Class A, when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Comply with applicable federal, state, and local requirements.

B. Perform cleaning, inspection, and remediation in accordance with the recommendations of NADCA "Assessment, Cleaning and Restoration of HVAC Systems" (ACR) and as specified herein.

C. Where NADCA ACR uses the terms "recommended", "highly recommended", or "ideally" in regard to a certain procedure or activity, do that unless it is clearly inapplicable to the project.

D. Take precautions to prevent introduction of additional hazards into occupied spaces.

E. Obtain Owner's approval of proposed temporary locations for large equipment.

F. Designate a decontamination area and obtain Owner's approval.

G. When portions of the facility are to remain occupied or in operation during cleaning activities, provide adequate controls or containment to prevent access to spaces being cleaned by unauthorized persons and provide detailed instructions to Owner as to these controls or containment.

H. If unforeseen mold or other biological contamination is encountered, notify Architect immediately, identifying areas affected and extent and type of contamination.

3.2 EXAMINATION

A. Prior to the commencement of any cleaning work, prepare and submit to Architect a project evaluation and plan for this project, including considerations recommended in NADCA ACR.

B. Coordinate cleaning plan with indoor air quality control plan specified in Section 01 57 19.

C. Inspect the system as required to determine appropriate methods, tools, equipment, and protection.

D. Start of cleaning work constitutes acceptance of existing conditions.

E. When concealed spaces are later made accessible, examine and document interior conditions prior to beginning cleaning.

F. Document all instances of mold growth, rodent droppings, other biological hazards, and damaged system components.

3.3 PREPARATION

A. When cleaning work might adversely affect life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with authorities having jurisdiction.

B. Ensure that electrical components that might be adversely affected by cleaning are de-energized, locked out, and protected prior to beginning work.

C. Air-Volume Control Devices: Mark the original position of dampers and other air-directional mechanical devices inside the HVAC system prior to starting cleaning.

D. Access to Concealed Spaces: Use existing service openings and make additional service openings as required to accomplish cleaning and inspection.

1. Do not cut openings in non-HVAC components without obtaining the prior approval of Owner.

2. Make new openings in HVAC components in accordance with NADCA Standard 05; do not compromise the structural integrity of the system.
3. Do not cut service openings into flexible duct; disconnect at ends for cleaning and inspection.

E. Ceiling Tile: Lay-in ceiling tile may be removed to gain access to HVAC systems during the cleaning process; protect tile from damage and reinstall upon completion; replace damaged tile.

3.4 CLEANING

A. Use any cleaning method recommended by NADCA ACR unless otherwise specified; do not use methods prohibited by NADCA ACR, or that will damage HVAC components or other work, or that will significantly alter the integrity of the system.

B. Obtain Owner's approval before using wet cleaning methods; ensure that drainage is adequate before beginning.

C. Ducts: Mechanically clean all portions of ducts.

D. Hoses, Cables, and Extension Rods: Clean using suitable sanitary damp wipes at the time they are being removed or withdrawn from their normal position.

E. Registers, Diffusers, and Grilles: When removing, take care to prevent containment exposure due to accumulated debris.

F. Coils: Follow NADCA ACR completely including measuring static pressure drop before and after cleaning; do not remove refrigeration coils from system to clean; report coils that are permanently impacted.

G. Fibrous Glass Material: Use HEPA vacuuming equipment, under constant negative pressure, do not permit to get wet, and do not damage surfaces; replace material damaged by cleaning operations.

H. Existing Damaged Fibrous Glass Material: Report to Architect all evidence of damage, deterioration, delaminating, friable material, mold or fungus growth, or moisture that cannot be remedied by cleaning or resurfacing with an acceptable insulation repair coating.
1. Material with active fungal growth is considered unremediable.
2. Remove unremediable material and clean underlying surfaces.
3. Where surface damage can be repaired by applying a coating, do so at no extra cost to Owner.
4. Replace unremediable material.

I. Collect debris removed during cleaning; ensure that debris is not dispersed outside the HVAC system during the cleaning process.

J. Store contaminated tools and equipment in polyethylene bags until cleaned in the designated decontamination area.

3.5 REPAIR

A. Repair openings cut in the ventilation system so that they do not significantly alter the airflow or adversely impact the facility's indoor air quality.

B. At insulated ducts and components, accomplish repairs in such a manner as to achieve the equivalent thermal value.

C. Reseal new openings in accordance with NADCA Standard 05.

D. Reseal rigid fiber glass duct systems using closure techniques that comply with UL 181 or UL 181A.

E. When new openings are intended to be capable of being re-opened in the future, clearly mark them and report their locations to Owner in project report documents.

3.6 FIELD QUALITY CONTROL

A. Ensure that the following field quality control activities are completed prior to application of any treatments or coatings and prior to returning HVAC system to normal operation.

B. Visually inspect all portions of the cleaned components; if not visibly clean as defined in NADCA ACR, re-clean and reinspect.

C. Coils: Cleaning must restore the coil pressure drop to within 10 percent of the coil's original installed pressure drop; if original pressure drop is not known, coil will be considered clean if free of foreign matter and chemical residue based on visual inspection.

D. Notify Architect when cleaned components are ready for inspection.

E. Notify Owner's testing and inspection agency when cleaned components are ready for inspection.

F. Owner reserves the right to verify cleanliness using NADCA ACR Surface Comparison Testing or NADCA Vacuum Test.

G. When directed, re-clean components until they pass.

H. Contractor shall bear the costs of retesting due to inadequate cleaning.

I. Submit evidence that all portions of the system required to be cleaned have been cleaned satisfactorily.

3.7 ADJUSTING

A. After satisfactory completion of field quality control activities, restore adjustable devices to original settings, including, but not limited to, dampers, air directional devices, valves, fuses, and circuit breakers.

3.8 WASTE MANAGEMENT

A. Double-bag waste and debris in 6 mil, 0.006 inch thick polyethylene plastic bags.

B. Dispose of debris off-site in accordance with applicable federal, state and local requirements.

END OF SECTION 23 01 30.51

SECTION 23 05 00 - HVAC GENERAL CONDITIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Common administrative, procedural, and general installation requirements applicable to all HVAC work.

B. General material and workmanship requirements for HVAC equipment and systems.

C. HVAC system coordination and general design intent.

1.2 RELATED REQUIREMENTS

A. Section 23 08 00 – Commissioning of HVAC.
B. Section 23 09 00 – Instrumentation and Control for HVAC.
C. Section 23 31 00 – HVAC Ducts and Casings.
D. Section 23 81 00 – Decentralized HVAC Equipment.

1.3 DEFINITIONS

A. HVAC Systems: Heating, ventilation, and air-conditioning systems including associated air handling, ductwork, piping, controls, and terminal devices.

B. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

C. ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers.

1.4 REFERENCE STANDARDS

A. ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings; 2022.

B. ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality; 2022.

C. SMACNA HVAC Duct Construction Standards – Metal and Flexible; Latest Edition.

D. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

E. UL 181 – Standard for Factory-Made Air Ducts and Air Connectors; Current Edition.

F. NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems; Current Edition.

1.5 SUBMITTALS

A. Product Data: Manufacturer's literature for all equipment, devices, and materials used.

B. Shop Drawings: Include equipment layouts, piping diagrams, duct routing, and coordination with other trades.

C. Test Reports: Pre-functional and functional testing reports.

D. Operation and Maintenance Manuals: Include start-up procedures, schedules, troubleshooting, and replacement parts lists.

E. Certificates: Submit certifications for energy efficiency, equipment compliance, and technician qualifications.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Firm with at least five years of experience installing HVAC systems of similar type and scope.

B. Regulatory Compliance:
   1. Perform all work in compliance with applicable local building codes.
   2. Install all systems in compliance with OSHA and EPA regulations.

C. Energy Efficiency Compliance: All equipment shall meet or exceed efficiency standards set forth in ASHRAE 90.1.

D. Coordination Meetings: Conduct pre-installation coordination meetings with all involved trades.

PART 2 PRODUCTS

2.1 GENERAL MATERIALS

A. Equipment and components shall be listed and labeled by a nationally recognized testing laboratory (NRTL).

B. Motors: High-efficiency motors, minimum NEMA Premium Efficiency or IE3 equivalent.

C. Piping:
   1. Copper tubing (Type L or M) for refrigerant and condensate.
   2. Steel pipe (Schedule 40) for hydronic and steam systems.

D. Ductwork:
   1. Galvanized sheet metal to SMACNA standards.
   2. Flexible ducts limited to maximum 6 feet length per run.
   3. Insulation: Minimum R-6 in conditioned spaces, R-8 in unconditioned.

2.2 SUPPORTS AND ANCHORAGES

A. Hangers and Supports: Adjustable, vibration-isolated where necessary, and per SMACNA and MSS SP-58 standards.

B. Seismic Restraints: Provide where required by code; certified engineered systems.

2.3 IDENTIFICATION

A. Labels: Engraved or laminated plastic tags for valves, dampers, and major components.

B. Color-Coding: As per ANSI A13.1 for piping systems.

C. Duct Markings: Indicate airflow direction and system designation.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION

A. Install systems in accordance with approved shop drawings and manufacturer’s instructions.

B. Provide adequate access to equipment requiring maintenance or adjustment.

C. Seal all duct joints and penetrations with mastic or UL 181-listed sealant.

D. Provide temporary protection for open ends of duct and piping during construction.

3.2 FIELD QUALITY CONTROL

A. Perform field testing of all systems for functionality and leaks.

B. Engage TAB (Testing, Adjusting, and Balancing) contractor certified by NEBB or AABC.

C. Test pressure drop across filters and coils before and after cleaning or startup.

3.3 SYSTEM STARTUP

A. Coordinate with controls contractor and commissioning authority.

B. Verify voltage, phasing, and amperage for each motor and compare with nameplate ratings.

C. Verify airflow and water flow rates meet design requirements.

3.4 ADJUSTING

A. Adjust balancing dampers, valves, thermostats, and controls to provide proper system operation.

B. Calibrate all control devices.

3.5 CLEANING

A. Clean all exposed HVAC components prior to final inspection.

B. Remove construction debris from all HVAC spaces and components.

C. Flush piping systems with clean water before introducing chemicals or refrigerants.

3.6 DEMONSTRATION AND TRAINING

A. Provide training for Owner’s personnel on system operation and maintenance.

B. Include walkthrough of major systems and distribution pathways.

3.7 WARRANTY

A. Provide minimum one-year warranty on materials and workmanship.

B. Equipment warranties shall be per manufacturer; minimum 5 years for compressors and 10 years for heat exchangers, where applicable.

END OF SECTION 23 05 00

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General construction and requirements.

B. Applications.

C. Single phase electric motors.

D. Three phase electric motors.

E. Electronically Commutated Motors (ECM).

1.2 RELATED REQUIREMENTS

A. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

B. Section 26 29 13 - Enclosed Controllers.

1.3 REFERENCE STANDARDS

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015 (Reaffirmed 2020).

B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.

C. NEMA MG 00001 - Motors and Generators; 2024.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.

D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

E. Operation Data: Include instructions for safe operating procedures.

F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for _____ use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.

B. Comply with NFPA 70.

C. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of high efficiency motors.

D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Baldor Electric Company/ABB Group

B. Leeson Electric Corporation

C. Regal-Beloit Corporation (Century)

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

A. Electrical Service: Refer to Section 26 05 83 for required electrical characteristics.

B. Electrical Service:
1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
2. Motors Larger than 1/2 Horsepower: _____ volts, three phase, 60 Hz.

C. Nominal Efficiency:
1. Open Motor with Two Poles: 82.5.
2. Open Motor with Four Poles: 82.5.
3. Open Motor with Six Poles: 50.0.
4. Enclosed Motor with Two Poles: 75.5.
5. Enclosed Motor with Four Poles: 82.5.
6. Enclosed Motor with Six Poles: 50.0.

D. Construction:
1. Open drip-proof type except where specifically noted otherwise.
2. Design for continuous operation in 104 degrees F environment.
3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.
4. Motors with frame sizes 254T and larger: Energy efficient type.

E. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

F. Wiring Terminations:
   1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
   2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.3 APPLICATIONS

A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.

B. Single phase motors for shaft mounted fans, oil burners, and centrifugal pumps: Split phase type.

C. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.

D. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.

E. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.

F. Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.

G. Motors located in outdoors, in wet air streams downstream of sprayed coil dehumidifiers, in draw through cooling towers, and in humidifiers: Totally enclosed weatherproof epoxy-treated type.

H. Motors located outdoors and in draw through cooling towers: Totally enclosed weatherproof epoxy-sealed type.

2.4 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A. Starting Torque: Less than 150 percent of full load torque.

B. Starting Current: Up to seven times full load current.

C. Breakdown Torque: Approximately 200 percent of full load torque.

D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.5 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A. Starting Torque: Exceeding one fourth of full load torque.

B. Starting Current: Up to six times full load current.

C. Multiple Speed: Through tapped windings.

D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.6 SINGLE PHASE POWER - CAPACITOR START MOTORS

A. Starting Torque: Three times full load torque.

B. Starting Current: Less than five times full load current.

C. Pull-up Torque: Up to 350 percent of full load torque.

D. Breakdown Torque: Approximately 250 percent of full load torque.

E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.

G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.7 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A. Starting Torque: Between 1 and 1-1/2 times full load torque.

B. Starting Current: Six times full load current.

C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

D. Design, Construction, Testing, and Performance: Comply with NEMA MG 00001 for Design B motors.

E. Insulation System: NEMA Class B or better.

F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 26 29 13.

I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

J. Sound Power Levels: To NEMA MG 00001.

K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.

L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

M. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

N. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

2.8 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A. Manufacturers:
   1. US Motors, a brand of NIDEC Motor Corporation

B. Applications:
   1. Commercial:
      a. DX Fan Coil Unit:
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the DX fan coil unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: Remote mount control/User-Interface.
         5) RPM: 300 through 1250.
      b. Hydronic Fan Coil Unit:
         1) Operating Mode: Constant cfm.
         2) Input: Motor manufacturer to coordinate control requirements with the control board of the fan coil unit and/or specified sequence of operation.
         3) Shaft Extension: Single.
         4) Options: User-interface.
         5) RPM: 300 through 1250.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C. Check line voltage and phase and ensure agreement with nameplate.

3.2 SCHEDULE

A. NEMA Open Motor Service Factors.
   1. 1/6-1/3 hp:
      a. 3600 rpm: 1.35.
      b. 1800 rpm: 1.35.
      c. 1200 rpm: 1.35.
      d. 900 rpm: 1.35.
   2. 1/2 hp:
      a. 3600 rpm: 1.25.
      b. 1800 rpm: 1.25.
      c. 1200 rpm: 1.25.
      d. 900 rpm: 1.15.
   3. 3/4 hp:
      a. 3600 rpm: 1.25.
      b. 1800 rpm: 1.25.
      c. 1200 rpm: 1.15.
      d. 900 rpm: 1.15.
   4. 1 hp:
      a. 3600 rpm: 1.25.
      b. 1800 rpm: 1.15.
      c. 1200 rpm: 1.15.
      d. 900 rpm: 1.15.

END OF SECTION 23 05 13

SECTION 23 05 17 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe sleeves.

B. Pipe-sleeve seals.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

1.3 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2022.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. FM (AG) - FM Approval Guide; current edition.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Valve Stem Packings: Two for each type and size of valve.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.

1. Minimum three years experience.
2. Approved by manufacturer.

C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 PIPE SLEEVES

A. Manufacturers:
   1. Flexicraft Industries; Pipe Wall Sleeve:

B. Vertical Piping:
   1. Sleeve Length: 1 inch above finished floor.
   2. Provide sealant for watertight joint.
   3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
   4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade Exterior Walls:
   1. Zinc coated or cast iron pipe.
   2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
   1. Galvanized steel pipe or black iron pipe with asphalt coating.
   2. Connect sleeve with floor plate except in mechanical rooms.

G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.

H. Clearances:
   1. Provide allowance for insulated piping.
   2. Wall, Floor, Partitions, and Beam Flanges: 1 inch greater than external pipe diameter.
   3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.

2.2 PIPE-SLEEVE SEALS

A. Manufacturers:
   1. Advance Products & Systems, LLC; Innerlynx:
   2. American Polywater Corporation; PGKD Modular Seals:
   3. Flexicraft Industries; PipeSeal: www.flexicraft.com/#sle.

B. Modular Mechanical Sleeve-Seal:
   1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
   2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
   3. Size and select seal component materials in accordance with service requirements.
   4. Service Requirements:
      a. Corrosion resistant.
      b. Oil, fuel, gas, and solvent resistant.
      c. Underground, buried, and wet conditions.
      d. Fire Resistant: 1 hour, UL (DIR) approved.
      e. High Temperature, up to 400 degrees F.
      f. Low temperature, down to minus 67 degrees F.
   5. Glass-reinforced plastic pressure end plates.

C. Sealing Compounds:
   1. Provide packing and sealing compound to fill pipe to sleeve thickness.
   2. Combined packing and seal compound is to match partition fire-resistance hourly rating.

D. Pipe Sleeve Material:
   1. Bearing Walls: Steel, cast iron, or terra-cotta pipe.
   2. Masonry Structures: Sheet metal or fiber.

E. Wall Sleeve: PVC material with waterstop collar, and nailer end-caps.

F. Sleeve-Forming Disk: Non-conductive plastic-based material, 3 inch thick.

G. Pipeline-Casing Seals:
   1. Coated boltless casing-spacer for 4 inch carrier pipe.
   2. Coated boltless modular seal for 6 inch carrier pipe.
   3. Carbon steel band with risers for 12 inch carrier pipe.
   4. End Seals: 1/8 inch, pull-on type, rubber or synthetic rubber based.

PART 3 EXECUTION

3.1 INSTALLERS

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

3.3 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

E. Structural Considerations:
   1. Do not penetrate building structural members unless indicated.

F. Provide sleeves when penetrating footings, floors, walls, partitions, and _____. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
   1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
   2. Aboveground Piping:
      a. Pack solid using mineral fiber in compliance with ASTM C592.
      b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
   3. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.
   4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

G. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.

3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

H. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.4 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION 23 05 17

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment components.

B. Retrofit piping cover system.

1.2 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping; 2014 (Reapproved 2020).

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).

F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures; 1999 (Reapproved 2018).

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.

J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.

K. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

M. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

N. FM (AG) - FM Approval Guide; current edition.

O. MFMA-4 - Metal Framing Standards Publication; 2004.

P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

Q. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

R. UL (DIR) - Online Certifications Directory; Current Edition.

S. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
   1. Fiberglass Channel (Strut) Framing Systems: Include requirements for strength derating according to ambient temperature.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
   1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

D. Derating Calculations for Fiberglass Channel (Strut) Framing Systems: Indicate load ratings adjusted for applicable service conditions.

E. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

F. Installer's Qualifications: Include evidence of compliance with specified requirements.

G. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 05 50 00.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Materials for Metal Fabricated Supports: Comply with Section 05 50 00.

C. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
a. ABB Installation Products
b. B-Line, a brand of Eaton Corporation
c. Custom Strut and Roll Forming, LLC
d. Elgen Manufacturing Company, Inc
e. Gripple, Inc; Fast Track - Standard:
f. Unistrut, a brand of Atkore International Inc
g. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. MFMA-4 compliant, pre-fabricated, MSS SP-58 type 59 continuous-slot metal strut channel with associated tracks, fittings, and related accessories.
3. MFMA-4 compliant, prefabricated, side-loading continuous-slot metal strut channel bracket with associated tracks, fittings, and related accessories.
4. Strut Channel or Bracket Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
7. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.

D. Prefabricated Trapeze-Framed Fiberglass Strut Systems:
1. Manufacturers:
a. Enduro Composites
b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. MSS SP-58 type 59, prefabricated continuous-slot fiberglass strut channel, associated fittings, and related accessories.
3. Channel Material: Use polyester resin or vinyl ester resin.
4. Minimum Channel Dimensions: 1-5/8 inch width by 1 inch height.
5. Flammability: Fire retardant with NFPA 101, Class A flame spread index (maximum of 25) when tested in accordance with ASTM E84; self-extinguishing in accordance with ASTM D635.

E. Strut Channels:
1. Manufacturers:

a. B-Line, a brand of Eaton Corporation
b. Gripple, Inc; Universal Bracket:
c. Unistrut, a brand of Atkore International Inc
d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.
3. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

F. Channel Nuts:
1. Manufacturers:
a. FNW; 7821: www.fnw.com/#sle.
b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Provide carbon steel channel nut with epoxy copper or zinc finish and long, regular, or short spring.

G. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
2. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Piping up to 1 inch: 1/4 inch diameter.
c. Piping larger than 1 inch: 3/8 inch diameter.
d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

H. Steel Cable:
1. Manufacturers:
a. Ductmate Industries, Inc, a DMI Company; Clutcher Cable Hanging System:
b. Elgen Manufacturing Company, Inc
c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

I. Cable Hanging System Kits:
1. Manufacturers:
a. B-Line, a brand of Eaton Corporation
b. Ductmate Industries, Inc
c. Gripple, Inc
d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Provide cable-wire in bulk or precut lengths with respective cable hangers as required to hold minimum weight of 120 lb.

3. Accessories: Provide brackets, clip or c-clip hangers, covers, and y-hook hangers.

J. Thermal Insulated Pipe Supports:
   1. Manufacturers:
      a. Buckaroos, Inc
      b. KB Enterprises
   2. General Requirements:
      a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
      b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
      c. Pipe supports to be provided for nominally sized, 1/2 to 30 inch iron pipes.
      d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by a 360 degree, PVC jacketing.
   3. PVC Jacket:
      a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
      b. Minimum Service Temperature: Minus 40 degrees F.
      c. Maximum Service Temperature: 180 degrees F.
      d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
      e. Thickness: 60 mil.
      f. Connections: Brush on welding adhesive.
   4. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
   5. Products:
      a. Buckaroos, Inc; CoolDry:

K. Pipe Supports:
   1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
   2. Liquid Temperatures Up To 122 degrees F:
      a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
      b. Support From Below: MSS SP-58 Types 35 through 38.
   3. Operating Temperatures from 122 to 446 degrees F:
      a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
      b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
      c. Sliding Support: MSS SP-58 Types 35 through 38.

L. Roller Chairs:
   1. Manufacturers:
      a. ASC Engineered Solutions
      b. FNW; 7901:
      c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. MSS SP-58 type 43 based on required load, nonconductive and corrosion resistant.
   3. Steel Yoke Type: MSS SP-58 type 44, vertically adjustable, nonconductive, and corrosion resistant.
   4. Material: Zinc plated ASTM A36/A36M carbon steel or ASTM A47/A47M malleable iron.

M. Pipe Stanchions:
   1. Manufacturers:
      a. Anvil International; H-Block:
      b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
   4. For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.

N. Beam Clamps:
   1. Manufacturers:
      a. FNW; 7201:
      b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
   3. Beam C-Clamp: MSS SP-58 type 23, malleable iron and steel with plain, stainless steel, and zinc finish.
   4. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
   5. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
   6. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
   7. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish,
   8. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

9. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

O. Riser Clamps:
   1. Manufacturers:
      a. FNW; 7020:
      b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
   3. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
   4. Medium Split Horizontal Pipe Clamp: MSS SP-58 type 4, carbon steel or stainless steel with epoxy plated, plain, stainless steel, or zinc plated finish.
   5. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
   6. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

P. U-Bolts:
   1. Manufacturers:
      a. FNW; 7610:
      b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. MSS SP-58 Type 24, carbon steel u-bolt for pipe support or anchoring.

Q. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.

R. Strut Clamps:
   1. Manufacturers:
      a. FNW; 7815:
      b. Gripple Inc; GCS:
      c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.
   3. Cushioned Pipe or Tubing Strut Clamp: Provide strut clamp with thermoplastic elastomer cushion having dielectric strength of 670 V/mil.
   4. Service Temperature Range: Minus 65 to 275 degrees F.

S. Insulation Clamps:
   1. Manufacturers:
      a. FNW; 7897:
      b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2. Two bolt-type clamps designed for installation under insulation.
3. Material: Carbon steel with epoxy copper or zinc finish.

T. Pipe Hangers:
1. Split Ring Hangers:
   a. Manufacturers:
      1) FNW; 7001:
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   b. Provide hinged split ring and yoke roller hanger with epoxy copper or plain finish.
   c. Material: ASTM A47/A47M malleable iron or ASTM A36/A36M carbon steel.
   d. Provide hanger rod and nuts of the same type and material for a given pipe run.
   e. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
2. Band Hangers, Adjustable:
   a. Manufacturers:
      1) Gripple, Inc; Universal Clamp (Threaded):
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   b. MSS SP-58 Type 7 or 9, Zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
3. J-Hangers, Adjustable:
   a. Manufacturers:
      1) FNW; 7025:
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   b. MSS SP-58 Type 5, Zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
   c. Felt-Lining: Provide for uninsulated pipe to reduce noise and prevent static issues.
4. Swivel Ring Hangers, Adjustable:
   a. Manufacturers:
      1) FNW; 7010:
      2) Substitutions: See Section 01 60 00 - Product Requirements.
      3) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   b. MSS SP-58 Type 10, epoxy-painted, zinc-colored.

c. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
d. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
e. Felt-Lining: Provide for uninsulated pipe to reduce noise and prevent static issues.

5. Clevis Hangers, Adjustable:
a. Manufacturers:
1) FNW; 7005:
2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
b. Copper Tube: MSS SP-58 Type 1, epoxy-plated copper.
c. Felt-Lined: MSS SP-58 Type 1, zinc-plated, silicone-free carbon steel.
d. Light-Duty: MSS SP-58 Type 1, zinc-colored, epoxy plated.
e. Standard-Duty: MSS SP-58 Type 1, zinc-colored, epoxy plated.
f. UL (DIR) listed: Pipe sizes 2-1/2 to 8 inch.
g. FM (AG) listed: Pipe sizes 2-1/2 to 8 inch.

U. Nonmetallic Pipe Hangers:
1. Manufacturers:
a. DecoShield Systems, Inc; Snap-2 Hangers:

V. Intermediate Pipe Guides:
1. Manufacturers:
a. Anvil International
b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Pipe Diameter 6 inch and Smaller: Provide minimum clearance of 0.16 inch.
3. Pipe Sizes 8 inch: 0.625 inch U-bolt with double nuts providing minimum clearance of 0.28 inch.
4. Pipe Size 10 inch: 0.75 inch U-bolt.
5. Pipe Sizes 12 to 16 inch: 0.875 inch U-bolt.
6. Pipe Sizes 18 to 30 inch: 1 inch U-bolt.
7. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.

W. Pipe Alignment Guides: Galvanized steel.
1. Manufacturers:
a. Anvil International
b. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
3. Pipe Sizes 10 inch and Larger: Roller type.

X. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

Y. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
   1. Manufacturers:
      a. Anvil International; H-Block:
      b. B-Line, a brand of Eaton Corporation
      c. Erico International Corporation, a brand of Pentair
      d. PHP Systems/Design
      e. Unistrut, a brand of Atkore International Inc
   2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
   3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
   5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

Z. Pipe Shields for Insulated Piping:
   1. Manufacturers:
      a. Anvil International
      b. FNW; 7750:
      c. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   2. MSS SP-58 Type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel
   3. General Construction and Requirements:
      a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
      b. Shields Material: UV-resistant polypropylene with glass fill.
      c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
      d. Minimum Service Temperature: Minus 40 degrees F.
      e. Maximum Service Temperature: 178 degrees F.
      f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

AA. Anchors and Fasteners:
   1. Manufacturers - Mechanical Anchors:
      a. FNW; 7502:
      b. Hilti, Inc
      c. ITW Red Head, a division of Illinois Tool Works, Inc

d. Powers Fasteners, Inc
e. Simpson Strong-Tie Company Inc

2. Manufacturers - Powder-Actuated Fastening Systems:
   a. Hilti, Inc
   b. ITW Ramset, a division of Illinois Tool Works, Inc
   c. Powers Fasteners, Inc
   d. Simpson Strong-Tie Company Inc
3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
6. Hollow Masonry: Use toggle bolts.
7. Hollow Stud Walls: Use toggle bolts.
8. Steel: Use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
9. Beam Ceiling Flanges: ASTM A47/A47M Grade 32510, malleable iron or stainless steel with copper, plain, stainless steel, or zinc finish.
10. Sheet Metal: Use sheet metal screws.
11. Wood: Use wood screws.
12. Plastic and lead anchors are not permitted.
13. Powder-actuated fasteners are not permitted.
    a. Where approved by Architect.
    b. Use only threaded studs; do not use pins.
14. Hammer-driven anchors and fasteners are not permitted.
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
15. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
16. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

BB. Pipe Installation Accessories:

1. Copper Pipe Supports:

a. Manufacturers:
   1) HoldRite, a brand of Reliance Worldwide Corporation
   2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2. Thermal Insulated, Surface-Mounted Pipe Supports:
   a. Manufacturers:
      1) FNW; 7701:
      2) HoldRite, a brand of Reliance Worldwide Corporation
      3) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
   b. Material: Carbon steel with epoxy copper or zinc finish.
   c. Weather and UV light resistant foam, plastic, or rubber material with built-in strut. Maximum Load: 50 lb for single pipe or multiple landed on top strut.
3. Overhead Pipe Supports:
   a. Manufacturers:
      1) HoldRite, a brand of Reliance Worldwide Corporation
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
4. Plenum Pipe Supports:
   a. Manufacturers:
      1) HoldRite, a brand of Reliance Worldwide Corporation
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
5. Telescoping Pipe Supports:
   a. Manufacturers:
      1) HoldRite, a brand of Reliance Worldwide Corporation
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
6. Inserts and Clamps:
   a. Manufacturers:
      1) HoldRite, a brand of Reliance Worldwide Corporation
      2) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
7. Seismic Bracing Hardware:
   a. Cable Suspension Systems:
      1) Manufacturers:
         (a) B-Line, a brand of Eaton Corporation
         (b) nVent Caddy, a brand of nVent
         (c) Gripple, Inc; UniGrip Standard:
         (d) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.

2) Strut channel or bracket-fitted fitting with locking mechanism for pipe or equipment suspension using cable wires extended to surface-mounted end-fixing fittings.
3) Provide cable wire and end-fixing as required to hold minimum weight of 120 lb.

b. Cable Sway Bracing Systems:
1) Manufacturers:
(a) B-Line, a brand of Eaton Corporation
(b) nVent Caddy, a brand of nVent
(c) Gripple, Inc; Standard Hanger:
(d) Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
2) Cable wire hanger with fix and release spring mechanism enclosed using zinc housing with 302 stainless steel components for pipe or equipment suspension to surface-mounted end-fixing fittings.
3) Provide cable wire and end-fixing as required to hold minimum weight of 25 lb.

2.2 RETROFIT PIPING COVER SYSTEM

A. Manufacturers:
1. DecoShield Systems, Inc

B. General Requirements:
1. Surface Burning Characteristics: Flame spread index/smoke developed index of 20/250, maximum, when tested in accordance with ASTM E84 or UL 723.

C. Materials:
1. Piping Cover System: Removal-resistant, modular, snap-fit cover units, clips, and anchors for use with CPVC, steel, and copper piping systems.
2. Cover Units: L-shaped and U-shaped cross-section units of flame retardant resin material, paintable finish.
3. Unit Length: 7.5 feet.
4. Provide coupling fittings for joining units end to end and prefabricated inside and outside corner fittings and end caps as required.
5. Provide mounting clips to secure covers to wall-ceiling per manufacturer requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Field-Welding (where approved by Architect): Comply with Section 05 50 00.

H. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

I. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.
   5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

K. Secure fasteners according to manufacturer's recommended torque settings.

L. Remove temporary supports.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION 23 05 29

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Adhesive-backed duct markers.

D. Stencils.

E. Pipe markers.

F. Ceiling tacks.

1.2 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Identification painting.

1.3 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Ductwork: Nameplates.

C. Piping: Tags.

2.2 NAMEPLATES

A. Manufacturers:

1. Advanced Graphic Engraving, LLC
2. Brimar Industries, Inc
3. Craftmark Pipe Markers
4. Kolbi Pipe Marker Co

5. Seton Identification Products, a Tricor Direct Company

B. Letter Color: White.

C. Letter Height: 1/4 inch.

D. Background Color: Black.

E. Plastic: Comply with ASTM D709.

2.3 TAGS

A. Manufacturers:
1. Advanced Graphic Engraving
2. Brady Corporation
3. Brimar Industries, Inc
4. Craftmark Pipe Markers
5. Kolbi Pipe Marker Co
6. Seton Identification Products, a Tricor Company

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 ADHESIVE-BACKED DUCT MARKERS

A. Manufacturers:
1. Brimar Industries, Inc
2. Craftmark Pipe Markers
3. Kolbi Pipe Marker Co

B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.

C. Style: Individual Label.

D. Color: Yellow/Black.

2.5 STENCILS

A. Manufacturers:
1. Brady Corporation
2. Craftmark Pipe Markers
3. Insite Solutions, LLC
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company

B. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Ductwork and Equipment: 2-1/2 inch high letters.

C. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors complying with ASME A13.1.

2.6 PIPE MARKERS

A. Manufacturers:
1. Brady Corporation
2. Brimar Industries, Inc
3. Craftmark Pipe Markers
4. Kolbi Pipe Marker Co
5. Seton Identification Products, a Tricor Company

B. Color: Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

F. Ammonia Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
1. Products:
a. Kolbi Pipe Marker Co; Ammonia Pipe Markers:

G. Color code as follows:
1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
2. Toxic and Corrosive Fluids: Orange with black letters.
3. Compressed Air: Blue with white letters.

2.7 CEILING TACKS

A. Manufacturers:
   1. Craftmark Pipe Markers

B. Description: Steel with 3/4 inch diameter color coded head.

C. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.2 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Apply stencil painting in accordance with Section 09 91 23.

D. Install plastic pipe markers in accordance with manufacturer's instructions.

E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

G. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

H. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

I. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

3.3 SCHEDULE

A. Equipment Type:
   1. Identification:

2. Background:
    a. Size:
    b. Color:
3. Lettering:
    a. Size:
    b. Color:

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

C. Field quality-control testing of Laboratory fume hoods.

D. Measurement of final operating condition of HVAC systems.

E. Sound measurement of equipment operating conditions.

F. Vibration measurement of equipment operating conditions.

G. Commissioning activities.

1.2 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances: Inspection and testing allowances.

B. Section 01 91 13 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

C. Section 23 08 00 - Commissioning of HVAC.

1.3 PRICE AND PAYMENT PROCEDURES

A. Cash Allowance: See Section 01 21 00 for additional requirements.

B. Allowance includes testing, adjusting, and balancing of mechanical systems.

1.4 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods; 2016, with Errata.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).

D. NEBB (TAB) - Procedural Standard for Testing, Adjusting and Balancing of Environmental Systems; 2019, with Errata (2022).

E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.

1. Submit to Engineer.
2. Submit to the Commissioning Authority.
3. Submit six weeks prior to starting the testing, adjusting, and balancing work.
4. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
5. Include at least the following in the plan:
    a. Preface: An explanation of the intended use of the control system.
    b. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    d. Identification and types of measurement instruments to be used and their most recent calibration date.
    e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
    f. Final test report forms to be used.
    g. Detailed step-by-step procedures for TAB work for each system and issue, including:
        1) Terminal flow calibration (for each terminal type).
        2) Diffuser proportioning.
        3) Branch/submain proportioning.
        4) Total flow calculations.
        5) Rechecking.
        6) Diversity issues.
    h. Expected problems and solutions, etc.
    i. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
    j. Details of how TOTAL flow will be determined; for example:
        1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
        2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
    k. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
    l. Confirmation of understanding of the outside air ventilation criteria under all conditions.
    m. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).

n. Method of checking building static and exhaust fan and/or relief damper capacity.
o. Proposed selection points for sound measurements and sound measurement methods.
p. Methods for making coil or other system plant capacity measurements, if specified.
q. Time schedule for TAB work to be done in phases (by floor, etc.).
r. Description of TAB work for areas to be built out later, if any.
s. Time schedule for deferred or seasonal TAB work, if specified.
t. False loading of systems to complete TAB work, if specified.
u. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
v. Interstitial cavity differential pressure measurements and calculations, if specified.
w. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
x. Procedures for formal progress reports, including scope and frequency.
y. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Field Quality-control Testing of Laboratory Fume Hoods:
1. Product Data sheets for all equipment proposed for use in on-site as-installed testing.
2. Sample Test Report.
3. List of laboratory fume hoods to be tested. Submit a minimum of one week prior to commencement of testing.
4. Test data demonstrating that each type of fume hood provided for the project has been successfully tested in the factory as per requirements of Section 11 53 13.

E. Field Logs: Submit at least twice a week to the Commissioning Authority.

F. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

G. Progress Reports.

H. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit to the the Commissioning Authority within two weeks after completion of testing, adjusting, and balancing.
2. Revise TAB plan to reflect actual procedures and submit as part of final report.

3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
4. Provide reports in soft cover, letter size, 3-ring binder manuals, 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.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
8. Include the following on the title page of each report:
    a. Name of Testing, Adjusting, and Balancing Agency.
    b. Address of Testing, Adjusting, and Balancing Agency.
    c. Telephone number of Testing, Adjusting, and Balancing Agency.
    d. Project name.
    e. Project location.
    f. Project Architect.
    g. Project Engineer.
    h. Project Contractor.
    i. Project altitude.
    j. Report date.

I. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
    1. AABC (NSTSB), AABC National Standards for Total System Balance.
    2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
    3. SMACNA (TAB).
    4. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

F. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating 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 clean of debris.
   6. Fans are rotating correctly.
   7. Fire and volume dampers are in place and open.
   8. Air coil fins are cleaned and combed.
   9. Air outlets are installed and connected.
   10. Duct system leakage is minimized.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
   1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

C. Provide additional balancing devices as required.

3.4 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
   1. Running log of events and issues.
   2. Discrepancies, deficient or uncompleted work by others.
   3. Contract interpretation requests.
   4. Lists of completed tests.

B. Ensure recorded data represents 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. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

H. Check and adjust systems approximately six months after final acceptance and submit report.

3.6 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

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 extend 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 the 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 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 at 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 the 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 system 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.

3.7 COMMISSIONING

A. See Sections 01 91 13 - General Commissioning Requirements and 23 08 00 for additional requirements.

B. Perform prerequisites prior to starting commissioning activities.

C. Fill out Prefunctional Checklists for:
   1. Air side systems.

D. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.

E. Re-check a random sample equivalent to 20% percent of the final TAB report data as directed by Commissioning Authority.
   1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
   2. Use the same test instruments as used in the original TAB work.

3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
4. For purposes of re-check, failure is defined as follows:
   a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.
   b. Temperatures: Deviation of more than one degree F.
   c. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
   d. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.
5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

F. In the presence of the Commissioning Authority, verify that:
1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

G. No seasonal tests are required.

H. No further monitoring is required.

I. No deferred testing is required.

3.8 SCOPE

A. Test, adjust, and balance the following:
1. Forced Air Furnaces.
2. Packaged Terminal Air Conditioning Units.
3. Air Coils.
4. Fans.
5. Air Filters.
6. Air Inlets and Outlets.

3.9 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer.
   2. Model/Frame.
   3. HP/BHP.
   4. Phase, voltage, amperage; nameplate, actual, no load.
   5. RPM.
   6. Service factor.
   7. Starter size, rating, heater elements.
   8. Sheave Make/Size/Bore.

B. V-Belt Drives:
   1. Identification/location.
   2. Required driven RPM.
   3. Driven sheave, diameter and RPM.
   4. Belt, size and quantity.
   5. Motor sheave diameter and RPM.
   6. Center to center distance, maximum, minimum, and actual.

C. Air Cooled Condensers:
   1. Identification/number.
   2. Location.
   3. Manufacturer.
   4. Model number.
   5. Serial number.
   6. Entering DB air temperature, design and actual.
   7. Leaving DB air temperature, design and actual.
   8. Number of compressors.

D. Air Moving Equipment:
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Arrangement/Class/Discharge.
   6. Air flow, specified and actual.
   7. Return air flow, specified and actual.
   8. Outside air flow, specified and actual.
   9. Total static pressure (total external), specified and actual.
   10. Inlet pressure.
   11. Discharge pressure.
   12. Sheave Make/Size/Bore.

13. Number of Belts/Make/Size.
14. Fan RPM.

E. Exhaust Fans:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

END OF SECTION 23 05 93

SECTION 23 07 13 - DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

C. Weather barrier coatings.

D. Jacketing and accessories.

1.2 REFERENCE STANDARDS

A. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.

C. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

E. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017.

F. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2020a.

G. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

H. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).

J. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.

K. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.

L. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2021.

M. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016 (Reapproved 2021).

N. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019.

O. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers; 2015.

P. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2017 (Reapproved 2023).

Q. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation; 2021.

R. ASTM C1775 - Standard Specification for Laminate Protective Jacket and Tape for Use Over Thermal Insulation for Outdoor Applications; 2022.

S. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay; 2017 (Reapproved 2021).

T. ASTM D93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester; 2020.

U. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

V. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

W. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

X. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth; 2016b.

Y. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2021.

Z. UL 181A - Closure Systems for Use with Rigid Air Ducts; Current Edition, Including All Revisions.

AA. UL 181B - Closure Systems for Use with Flexible Air Ducts and Air Connectors; Current Edition, Including All Revisions.

BB. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Samples: Submit two samples of any representative size illustrating each insulation type.

D. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. CertainTeed Corporation
   2. Johns Manville.
   3. JP Lamborn Co; Thermal Sleeve MT:
   4. Knauf Insulation; Atmosphere Duct Wrap:
   5. Owens Corning Corporation

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1,200 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   3. Secure with pressure-sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.

E. Indoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

F. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

G. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

PART 3 EXECUTION

3.1 EXAMINATION

A. Test ductwork for design pressure prior to applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated Ducts Conveying Air Below Ambient Temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated Ducts Conveying Air Above Ambient Temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

F. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

G. Slope exterior ductwork to shed water.

H. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.

3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

I. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air-flow. Increase duct size to allow for insulation thickness.

J. Fire-rated Insulation Application:
1. Insulation to be rolled out tautly before measuring and making any material cuts. Install both layers of wrap with transverse (perimeter) and longitudinal butted joints. Between the first and second layers of wrap stagger transverse joints and offset longitudinal joints to different corners. All visually exposed blanket edges are to be sealed with minimum 3" wide aluminum foil tape.

3.3 SCHEDULES

A. Supply Ducts:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.

END OF SECTION 23 07 13

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. Weather barrier coatings.

D. Jacketing and accessories.

E. Engineered wall outlet seals and refrigerant piping insulation protection.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

1.3 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.

E. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).

F. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2019).

G. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

H. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2017.

I. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2020a.

J. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2019.

K. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2022.

L. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

M. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2019.
N. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2022.
O. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2021.
P. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2017.
Q. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2018).
R. ASTM C1126 - Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation; 2019.
S. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2021.
T. ASTM C1423 - Standard Guide for Selecting Jacketing Materials for Thermal Insulation; 2021.
U. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service; 2020.
V. ASTM C1775 - Standard Specification for Laminate Protective Jacket and Tape for Use Over Thermal Insulation for Outdoor Applications; 2022.
W. ASTM D93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester; 2020.
X. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).
Y. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2018).
Z. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces; 2008 (Reapproved 2019).
AA. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber; 2020.
BB. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
CC. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017.
DD. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.

EE. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay; 2017 (Reapproved 2021).

FF. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

GG. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

HH. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

II. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

JJ. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

KK. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

LL. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013 (Reapproved 2021).

MM. SAE AMS3779 - Tape, Adhesive, Pressure-Sensitive Thermal Radiation Resistant, Aluminum Coated Glass Cloth; 2016b.

NN. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturers:
   1. Aeroflex USA, Inc; Aerocel Stay-Seal with Protape (SSPT):
   2. Armacell LLC; ArmaFlex Ultra with FlameDefense:.
   3. K-Flex USA LLC; K-Flex Titan:

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

D. Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.
   1. Manufacturers:
      a. Vimasco Corporation

2.3 WEATHER BARRIER COATINGS

A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based mastic for use over closed cell polyethylene and polyurethane foam insulation; applied with glass fiber or synthetic reinforcing mesh.
   1. Manufacturers:
      a. H.B. Fuller Construction Products, Inc; Childers - CP Series Weather Barrier Coating:
   2. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.
   3. Water Vapor Permeance: Greater than 1.0 perm in accordance with ASTM E96/E96M.
   4. Resistance to Fungal Growth: No growth when tested in accordance with ASTM D5590.
   5. Color: As selected by Architect.

2.4 JACKETING AND ACCESSORIES

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation
   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil, 0.010 inch.
      e. Connections: Brush on welding adhesive.
   3. Covering Adhesive Mastic: Compatible with insulation.

B. ABS Plastic:
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F.
      b. Maximum Service Temperature: 180 degrees F.
      c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 30 mil, 0.030 inch.
      e. Connections: Brush on welding adhesive.

C. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.
   1. Lagging Adhesive: Compatible with insulation.
      a. Manufacturers:
         1) Vimasco Corporation

D. Aluminum Jacket:
   1. Comply with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.
   2. Thickness: 0.016 inch sheet.
   3. Type: Factory-applied, self-adhesive jacketing.
   4. Finish: Smooth.
   5. Joining: Longitudinal slip joints and 2 inch laps.
   6. Fittings: 0.016 inch thick die-shaped fitting covers with factory-attached protective liner.
   7. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
   8. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

E. Aluminum-Foil Laminate Jacket:

1. Manufacturers:
   a. Ideal Tape Co., Inc
2. Factory-applied, pressure sensitive adhesive jacketing on paper release liner.
3. Finish: Aluminum smooth.
4. Comply with ASTM C1775.

F. Aluminum-Foil Laminate Jacket:
1. Manufacturers:
   a. H.B. Fuller Construction Products, Inc; Foster - Vapor-Fas:
2. Factory-applied, pressure sensitive adhesive jacketing to comply with ASTM C1775.

G. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
1. Thickness: 0.010 inch.
2. Finish: Smooth.
3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

H. Reinforced Tape:
1. Manufacturers:
   a. Ideal Tape Co., Inc
2. FSK tape suitable for sealing seams between insulation, insulated pipe bends, and fittings resulting in a tight, smooth surface without wrinkles.
3. Comply with UL 723, ASTM E84.
4. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
5. Finish: Match insulation.

I. Plain Foil Tape:
1. Manufacturers:
   a. Ideal Tape Co., Inc
2. Aluminum foil with pressure-sensitive adhesive on paper release liner.
3. Finish: Plain foil.

J. Vapor Barrier Membranes: ASTM C1136, Type IX.
1. Multilayer Laminate Vapor Barrier:
   a. Provide multilayer laminate with 1.0 mil, 0.001 inch foil, reversible.
   b. Thickness: 2.4 mil, 0.002 inch.
   c. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
   d. Manufacturers:
      1) Polyguard Products; ZERO-PERM: .
2. Rubberized Asphalt Vapor Barrier:
   a. Thickness: 30 mil, 0.030 inch.

b. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
c. Manufacturers:
1) Polyguard Products; Insulrap 30 NG:

2.5 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION

A. Manufacturers:
1. Airex Manufacturing, Inc:

B. Basis of Design: Airex Manufacturing, Inc; www.airexmfg.com/#sle.
1. Pipe Penetration Wall Seal: Airex Titan Outlet.
2. Refrigeration Pipe Insulation Protection System: Airex E-Flex Guard.
3. Pipe Penetration Wall Seal and Insulation Protection System: Airex Pro-System Kit.

C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
3. Outlet Cover Color: Gray.
4. Water Penetration: Comply with ASTM E331.
5. Air Leakage: Comply with ASTM E283.
6. Air Permeance: Comply with ASTM E2178.

D. Insulation Protection System: Refrigerant piping insulation PVC protective cover.
1. PVC Insulation Cover Color: Black with full-length velcro fastener.
2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
5. Flame Spread and Smoke Development Rating of 24/450: Comply with ASTM E84 or UL 723.
6. Carbon Arc Light Exposure: Comply with ASTM G153.
7. Tensile Strength After UV Exposure and Water Immersion: Comply with ASTM D412.
8. Water Absorption of Plastics: Comply with ASTM D570.
9. Adhesive free.

2.6 ACCESSORIES

A. General Requirements:
   1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
   2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
   3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
   4. Supply materials that are asbestos free.

B. Corrosion Inhibitors:
   1. Corrosion Control Gel:
      a. Manufacturers:
         1) Polyguard Products; RG2400LT:
      b. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

PART 3 EXECUTION

3.1 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

I. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

M. Buried Piping: Provide factory-fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil, 0.001 inch thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULE

A. Cooling Systems:
   1. Refrigerant Suction: ½” Flexible Elastomeric Insulation
   2. Refrigerant Hot Gas: ½” Flexible Elastomeric Insulation

END OF SECTION 23 07 19

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Engineered wall seals and insulation protection.

D. Exterior penetration accessories.

1.2 RELATED REQUIREMENTS

A. Section 08 31 00 - Access Doors and Panels.

B. Section 09 91 23 - Interior Painting.

C. Section 23 07 16 - HVAC Equipment Insulation.

D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.3 REFERENCE STANDARDS

A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers; 2005.

B. AHRI 710 (I-P) - Performance Rating of Liquid-Line Driers; 2009.

C. AHRI 711 (SI) - Performance Rating of Liquid-Line Driers; 2009.

D. AHRI 730 (I-P) - Flow Capacity Rating of Suction Line Filters and Suction Line Filter Driers; 2013 (Reapproved 2014).

E. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.

F. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2019, with All Amendments and Errata.

G. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2021.

H. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2021.

I. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.

J. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2018.

K. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.

L. ASME B31.9 - Building Services Piping; 2020.

M. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

N. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2020.

O. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.

P. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2020.

Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

R. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.

S. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

T. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).

U. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

V. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

W. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013 (Reapproved 2021).

X. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.

Y. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

Z. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturer's catalogue information. Provide manufacturer's catalog data including load capacity.

C. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.

D. Design Data: Submit design data indicating pipe sizing. Indicate load-carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Test Reports: Indicate results of leak test, acid test.

F. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.

G. Submit welders certification of compliance with ASME BPVC-IX.

H. Designer's qualification statement.

I. Installer's qualification statement.

J. Project Record Documents: Record exact locations of equipment and refrigeration accessories on record drawings.

K. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

L. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Filter-Dryer Cartridges: One of each type and size.
   3. Refrigeration Oil Test Kits: One, each containing everything required to conduct one test.
   4. Extra Refrigerant: One container of refrigerant, _____ pounds size.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 5 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure integrity of system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

C. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.

D. Strainers:
   1. Use line size strainer upstream of each automatic valve.

2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
3. On steel piping systems, use strainer in suction line.
4. Use shut-off valve on each side of strainer.

E. Pressure Relief Valves: Use on ASME receivers and pipe to outdoors.

F. Filter-Driers:
1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
2. Use a filter-drier on suction line just ahead of compressor.

2.2 REGULATORY REQUIREMENTS

A. Comply with ASME B31.9 for installation of piping system.

B. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

C. Welders Certification: In accordance with ASME BPVC-IX.

D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.3 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

B. Copper Tube to 7/8-inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
1. Fittings: ASME B16.26 cast copper.
2. Joints: Flared.

C. Pipe Supports and Anchors:
1. Provide hangers and supports that comply with MSS SP-58.
a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

9. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
10. 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.
11. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
    a. Bases: High density, UV tolerant, polypropylene or reinforced PVC.
    b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
    c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
    d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
    e. Height: Provide minimum clearance of 6 inches under pipe to top of roofing.
    f. Manufacturers:
        1) PHP Systems/Design

2.4 REFRIGERANT

A. Refrigerant: Use refrigerants as required by equipment manufacturer.

2.5 ENGINEERED WALL SEALS AND INSULATION PROTECTION

A. Manufacturers:
    1. Airex Manufacturing, Inc

B. Basis of Design: Airex Manufacturing, Inc; www.airexmfg.com/#sle.
    1. Pipe Penetration Wall Seal: Airex Titan Outlet.
    2. Refrigeration Pipe Insulation Protection System: Airex E-Flex Guard.
    3. Pipe Penetration Wall Seal and Insulation Protection System: Airex Pro-System Kit.

C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
    1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
        a. Elastomeric Sleeve Diameter: 1-11/16 inch.
    2. Wall Outlet Size, Siding and Compact Applications: 6-7/8 inch wide by 3-7/8 inch high.
        a. Elastomeric Sleeve Diameter: 1-11/16 inch.
    3. Outlet Cover Color: Gray.

4. Water Penetration: Comply with ASTM E331.
5. Air Leakage: Comply with ASTM E283/E283M.
6. Air Permeance: Comply with ASTM E2178.

D. Insulation Protection System: Mechanical line insulation and PVC cover.
1. PVC Insulation Cover Color: Black with full-length velcro fastener.
2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
5. Flame Spread and Smoke Development Rating of 25/450: Comply with ASTM E84.
6. Adhesive free.

2.6 EXTERIOR PENETRATION ACCESSORIES

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.
1. Products:
a. Quickflash Weatherproofing Products, Inc

B. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
1. Products:
a. Alta Products, LLC; Sigrist Pipe Chase Housing, Curbs, and Exit Seals:
b. Menzies Metal Products

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Inserts:
   1. Provide inserts for placement in concrete formwork.
   2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
   3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
   4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
   5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

G. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.5.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Provide copper plated hangers and supports for copper piping.

H. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

I. Provide clearance for installation of insulation and access to valves and fittings.

J. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Section 08 31 00.

K. Flood piping system with nitrogen when brazing.

L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.

M. Prepare unfinished pipe, fittings, supports, and accessories for finish painting. See Section 09 91 23.

N. Insulate piping and equipment.

O. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

P. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

Q. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

R. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.

S. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

T. Fully charge completed system with refrigerant after testing.

U. Provide electrical connection to solenoid valves. See Section 26 05 83.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Test refrigeration system in accordance with ASME B31.5.

C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test and repair piping until no leakage.

END OF SECTION 23 23 00

SECTION 23 31 00 - HVAC DUCTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal ducts.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 09 91 13 - Exterior Painting: Weld priming, weather resistant, paint or coating.

C. Section 09 91 23 - Interior Painting: Weld priming, paint or coating.

D. Section 11 40 00 - Foodservice Equipment: Kitchen range hoods.

E. Section 23 01 30.51 - HVAC Air-Distribution System Cleaning: Post install duct cleaning.

F. Section 23 05 48 - Vibration and Seismic Controls for HVAC.

G. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

H. Section 23 33 19 - Duct Silencers.

I. Section 23 37 00 - Air Outlets and Inlets: Fabric air distribution devices.

1.3 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

F. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.

H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

I. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.

J. ICC (IMC) - International Mechanical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.

L. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.

M. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.

N. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.

O. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

P. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.

Q. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.

R. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2021.

S. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.

T. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012.

U. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

V. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.

W. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

X. UL 2518 - Standard for Safety Air Dispersion Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Shop Drawings: Indicate duct fitting types, gauges, sizes, welds, and configuration.

D. Manufacturer's Certificate: Certify that installation of glass fiber ductwork meets or exceed specified requirements.

E. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate per appropriate seal class, following SMACNA (LEAK).

F. Manufacturer's Installation Instructions: Indicate special procedures for glass fiber ducts.

G. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.6 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.

B. Provide metal duct unless otherwise indicated. Fibrous glass duct can be substituted at the Contractor's option.

C. Acoustical Treatment: Provide sound-absorbing liners and sectional silencers for metal-based ducts in compliance with Section 23 33 19.

D. Seismic Restraint: Fabricate in compliance with ICC (IMC) requirements; see Section 23 05 48.

E. Duct Shape and Material in accordance with Allowed Static Pressure Range:
   1. Round: Plus or minus 2 in-wc of galvanized steel.
   2. Rectangular: Plus or minus 1/2 in-wc of galvanized steel.
   3. Flat Oval: Plus 2 in-wc of galvanized steel.
   4. Flexible Duct (Fabric and wire): Plus or minus 1/2 in-wc; see Section 23 37 00.

F. Duct Sealing and Leakage in accordance with Static Pressure Class:
   1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
      a. Supply Air: 1/2 in-wc pressure class, galvanized steel.
      b. Outside Air Intake: 1/2 in-wc pressure class, galvanized steel.

c. Return and Relief Air: 1/2 in-wc pressure class, galvanized steel.
d. General Exhaust Air: 1/2 in-wc pressure class, galvanized steel.

2. Low Pressure Service: Up to 2 in-wc:
   a. Seal: Class C, apply to seal off transverse joints.
   b. Leakage:
      1) Rectangular: Class 24 or 24 cfm/100 sq ft.
      2) Round: Class 12 or 12 cfm/100 sq ft.
3. Low Pressure Service: From 2 in-wc to 3 in-wc:
   a. Seal: Class B, apply sealing of transverse joints and longitudinal seams.
   b. Leakage:
      1) Rectangular: Class 12 or 12 cfm/100 sq ft.
      2) Round: Class 6 or 6 cfm/100 sq ft.

G. Duct Fabrication Requirements:
1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
2. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
3. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
4. Construct tee'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 must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
5. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
6. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
7. Provide turning vanes of perforated metal with glass fiber insulation when an acoustical lining is required.
8. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.2 METAL DUCTS

A. Material Requirements:
1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
2. Aluminum: ASTM B209/B209M, aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.

3. Stainless Steel: ASTM A666, Type 304.

B. Rectangular Metal Duct:
   1. Rectangular Double Wall Insulated: Rectangular spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
      a. Insulation:
         1) Thickness: 1 inch.
         2) Material: Air.

C. Round Metal Ducts:
   1. Round Single Wall Duct: Round lock seam duct with galvanized steel outer wall.
      a. Manufacturers:
         1) EHG, a DMI Company
         2) Elgen Manufacturing Company, Inc; Snap Lock Pipes and Fittings:
         3) Linx Industries, Inc, a DMI Company
         4) MKT Metal Manufacturing
   2. Round Double Wall Insulated Duct: Round spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
      a. Insulation:
         1) Thickness: 1 inch.
         2) Material: Air.
      b. Manufacturers:
         1) MKT Metal Manufacturing; Weatherguard:
   3. Round Connection System: Interlocking duct connection system per SMACNA (DCS).
      a. Manufacturers:
         1) Ductmate Industries, Inc, a DMI Company

D. Round Spiral Duct:
   1. Round spiral lock seam duct with galvanized steel outer wall.
   2. Manufacturers:
      a. EHG, a DMI Company
      b. Elgen Manufacturing Company, Inc
      c. GSI, a DMI Company
      d. Linx Industries, Inc, a DMI Company
      e. MKT Metal Manufacturing

E. Connectors, Fittings, Sealants, and Miscellaneous:
   1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
   2. Transverse Duct Connection System: SMACNA "E" rated rigid class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).

a. Manufacturers:
    1) Carlisle HVAC Products; Nexus Flange Connectors with Sealant Pocket:
    2) Ductmate Industries, Inc, a DMI Company
    3) Elgen Manufacturing Company, Inc
    4) MKT Metal Manufacturing

3. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
    a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
    b. VOC Content: Not more than 250 g/L, excluding water.
    c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
    d. For Use with Flexible Ducts: UL labeled.
    e. Manufacturers:
        1) Carlisle HVAC Products; Hardcast Versa-Grip 181 Water Based Fiber Reinforced Duct Sealant.
        2) Design Polymerics; DP 1010 Water Based Smooth Duct Sealant, Zero VOC, Premium Quality:
        3) Ductmate Industries, Inc, a DMI Company
        4) Elgen Manufacturing Company, Inc; Duct Sealer
        5) H.B. Fuller Construction Products, Inc
4. Gasket Tape:
    a. Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle ring connections.
    b. Manufacturers:
        1) Design Polymerics; DP 1040 100 Percent Solids, Zero VOC, High Pressure/High-Velocity Butyl Gasket Tape
5. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
6. Hanger Fasteners: Attach hangers to structure using appropriate fasteners as follows:
    a. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
    b. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
    c. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
    d. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
    e. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
    f. Other Types: As required.
    g. Manufacturers:

1) Powers Fasteners, Inc

PART 3 EXECUTION

3.1 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install products following the manufacturer's instructions.

C. Comply with safety standards NFPA 90A and NFPA 90B.

D. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Duct sizes indicated are inside precise dimensions. For lined ducts, maintain sizes inside lining.

G. Provide openings in ductwork as indicated to accommodate thermometers and controllers. Provide pilot tube openings as indicated for testing of systems, complete with metal can with spring device or screw to insure against air leakage. For openings, insulate ductwork and install insulation material inside a metal ring.

H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

I. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.

J. Use double nuts and lock washers on threaded rod supports.

K. Connect diffusers or light troffer boots to low-pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

L. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

M. Louver Fit-out:
   1. Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.
   2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.

N. Plenums and Casings:
   1. Mount floor-mounted casings on 4 inch high concrete curbs.
   2. At floor, rivet panels on 8 inch centers to angles.
   3. Where floors are acoustically insulated, provide liner of galvanized 18 gauge, 0.052 inch expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

O. Duct Insulation: Provide duct insulation in compliance with Section 23 07 13.

P. Painting: Provide surface finish as indicated on drawings.

3.2 CLEANING

A. Clean thoroughly each duct system as indicated within Section 23 01 30.51.

B. Clean the duct system and force air at high velocity through the duct to remove accumulated dust. Clean half the system at a time to obtain sufficient air. Protect equipment that could be harmed by excessive dirt with temporary filters or bypass during cleaning.

END OF SECTION 23 31 00

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Duct access doors.

D. Flexible duct connectors.

1.2 REFERENCE STANDARDS

A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks; 2020, with Errata and Amendments (2022).

B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

C. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

E. NFPA 92 - Standard for Smoke Control Systems; 2021.

F. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.

G. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2021.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

L. UL 555C - Standard for Safety Ceiling Dampers; Current Edition, Including All Revisions.

M. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

N. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

E. Project Record Drawings: Record actual locations of access doors and test holes.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements for additional provisions.
   2. Extra Fusible Links: One of each type and size.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane):
   2. Elgen Manufacturing Company, Inc
   3. Krueger-HVAC, Division of Air System Components
   4. Ruskin Company
   5. Titus HVAC, a brand of Johnson Controls
   6. Ward Industries, a brand of Hart and Cooley, Inc

B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.2 BACKDRAFT DAMPERS - METAL

A. Manufacturers:
   1. Louvers & Dampers, Inc, a brand of Mestek, Inc
   2. Nailor Industries, Inc
   3. Ruskin Company
   4. United Enertech

B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted 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 to permit setting for varying differential static pressure.

2.3 DUCT ACCESS DOORS

A. Manufacturers:
   1. Acudor Products Inc, a Division of Nelson Industrial Inc
   2. Ductmate Industries, Inc, a DMI Company
   3. Elgen Manufacturing Company, Inc
   4. Lloyd Industries, Inc
   5. MKT Metal Manufacturing
   6. Nailor Industries, Inc
   7. Ruskin Company
   8. SEMCO LLC
   9. Ward Industries, a brand of Hart and Cooley, Inc

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less Than 12 inches Square: Secure with sash locks.
   2. Up to 18 inches Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
   4. Larger Sizes: Provide an additional hinge.
   5. Sash Lock:
   6. Compression Latch:
   7. Hinge:
   8. High Temperature Duct Access Doors:
      a. Comply with NFPA 96.
      b. Comply with UL 1978.
      c. Manufacturers:
         1) Ductmate Industries, Inc, a DMI Company

D. Access doors with sheet metal screw fasteners are not acceptable.

2.4 FLEXIBLE DUCT CONNECTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric:
   2. Ductmate Industries, Inc, a DMI Company
   3. Elgen Manufacturing Company, Inc

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Flexible Duct Connections: Fabric crimped into metal edging strip.

1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
   a. Net Fabric Width: Approximately 2 inches wide.
2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.

D. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

E. Maximum Installed Length: 14 inch.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. 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. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.

G. Demonstrate re-setting of fire dampers to Owner's representative.

H. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

I. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

J. For fans developing static pressures of 5.0 inches and over, cover flexible connections with leaded vinyl sheet, held in place with metal straps.

K. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

L. Use splitter dampers only where indicated.

M. Provide balancing dampers on high velocity systems where indicated. See Section 23 36 00 - Air Terminal Units.

N. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION 23 33 00

SECTION 23 34 23 - HVAC POWER VENTILATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cabinet exhaust fans.

1.2 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 10 06 - Plumbing Piping Specialties.

C. Section 23 05 48 - Vibration and Seismic Controls for HVAC.

D. Section 23 31 00 - HVAC Ducts and Casings.

E. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

F. Section 23 40 00 - HVAC Air Cleaning Devices.

G. Section 25 35 16 - Integrated Automation Sensors and Transmitters.

H. Section 25 35 23 - Integrated Automation Control Dampers.

I. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

J. Section 26 29 23 - Variable-Frequency Motor Controllers.

1.3 REFERENCE STANDARDS

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.

B. AMCA 99 - Standards Handbook; 2016.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.

D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016.

E. AMCA 211 - Certified Ratings Program Product Rating Manual for Fan Air Performance; 2022.

F. AMCA 260 - Laboratory Methods of Testing Induced Flow Fans for Rating; 2020.

G. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.

H. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

I. AMCA 311 - Certified Ratings Program Product Rating Manual for Fan Sound Performance; 2016.

J. ANSI Z9.5 - Laboratory Ventilation; 2012.

K. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

L. NFPA 45 - Standard on Fire Protection for Laboratories Using Chemicals; 2019.

M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

N. NFPA 91 - Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids; 2020.

O. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2021.

P. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

Q. UL 762 - Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate fan roof curbs and service utilities installation according to fan size.

B. Sequencing: Ensure that utility connections are completed in an orderly and expeditious manner.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on fans and accessories, including fan curves with specified operating point plotted, power, rpm, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer's Instructions: Indicate installation instructions.

D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Fan Belts: One set for each individual fan.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.7 FIELD CONDITIONS

A. Request Owner permission to use permanent ventilator(s) for ventilation during construction.

B. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Carnes, a division of Carnes Company Inc

B. Greenheck Fan Corporation

C. Loren Cook Company

D. PennBarry, Division of Air System Components

E. Twin City Fan & Blower

2.2 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: Comply with AMCA 204.

B. Performance Ratings: Comply with AMCA 210, bearing certified rating seal.

C. Sound Ratings: Comply with AMCA 301, tested to AMCA 300, bearing certified sound ratings seal.

D. Fabrication: Comply with AMCA 99.

E. UL Compliance: UL 705, listed, labeled, designed, manufactured, and tested.

F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

G. Enclosed Safety Switches: Comply with NEMA EN 10250.

H. Kitchen Hood Exhaust Fans: Comply with requirements of NFPA 96 and UL 762.

2.3 CABINET EXHAUST FANS

A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resiliently mounted motor, gravity backdraft damper in discharge.

B. Disconnect Switch: Cord and plug-in housing for thermal overload protected motor and wall mounted switch.

C. Grille: Molded white plastic.

D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is reached with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

E. Performance Ratings: As indicated on drawings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Hung Cabinet Fans:

1. Install fans with resilient mountings and flexible electrical leads, see Section 23 05 48.
2. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

E. Provide sheaves required for final air balance.

F. Install backdraft dampers on inlet to roof and wall exhausters.

G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION 23 34 23

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Service entrance cable.

C. Metal-clad cable.

D. Wiring connectors.

E. Electrical tape.

F. Heat shrink tubing.

G. Oxide inhibiting compound.

H. Wire pulling lubricant.

I. Cable ties.

J. Firestop sleeves.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2023.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).

D. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

G. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

H. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.

I. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

J. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

K. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

L. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

M. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Field Quality Control Test Reports.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum of three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.8 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. For underground service entrance, installed in raceway.
   2. In addition to other applicable restrictions, may not be used:
      a. Where exposed to damage.

F. Armored cable is not permitted.

G. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
         1) Maximum Length: 6 feet.
      b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
         1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
   2. In addition to other applicable restrictions, may not be used:
      a. Where not approved for use by the authority having jurisdiction.
      b. Where exposed to view.
      c. Where exposed to damage.
      d. For damp, wet, or corrosive locations.

H. Manufactured wiring systems are not permitted.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with the requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 05 26.

H. Conductor Material:
   1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.
   4. Aluminum Conductors (only where specifically indicated): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.

J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

K. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
      a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
   3. Color Code:
      a. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.

3) Phase C: Blue.
4) Neutral/Grounded: White.

b. Equipment Ground, All Systems: Green.
c. Isolated Ground, All Systems: Green with yellow stripe.
d. For control circuits, comply with manufacturer's recommended color code.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers (Listed alphabetically):
1. Copper Building Wire:
a. Cerro Wire LLC: www.cerrowire.com.
b. Encore Wire Corporation: www.encorewire.com.
c. General Cable Technologies Corporation: www.generalcable.com.
d. Service Wire Co: www.servicewire.com.
e. Southwire Company: www.southwire.com.
f. Substitutions: See Section 01 60 00 - Product Requirements.
2. Aluminum Building Wire (only where specifically indicated):
a. Encore Wire Corporation: www.encorewire.com.
b. Southwire Company: www.southwire.com.
c. Stabiloy, a brand of General Cable Technologies Corporation: www.stabiloy.com.
d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: Single conductor insulated wire.

C. Conductor Stranding
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
a. Size 4 AWG and Larger: Type XHHW-2.
b. Installed Underground: Type XHHW-2.
2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.4 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc: www.afcweb.com.
2. Encore Wire Corporation: www.encorewire.com.
3. Service Wire Co: www.servicewire.com.
4. Southwire Company: www.southwire.com.

5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

2.5 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.6 ACCESSORIES

A. Electrical Tape:
1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.

D. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.

2. Suitable for use with conductors/cables and associated insulation/jackets to be installed; approved by conductor/cable manufacturer.
3. Suitable for use at installation temperature.

E. Cable Ties: Material and tensile strength rating suitable for application.

F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.

G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:
1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Arrange circuiting to minimize splices.
4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.

8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

D. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
   2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

F. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

G. Install conductors with a minimum of 6 inches of slack at each outlet.

H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
3. Wet Locations: Use heat shrink tubing.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.2 REFERENCE STANDARDS

A. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2022.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.3 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.

2. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

F. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.
      b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
   2. Metal Underground Water Pipe(s):
      a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
      b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
   3. Concrete-Encased Electrode:
      a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
   4. Ground Ring:
      a. Utilize existing ground ring encircling the building or structure.
   5. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
   6. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
   7. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
   8. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.

9. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
10. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.

G. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
1. Use insulated copper conductors unless otherwise indicated.
a. Exceptions:
1) Use bare copper conductors where installed underground in direct contact with earth.
2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
2. Material: Copper-bonded (copper-clad) steel.
3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION 26 05 26

SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Floor boxes.

D. Underground boxes/enclosures.

1.2 RELATED REQUIREMENTS

A. Section 08 31 00 - Access Doors and Panels: Panels for maintaining access to concealed boxes.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 27 26 - Wiring Devices:
   1. Wall plates.

1.3 REFERENCE STANDARDS

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

G. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

H. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:
1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.

8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches:
a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

C. Box Locations:
1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
2. Unless dimensioned, box locations indicated are approximate.
3. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
4. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.

D. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

G. Install boxes as required to preserve insulation integrity.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

J. Close unused box openings.

K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

L. Provide grounding and bonding in accordance with Section 26 05 26.

END OF SECTION 26 05 33

SECTION 26 05 33.23 - SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems.

D. Section 26 05 33.16 - Boxes for Electrical Systems.

1.2 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

C. UL 5 - Surface Metal Raceways and Fittings; Current Edition, Including All Revisions.

D. UL 5A - Nonmetallic Surface Raceways and Fittings; Current Edition, Including All Revisions.

E. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.3 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 RACEWAY REQUIREMENTS

A. Provide all components, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.2 SURFACE RACEWAY SYSTEMS

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell.com.

2. MonoSystems, Inc: www.monosystems.com.
3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Surface Metal Raceways: Listed and labeled as complying with UL 5.

C. Surface Nonmetallic Raceways: Listed and labeled as complying with UL 5A.

2.3 WIREWAYS

A. Manufacturers:
1. Cooper B-Line, a division of Cooper Industries: www.cooperindustries.com.
2. Enduro Composites: www.endurocomposites.com.
3. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com.
4. Schneider Electric; Square D Products: www.schneider-electric.us.

B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.

C. Wireway Type, Unless Otherwise Indicated:
1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel with screw-cover.
2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw-cover; include provision for padlocking.

D. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.

E. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.

C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install raceways plumb and level.

C. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.

D. Secure and support raceways in accordance with Section 26 05 29 at intervals complying with NFPA 70 and manufacturer's requirements.

E. Close unused raceway openings.

F. Provide grounding and bonding in accordance with Section 26 05 26.

3.3 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.4 PROTECTION

A. Protect installed raceways from subsequent construction operations.

END OF SECTION 26 05 33.23

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Voltage markers.

D. Underground warning tape.

E. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 27 10 00 - Structured Cabling: Identification for communications cabling and devices.

1.3 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NFPA 70E - Standard for Electrical Safety in the Workplace; 2021.

C. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    a. Panelboards:
        1) Identify power source and circuit number. Include location when not within sight of equipment.
        2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
        3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
    b. Enclosed switches, circuit breakers, and motor controllers:

1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.

c. Electricity Meters:
1) Identify load(s) metered.

2. Service Equipment:
a. Use identification nameplate to identify each service disconnecting means.
b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.

3. Emergency System Equipment:
a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.

4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
a. Service equipment.
b. Industrial control panels.
c. Motor control centers.
d. Elevator control panels.
e. Industrial machinery.

C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Identification for Communications Conductors and Cables: Comply with Section 27 10 00.
3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

D. Identification for Boxes:
1. Use warning labels to identify electrical hazards for boxes containing exposed live parts or exposed conductors.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
   3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
   4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
   5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
   1. Minimum Size: 1 inch by 2.5 inches.
   2. Legend:
      a. System designation where applicable:
         1) Emergency Power System: Identify with text "EMERGENCY".
      b. Equipment designation or other approved description.
   3. Text: All capitalized unless otherwise indicated.
   4. Minimum Text Height:
      a. System Designation: 1 inch.
      b. Equipment Designation: 1/2 inch.
   5. Color:
      a. Normal Power System: White text on black background.
      b. Emergency Power System: White text on red background.

2.3 VOLTAGE MARKERS

A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

B. Minimum Size:
   1. Markers for Equipment: 1 1/8 by 4 1/2 inches.

C. Legend:
   1. Markers for Voltage Identification: Highest voltage present.

D. Color: Black text on orange background unless otherwise indicated.

2.4 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
      a. Do not use labels designed to be completed using handwritten text.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Boxes: Outside face of cover.
   8. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Secure rigid signs using stainless steel screws.

G. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION 26 05 53

SECTION 26 24 16 - PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.3 REFERENCE STANDARDS

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

B. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

C. NEMA PB 1 - Panelboards; 2011.

D. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000V or Less; 2023.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

H. UL 67 - Panelboards; Current Edition, Including All Revisions.

I. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

K. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

L. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

M. UL 1053 - Ground-Fault Sensing and Relaying Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
   1. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
   2. Include documentation of listed series ratings upon request.

D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:

1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com.

B. Eaton Corporation: www.eaton.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens Industry, Inc: www.usa.siemens.com.

2.2 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
      b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation. Verify existing conditions prior to order of equipment.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
   2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   a. Indoor Clean, Dry Locations: Type 1.
   b. Outdoor Locations: Type 3R.
2. Boxes: Galvanized steel unless otherwise indicated.
   a. Provide wiring gutters sized to accommodate the conductors to be installed.
3. Fronts:
   a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
   b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.

L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

M. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

2.3 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum or copper, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Aluminum or copper.
   3. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Fusible Switches:
   1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA KS 1, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.
   2. Fuse Clips: As required to accept indicated fuses.
   3. Provide externally operable handle with means for locking in the OFF position. Provide means for locking switch cover in the closed position. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

B. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
         1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Aluminum or copper, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   6. Provide the following circuit breaker types where indicated:
      a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
      b. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
   7. Do not use tandem circuit breakers.
   8. Do not use handle ties in lieu of multi-pole circuit breakers.

2.5 SOURCE QUALITY CONTROL

A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install panelboards in accordance with NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install panelboards plumb.

F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

I. Provide grounding and bonding in accordance with Section 26 05 26.

J. Install all field-installed branch devices, components, and accessories.

K. Provide filler plates to cover unused spaces in panelboards.

L. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated.
   1. Emergency and night lighting circuits.
   2. Fire detection and alarm circuits.
   3. Intrusion detection and access control system circuits.

3.2 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

C. Test GFCI circuit breakers to verify proper operation.

D. Test AFCI circuit breakers to verify proper operation.

E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.3 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

3.4 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Fan speed controllers.

D. Receptacles.

E. Wall plates.

F. Floor box service fittings.

G. Poke-through assemblies.

1.2 RELATED REQUIREMENTS

A. Section 26 05 33 - Boxes for Electrical Systems.

1.3 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h (Validated 2022).

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2017g (Validated 2023).

C. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

D. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

G. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

I. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

J. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

K. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

L. UL 1917 - Solid-State Fan Speed Controls; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
4. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Screwdrivers for Tamper-Resistant Screws: Two for each type of screw.
3. Extra Flush Floor Service Fittings: Two of each type.
4. Extra Poke-Through Core Hole Closure Plugs: Two for each core size.

1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.1 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide tamper resistant receptacles for receptacles installed in dwelling units and child care facilities.

E. Provide GFCI protection for receptacles installed within 6 feet of sinks.

F. Provide GFCI protection for receptacles installed in kitchens.

G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.2 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

2.3 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.4 WALL DIMMERS

A. Manufacturers:
   1. Leviton Manufacturing Company, Inc: www.leviton.com.
   2. Lutron Electronics Company, Inc; Maestro Series: www.lutron.com.
   3. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us.

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

2.5 FAN SPEED CONTROLLERS

A. Description: 120 V AC, solid-state, full-range variable speed, slide control type with separate on/off switch, with integral radio frequency interference filtering, fan noise elimination circuitry, power failure preset memory, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1917.
   1. Current Rating: 1.5 A unless otherwise indicated or required to control the load indicated on the drawings.

2.6 RECEPTACLES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell.com.
2. Leviton Manufacturing Company, Inc: www.leviton.com.
3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.
4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
   3. Isolated Ground Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
   4. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
   5. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
      a. Provide test and reset buttons of same color as device.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.

2.7 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc: www.leviton.com.
   3. Lutron Electronics Company, Inc: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us.

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices. Contractor to provide unit pricing and verify one-for-one replacements following field test and confirmation of replacement requirement from owner.
   2. Size: Standard.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

D. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.1 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.2 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
   1. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
   2. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

B. Install wiring devices in accordance with manufacturer's instructions.

C. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

D. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

E. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

F. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.

G. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

K. Do not share neutral conductor on branch circuits utilizing wall dimmers.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity.

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.4 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.5 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION 26 27 26

SECTION 26 28 16.16 - ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Enclosed safety switches.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 28 13 - Fuses.

1.3 REFERENCE STANDARDS

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

B. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

E. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

F. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

G. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.6 DELIVERY, STORAGE, AND HANDLING

A. 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.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. ABB/GE: www.electrification.us.abb.com.

B. Eaton Corporation: www.eaton.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens Industry, Inc: www.usa.siemens.com.

2.2 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:
   1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

H. Provide with switch blade contact position that is visible when the cover is open.

I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.

J. Conductor Terminations: Suitable for use with the conductors to be installed.

K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 3R.

N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

O. Heavy Duty Switches:
   1. Comply with NEMA KS 1.
   2. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.3 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION 26 28 16

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

1.2 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

D. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

D. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.3 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.4 EXIT SIGNS

A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single- or double-face as indicated or as required for installed location.
   2. Directional Arrows: As indicated or as required for installed location.

B. Powered Exit Signs: Internally illuminated with LEDs unless otherwise indicated.
   1. Self-Powered Exit Signs:

a. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
b. Battery: Sealed, maintenance-free, nickel cadmium unless otherwise indicated.
c. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
d. Provide low-voltage disconnect to prevent battery damage from deep discharge.
e. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Provide required support and attachment in accordance with Section 26 05 29.

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Ceiling Mounted Luminaires:
1. Do not use ceiling tiles to bear weight of luminaires.
2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

4. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

F. Suspended Luminaires:
1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Emergency Lighting Units:
1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

J. Exit Signs:
1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.

K. Install lamps in each luminaire.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.4 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.5 CLEANING

A. Clean surfaces according to manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.6 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 51 00

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33 - Boxes for Electrical Systems.

C. Section 26 27 26 - Wiring Devices: Receptacles for installation in poles.

1.2 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.4 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

2.3 POLES

A. All Poles:
1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
2. Material: Aluminum, unless otherwise indicated.
3. Shape: Square straight, unless otherwise indicated.
4. Finish: Match luminaire finish, unless otherwise indicated.
5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Provide required support and attachment in accordance with Section 26 05 29.

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.

F. Suspended Luminaires:
   1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
   2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

H. Pole-Mounted Luminaires:
   1. Grounding:
      a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
   2. Install weather resistant GFI duplex receptacle with weatherproof cover as specified in Section 26 27 26 in designated poles.

I. Install accessories furnished with each luminaire.

J. Bond products and metal accessories to branch circuit equipment grounding conductor.

K. Install lamps in each luminaire.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 CLEANING

A. Clean surfaces according manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

Envisage
ARCHITECTURE

7. REFERENCE SUSTAINABLE DOCUMENTS

3244 Fairfield Ave ■ Cincinnati, OH 45207 ■ www.envisage-arch.com ■ 513.409.0609

Sol design + consulting

agenda

Enterprise Green Communities (EGC) Design Charrette
Linn St Exchange
Tulsa, OK

15 July 2025
9:00 am

Attendees: See attached attendee list.

The purpose of the meeting is to introduce the design and construction team to the EGC certification process; to integrate green strategies across all aspects of design, drawings and trades expertise; and to set expectations to ensure a successful EGC certification.

1 Introductions

- Project team, qualifications, roles, and responsibilities

2 Overview of EGC Process

- EGC Rating System
- Players – Provider, Rater, Design & Construction Team

3 EGC Certification Process

- EGC Criteria
  - Certification Threshold & Additional requirements
  - Prerequisite & Credits
  - Energy Model Review
- Energy Star Requirements and Checklist
  - Green Rater Design & Inspection Checklists
  - HVAC Design & Commissioning Checklists
  - GC Water Management Builder Checklist
- Field Visual Inspections – Thermal Bypass (Pre-Drywall)
- Field Testing – Air Infiltration, Distribution Loss (Total Duct Leakage & Duct Leakage to Outside), Duct Static Pressure, Room Pressure Test
- Document Inspections – Plans and Specs; calculations (Mechanical, water use, landscaping, etc.); Product data sheets

FOR REFERENCE

4 Project Schedule

- EGC Pre-build
- EGC Checklist and Energy Model Review
- Construction Start – Trades Training
- Mid Construction Inspections
- Post Construction Inspections & Testing
- Close-out Process
- Project Certification

5 External Deliverables during Design

- Revit/CAD files
- Energy Star HVAC Design Checklist
- 80% Progress for EGC plan review

6 Closing Remarks

PROJECT MANUAL

Cincinnati Metropolitan Housing Authority
CMHA - Linn St_ Exchange
Cincinnati, Ohio

Prepared by
ENVISAGE ARCHITECTURE LLC

1431 Jones St
1502 Jones St
1526 Jones St
Cincinnati Ohio 45207
Project Number 2025-912

3.6 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION 26 56 00

SIGN-IN SHEET

Name	Company	Trade	Email	Phone #

CRITERIA CHECKLIST

This checklist provides an overview of the technical requirements within the Enterprise Green Communities Criteria.

To achieve Enterprise Green Communities Certification, all projects must achieve compliance with the Criteria mandatory measures applicable to that construction type. **New Construction projects must also achieve at least 40 optional points, and Substantial and Moderate Rehab projects must also achieve at least 35 optional points.**

These projects that also comply with Criterion 5.2b or Criterion 5.4 will be recognized with Enterprise Green Communities Certification Plus.

Project:	Linn St Exchange
Address:	1400, 1500 Linn St
Location Type:	Urban
Building Type:	Midrise

FOR REFERENCE

Yes	Maybe		1. INTEGRATIVE DESIGN
Yes		M	**1.1 Integrative Design: Project Priorities Survey** Complete the Project Priorities Survey, which can be found in the Appendix.
Yes		M	**1.2 Integrative Design: Charrettes and Coordination Meetings** Develop an integrative design process that moves the outputs of the Project Priorities Survey into action through a series of collaborative meetings. Prioritize multi-benefit strategies. Assign responsibility within your design and development teams for accountability.
Yes		M	**1.3 Integrative Design: Documentation** Include Enterprise Green Communities Criteria information in your contract documents and construction specifications (Division 1 Section 01 81 13 Sustainable Design Requirements) as necessary for the construction team to understand the requirements and how they will be verified. Ensure and indicate, that the drawings and specifications have been generated to be compliant and meet the certification goals.
Yes		M	**1.4 Integrative Design: Construction Management** Create, implement, and document your contractor/subcontractor education plan to ensure that all persons working on-site fully understand their role in achieving the project objectives. Include a summary of the Project Priorities Survey (Criterion 1.1), the sustainability goals, and anticipated roles of each party in regards to the performance expected of the project. Attach and reference this training plan to Division 1 Section 01 81 13 Sustainable Design Requirements. Include timeline estimates for performance testing and verification schedules in the overall construction schedule. As relevant, review requirements for Criteria 8.1, 8.2, and 8.3, and begin populating these documents with relevant information from design and construction.
		12 or 15	**1.5 Design for Health and Well-Being: Health Action Plan** Follow Steps 1-6 of the Health Action Plan framework per the full criterion. *[12 points with extra 3 points for Step 7]* This includes: 1) Commit to embedding health into the project lifecycle; 2) Partner with a project health professional; 3) Collect and analyze community health data; 4) Engage with community stakeholders to prioritize health data and strategies; 5) Identify strategies to address those health issues; 6) Create an implementation plan; and 7) Create a monitoring plan.

		10	**1.6 Resilient Communities: Multi-Hazard Risk/Vulnerability Assessment** Conduct a four-part assessment (social, physical, functional, strategy) to identify critical risk factors of your property and implement at least two sets of strategies to enable the project to adapt to, and mitigate, climate related or seismic risks. See full criterion for more guidance.
		8	**1.7 Resilient Communities: Strengthening Cultural Resilience** Integrate community and resident participation in the development processes so that the built environment honors cultural identities, resident voices, and community histories. Option 1: Complete a Cultural Resilience Assessment OR Option 2: Convene a Cultural Advisory Group
0	0		1. INTEGRATIVE DESIGN SUBTOTAL
Yes	Maybe		**2. LOCATION + NEIGHBORHOOD FABRIC**
Yes		M	**2.1 Sensitive Site Protection** All projects must: 1. Protect floodplain functions (e.g., storage, habitat, water quality) by limiting new development within the 100-year floodplain of all types of watercourses. 2. Conserve and protect aquatic ecosystems, including wetlands and deepwater habitats, that provide critical ecosystem functions for fish, other wildlife, and people. 3. Protect ecosystem function by avoiding the development of areas that contain habitat for plant and animal species identified as threatened or endangered. 4. Conserve the most productive agricultural soils by protecting prime farmland, unique farmland, and farmland of statewide or local importance. If your site contains any of these ecologically sensitive features, follow the specific Requirements under that subheading.
N/A		M	**2.2 Connections to Existing Development and Infrastructure** *(Mandatory for New Construction projects that do not qualify as Rural/Tribal/Small Town)* Locate the project on a site with access to existing roads, water, sewers, and other infrastructure and within or contiguous to (having at least 25% of the perimeter bordering) existing development. Connect the project to the existing pedestrian network. For sites over 5 acres, provide connections to the adjacent street network at least every 800 feet. Tie all planned bike paths to existing bike paths.
N/A		M	**2.3 Compact Development** *(Mandatory for New Construction)* At a minimum, build to the residential density (dwelling units/acre) of the census block group where the project is located. In Rural/Tribal/Small Town locations that do not have zoning requirements: Build to a minimum net density of 5 units per acre for single-family houses; 10 units per acre for multifamily buildings, single and two-story; and 15 units per acre for multifamily buildings greater than two-stories.

7		5 or 7	**2.4 Increased Compact Development** Exceed the residential density (dwelling units/acre) of the census block group in which your project is located. Exceed by 2x for *[5 points]* ; exceed by 3x for *[7 points]* . In Rural/Tribal/Small Towns that do not have zoning requirements, build to a minimum net density of 7.5 units per acre for single-family houses; 12 units per acre for multifamily buildings, single and two-story; and 20 units per acre for multifamily buildings greater than two stories. *[5 points]*
N/A		M	**2.5 Proximity to Services and Community Resources** *(Mandatory for New Construction)* Locate the project within a 0.5-mile walk distance of at least four, or a 1-mile walk distance of at least seven, of the listed services. For projects that qualify as Rural/Tribal/Small Town, locate the project within 5 miles of at least four of the listed services.
N/A		M	**2.6 Preservation of and Access to Open Space for Rural/Tribal/Small Town** *(Mandatory for New Construction Rural/Tribal/Small Town)* Option 1: Locate the project within a 0.25-mile walk distance of dedicated public open space that is a minimum of 0.75 acres; at least 80% of which unpaved. OR Option 2: Set aside a minimum of 10% (minimum of 0.25 acres) of the total project acreage as open and accessible to all residents; at least 80% of which unpaved.
4		6 max	**2.7 Preservation of and Access to Open Space** Option 1: Locate the project within a 0.25-mile walk distance of dedicated open space that is a minimum of 0.75 acres; at least 80% of which unpaved. *[4 points]* OR Option 2: Set aside a percentage of permanent open space for use by all residents; at least 80% of which unpaved. 25% *[2 points] ;* 35% *[4 points] ;* 45% + written statement of preservation/ conservation policy *[6 points].*
			2.8 Access to Transit *(Mandatory for New Construction projects that do not qualify as Rural/Tribal/Small Town; Optional for all other project types)*
N/A		M	**Mandatory: New Construction, not Rural/Tribal/Small Town** Locate projects within a 0.5-mile walk distance of transit services (bus, rail and/or ferry), constituting at least 45 or more transit rides per weekday, with some type of weekend service.
		2	**Optional: New Construction, not Rural/Tribal/Small Town** Locate the project along dedicated bike trails or lanes (Class I, II, or IV) that lead to high-quality transit services (100 trips per day) within 3 miles. *[2 points]*
6		2, 6, 8	**Optional: Rehabilitation, not Rural/Tribal/Small Town** Locate projects within a 0.5-mile walk distance of public transit services (bus, rail and/or ferry), constituting at least 45 or more transit rides per weekday, with some type of weekend service. [6 points] Locate the project along dedicated bike trails or lanes (Class I, II, or IV) that lead to high-quality transit services (100 trips per day) within 3 miles. *[2 points]*
		6	**Optional: New Construction and Rehabilitation, Rural/Tribal/Small Town** Locate the project within 0.5 mile walk distance of public transit services with at least 45 rides per weekday and some weekend service. OR, Install at least two charging stations for electric vehicles. OR, Locate the project with 5 miles of one of the following transit options: 1) vehicle share program; 2) dial-a-ride program; 3) employer vanpool; 4) park-and-ride; 5) public/private regional transportation.

		2-8	**2.9 Improving Connectivity to the Community** Improve access to community amenities through at least one of the options incentivizing biking mobility or improving access to transit.
		5 max	**2.10 Passive Solar Heating/Cooling** Design and build with passive solar design, orientation, and shading that meet the guidelines specified.
		6	**2.11 Adaptive Reuse of Buildings** Rehabilitate and adapt an existing structure that was not previously used as housing. Design the project to adapt, renovate, or reuse at least 50% of the existing structure and envelope.
		6	**2.12 Access to Fresh, Local Foods** Provide residents and staff with access to fresh, local foods through one of the following options: Option 1: Neighborhood Farms and Gardens Option 2: Community-Supported Agriculture Option 3: Proximity to Farmers Market
8		8	**2.13 Advanced Certification: Site Planning, Design and Management** Locate building(s) within a community that is certified in LEED for Neighborhood Development, LEED for Cities and Communities, Living Community Challenge, or SITES.
		6 max	**2.14 Local Economic Development and Community Wealth Creation** Demonstrate that local preference for construction employment and subcontractor hiring was part of your bidding process, and how it functioned during construction. *[2 points]* OR Demonstrate that you achieved at least 20% local employment. *[3 points]* OR Provide physical space for small business, nonprofits, and/or skills and workforce education. *[3 points]*
N/A		M	**2.15a Access to Broadband: Broadband Ready** *(Mandatory for New Construction and Substantial Rehab Projects in Rural/Tribal/Small Town Locations)* Incorporate broadband infrastructure so that when broadband service comes to a community, the property can be easily connected. Include a network of mini-ducts or conduit throughout the building, extending from the expected communications access point to each network termination point in the building.
		6	**2.15b Access to Broadband: Connectivity** Ensure all units and common spaces in the property have broadband internet access with at least a speed of 25/3 mbs.
25	**0**		**2. LOCATION + NEIGHBORHOOD FABRIC SUBTOTAL**

Yes	Maybe		3. SITE IMPROVEMENT
Yes		M	**3.1 Environmental Remediation** Determine whether there are any hazardous materials present on the site through one of the four methods listed. Mitigate any contaminants found.
Yes		M	**3.2 Minimization of Disturbance during Staging and Construction** For sites >1 acre, implement EPA's National Pollutant Discharge Elimination System Stormwater Discharges from Construction Activities guidance, or local requirements, whichever is more stringent. For sites with an area <= 1, follow guidance in full criterion.
Yes		M	**3.3 Ecosystem Services/Landscape** *(Mandatory, if providing landscaping)* If providing plantings, all must be native or climate-appropriate (adapted) to the region and appropriate to the site's soil and microclimate. Do not introduce any invasive plant species. Plant, seed, or xeriscape all disturbed areas.
Yes		M	**3.4 Surface Stormwater Management** *(Mandatory for New Construction; Mandatory for Substantial and Moderate Rehab projects if land disturbed is >= 5,000 sq.ft.)* Treat or retain on-site precipitation equivalent to the 60th percentile precipitation event. Where not feasible due to geotechnical issues, soil conditions, or the size of the site, treat or retain the maximum volume possible.
		10 max	**3.5 Surface Stormwater Management** Through on-site infiltration, evapotranspiration, and rainwater harvesting, retain precipitation volume from 70% precipitation event *[6 points],* 80% precipitation event *[8 points] ,* or 90% precipitation event *[10 points].*
		M	**3.6 Efficient Irrigation and Water Reuse** *(Mandatory, if permanent irrigation is utilized)* If irrigation is utilized, install an efficient irrigation system per the requirements listed.
		4 or 6	**3.7 Efficient Irrigation and Water Reuse** *(Optional, if irrigation is utilized)* Meet the requirements of Criterion 3.6 AND: Option 1: Install an efficient irrigation system equipped with a WaterSense labeled weather- based irrigation controller (WBIC) OR Option 2: At least 50% of the site's irrigation satisfied by water use from the sources listed.
0	0		3. SITE IMPROVEMENT SUBTOTAL

Yes	Maybe		4. WATER
Yes		M	**4.1 Water-Conserving Fixtures** Reduce total indoor water consumption by at least 20% compared to baseline indoor water consumption chart. Any new toilet, showerhead, and/or lavatory faucet must be WaterSense certified. For all single-family homes and all dwelling units in buildings three stories or fewer, the supply pressure may not exceed 60 psi.
3		6 max	**4.2 Advanced Water Conservation** Reduce total indoor water consumption by at least 30% compared to baseline indoor water consumption chart. Any new toilet, showerhead, and/or lavatory faucet must be WaterSense certified.
Yes			**4.3 Water Quality**
		M, 3	**Mandatory/Optional:** Mandatory for Substantial Rehabs of buildings built before 1986; Optional for all other building types: Replace lead service lines *[3 points]*
		M	**Mandatory:** For multifamily buildings with either a cooling tower, a centralized hot water system, or 10+ stories: Develop a Legionella water management program
		8	**Optional:** Test and remediate as indicated for lead, nitrates, arsenic, and coliform bacteria
		4	**4.4 Monitoring Water Consumption and Leaks** Conduct pressure-loss tests and visual inspections to determine if there are leaks; fix leaks. AND Install an advanced water monitoring and leak detection system capable of identifying and shutting water off during anomalous water events. OR Install a device to separately monitor water consumption of each cold branch off the apartment line riser for each dwelling unit or each cold water riser and the domestic hot water cold water feed for each building or each toilet that allows remote monitor readings; common laundry facilities; boiler makeup water; outdoor water consumption; and water consumption in any non-residential space.
		4	**4.5 Efficient Plumbing Layout and Design** Store no more than 0.5 gallon of water in any piping/manifold between the fixture and the water heating source or recirculation line. No more than 0.6 gallon of water shall be collected from the fixture before a 10-degree Fahrenheit rise in temperature is observed. Recirculation systems must be demand-initiated.
		6 max	**4.6 Non-Potable Water Reuse** Harvest, treat, and reuse rainwater and/or greywater to meet a portion of the project's non-potable water needs: 10% reuse *[3 points]* ; 20% reuse *[4 points]* ; 30% reuse *[5 points];* 40% reuse *[6 points].*

		8	**4.7 Access to Potable Water During Emergencies** Provide residents with ready access to potable water in the event of an emergency that disrupts normal access to potable water, including disruptions related to power outages that prevent pumping water to upper floors of multifamily buildings or pumping of water from on-site wells, per one of the three options listed.
3	0		4. WATER SUBTOTAL
Yes	Maybe		**5. OPERATING ENERGY**
		M	**5.1a Building Performance Standard** *(Mandatory for New Construction)* Certify all buildings with residential units in the project through either ENERGY STAR Multifamily New Construction, ENERGY STAR Manufactured Homes, and/or ENERGY STAR Certified Homes as relevant. AND Provide projected operating energy use intensity and projected operating building emissions intensity.
Yes		M	**5.1b Building Performance Standard** *(Mandatory for Rehab)* Provide projected operating energy use intensity and projected operating building emissions intensity. AND Conduct commissioning for compartmentalization, insulation installation, and HVAC systems as indicated. AND one of the following options: - ERI Option: <= HERS 80 for each dwelling unit. Exception for some Rehabs built before 1980. - ASHRAE Option: Energy performance of the completed building equivalent to, or better than, ASHRAE 90.1-2013 using an energy model created by a qualified energy services provider according to Appendix G 90.1-2016.
		12 max	**5.2a Moving to Zero Energy: Additional Reductions in Energy Use** *(Not available for projects using prescriptive path for Criterion 5.1a or for projects following Criterion 5.2b or 5.4.)* Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8. Design and construct a building that is projected to be more efficient than what is required by Criteria 5.1a/b. Achieve HERS score of 5 lower than required by 5.1a/b if following ERI path for compliance OR 5% greater efficiency than required if following ASHRAE path for 5.1a/b compliance *[5 points].* Additional 1 point for each additional 2-point decrease in HERS score required by Criteria 5.1a/b if following ERI path for compliance OR for 1% greater efficiency if following ASHRAE path for Criteria 5.1a/b, up to a maximum of 12 optional points.
		12-15	**5.2b Moving to Zero Energy: Near Zero Certification** **[Mandatory for Enterprise Green Communities Certification Plus]** *(Not available for projects following Criterion 5.2a or 5.4.)* Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8. Certify the project in a program that requires advanced levels of building envelope performance such as DOE ZERH *[12 points]* and/or PHI Classic or PHIUS+ *[15 points]* .

	3-6	**5.3a Moving to Zero Energy: Photovoltaic/Solar Hot Water Ready** *(Not available for projects following Criterion 5.3b or 5.4.)* Orient, design, engineer, wire, and/or plumb the development through the Photovoltaic Ready pathway or Solar Hot Water Ready Pathway to accommodate installation of photovoltaic (PV) or solar hot water system in the future.
	8 max	**5.3b Moving to Zero Energy: Renewable Energy** *(Not available for projects following Criterion 5.3a or 5.4)* Install renewable energy source to provide a specified percentage of the project's estimated source energy demand. See full criterion for allowable sources.
	4-8	**Option 1:** For percentage of total project energy consumption provided by renewable energy. OR
	1-5	**Option 2:** For percentage of common area meter energy consumption provided by renewable energy.
	24	**5.4 Achieving Zero Energy** **[Automatic Qualification for Enterprise Green Communities Certification Plus]** *(Not available for projects following Criterion 5.2a, 5.2b, 5.3a, or 5.3b.)* Projects in CZ 1-4A following this criterion must also comply with Criterion 7.8. Achieve Zero Energy performance through one of the following options: **Option 1:** Certify each building in the project to DOE Zero Energy Ready Home program or PHI Plus AND Either install renewables and/or procure renewable energy, which in sum will produce as much, or more, energy in a given year than the project is modeled to consume. OR **Option 2:** Certify each building in the project in a program that requires zero energy performance such as PHIUS+ Source Zero, PHI Plus, PHI Premium, ILFI's Zero Energy Petal, Zero Carbon Petal, or Living Building Certification.
	5 max	**5.5a Moving to Zero Carbon: All-Electric Ready** *(Not available for projects following Criterion 5.5b)* Ensure the project has adequate electric service and has been designed and wired to allow for a seamless switch to electricity as a fuel source in the future for the following uses: space heating *[1 point],* space cooling *[1 point]* , water heating (DHW) *[1 point]* , clothes dryers *[1 point]* , equipment for cooking *[1 point].*
	15	**5.5b Moving to Zero Carbon: All Electric** *(Not available for projects following Criterion 5.5a)* No combustion equipment used as part of the building project; the project is all-electric.
Yes	M	**5.6 Sizing of Heating and Cooling Equipment** *(Mandatory for Substantial and Moderate Rehabs that include replacement of heating and cooling equipment. Not relevant for projects following 5.1a, 5.2b, or 5.4.)* Size and select heating and cooling equipment in accordance with ACCA manuals J and S OR in accordance with the ASHRAE Handbook of Fundamentals

Yes		M	**5.7 ENERGY STAR Appliances** *(Mandatory for Substantial and Moderate Rehabs providing appliances. Not relevant for projects following 5.1a, 5.2b, or 5.4.)* Install ENERGY STAR clothes washers, dishwashers, and refrigerators. If appliances will not be installed or replaced at this time, specify that at the time of installation or replacement, ENERGY STAR models must be used via Criterion 8.1 and Criterion 8.4.
Yes		M	**5.8 Lighting** *(Mandatory for all lighting within New Construction and Substantial Rehab projects. Mandatory for new lighting in Moderate Rehab projects.)* Follow the guidance for high-efficacy permanently installed lighting and other characteristics for recessed light fixtures, lighting controls, lighting power density, and exterior lighting.
		8	**5.9 Resilient Energy Systems: Floodproofing** *(Not relevant for Rehab projects in Special Flood Hazard Areas)* Conduct floodproofing of lower floors, including perimeter floodproofing (barriers/shields). Design and install building systems as specified by the full criterion so that the operation of those systems will not be grossly affected in case of a flood.
		8	**5.10 Resilient Energy Systems: Critical Loads** Loads Provide emergency power to serve at least three critical energy loads as described by the full criterion. **Option 1**: Islandable PV system OR **Option 2**: Efficient generator
0	0		5. OPERATING ENERGY SUBTOTAL
Yes	**Maybe**		**6. MATERIALS**
		8 max	**6.1 Ingredient Transparency for Material Health** Install products that have publicly disclosed inventories characterized and screened to 1,000 ppm or better: • 1 point per 5 installed Declare or HPD products from at least three different product categories • 1 point per 2 installed Declare or HPD products in any of these categories: adhesives, sealants, windows • 1 point per each product with third-party verified HPD or third-party verified Declare label • 2 points per each product with third-party verified HPD or third-party verified Declare label in any of these categories: adhesives, sealants, windows
		3 max	**6.2 Recycled Content and Ingredient Transparency** Use building products that feature, and disclose, their recycled content. The building product must make up 75% by weight or cost of a project category for the project and be composed of at least 25% post-consumer recycled content.
		8 max	**6.3 Chemical Hazard Optimization** Install products that have third-party verification of optimization to 100 ppm or better per the options listed within the full criterion.

Yes	M	**6.4 Healthier Material Selection**
	15 max	Select all interior paints, coatings, primers, and wallpaper; interior adhesives and sealants; flooring; insulation; and composite wood as specified. Optional points also available.
	12 max	**6.5 Environmentally Responsible Material Selection**
		Select concrete, steel, or insulation with a publicly disclosed EPD *[3 points]* , Install a green or cool roof *[3 points]* , use reflective paving *[3 points]* , and/or use FSC certified wood *[3 points]* . Refer to criterion for specifics.
Yes	M	**6.6 Bath, Kitchen, Laundry Surfaces**
		(Mandatory for New Construction and Substantial Rehab. Moderate Rehabs that do not include work in the shower and tub areas are exempt from the shower and tub enclosure requirement.) Use materials that have durable, cleanable surfaces throughout bathrooms, kitchens, and laundry rooms. Use moisture-resistant backing materials per ASTM # D 6329 or 3273 behind tub/shower enclosures, apart from one-piece fiberglass enclosures which are exempt.
	4 max	**6.7 Regional Materials**
		Use products that were extracted, processed, and manufactured within 500 miles of the project for a minimum of 90%, based on weight or on cost, of the amount of the product category installed. Select any or all of these options (every two compliant materials can qualify for 1 point): • Framing Cladding (e.g. siding, masonry, roofing) • Flooring Concrete/cement and aggregate • Drywall/interior sheathing
Yes	M	**6.8 Managing Moisture: Foundations**
		(Mandatory for all New Construction projects and all Rehab projects with either basement and/or crawl space foundations) Install capillary breaks and vapor retarders that meet specified criteria appropriate for the foundation type.
Yes	M	**6.9 Managing Moisture: Roofing and Wall Systems**
		(Mandatory for all Rehab projects that include deficiencies in or include replacing particular assemblies called out below. New Construction projects are considered compliant per Criterion 5.1.) Provide water drainage away from walls, window, and roofs by implementing the list of techniques.
Yes	M	**6.10 Construction Waste Management**
	6 max	Develop and implement a waste management plan that reduces non-hazardous construction and demolition waste through recycling, salvaging, or diversion strategies through one of the three options. Achieve optional points by going above and beyond the requirement.

		2	**6.11 Recycling Storage** For projects with municipal recycling infrastructure and/or haulers, provide separate bins for the collection of trash and recycling for each dwelling unit and all shared community rooms. OR For projects without that infrastructure, advocate to the local waste hauler or municipality for regular collection of recyclables.
0	0		**6. MATERIALS SUBTOTAL**

Yes	Maybe		**7. HEALTHY LIVING ENVIRONMENT**
Yes		M	**7.1 Radon Mitigation** *(Mandatory for New Construction and Substantial Rehab)* For New Construction in EPA Zone 1 areas, install passive radon-resistant features below the slab and a vertical vent pipe with junction box within 10 feet of an electrical outlet in case an active system should prove necessary in the future. For Substantial Rehab projects in EPA Zone 1, test before and after the retrofit and mitigate per the specified protocols.
Yes		M	**7.2 Reduce Lead Hazards in Pre-1978 Buildings** *(Mandatory for Substantial Rehab of Buildings Constructed Before 1978)* Conduct lead risk assessment or inspection to identify lead hazards. Control identified lead hazards using lead abatement or interim controls, using lead-safe work practices that minimize and contain dust.
Yes		M	**7.3 Combustion Equipment** **For New Construction and Rehab projects:** Specify power-vented or direct-vent equipment when installing any new combustion appliance for space or water heating that will be located within the conditioned space. If there are any combustion appliances within the conditioned space, install one hard-wired carbon monoxide (CO) alarm with battery backup function for each sleeping zone, placed per National Fire Protection Association (NFPA) 72. **For Rehabs:** If there is any combustion equipment located within the conditioned space for space or water heating that is not power-vented or direct-vent and that is not scheduled for replacement, conduct combustion safety testing prior to and after the retrofit; remediate as indicated.
N/A		M	**7.4 Garage Isolation** • Provide a continuous air barrier between the conditioned space and any garage space to prevent the migration of any contaminants into the living space. Visually inspect common walls and ceilings between attached garages and living spaces to ensure that they are air-sealed before insulation is installed. • Do not install ductwork or air handling equipment for the conditioned space in a garage. • Fix all connecting doors between conditioned space and garage with gaskets or make airtight. • Install one hard-wired CO alarm with battery backup function for each sleeping zone of the project, placed per NFPA 72 unless the garage is mechanically ventilated or an open parking structure.
Yes		M	**7.5 Integrated Pest Management** Seal all wall, floor, and joint penetrations with low-VOC caulking or other appropriate nontoxic sealing methods to prevent pest entry.

			7.6 Smoke-Free Policy
Yes		M	**Mandatory:** Implement and enforce a smoke-free policy in all common areas and within a 25-foot perimeter around the exterior of all residential buildings. Lease language must prohibit smoking in these locations and provide a graduated enforcement policy. Make the smoke-free policy readily available.
10		10	**Optional:** Expand the policy above to include all indoor spaces in the property.
	6	M 12 max	**7.7 Ventilation** *(Mandatory for New Construction and Substantial Rehab; Optional for Moderate Rehab)* For each dwelling unit in full accordance with ASHRAE 62.2-2010, install: • A local mechanical exhaust system in each bathroom *[3 points if Moderate Rehab]* • A local mechanical exhaust system in each kitchen *[3 points if Moderate Rehab]* • A whole-house mechanical ventilation system *[3 points if Moderate Rehab]* Verify these flow rates are either within +/- 15 CFM or +/- 15% of design value. For each multifamily building of four or more stories, in full accordance with ASHRAE¬†62.1-2010, install: • A mechanical ventilation system for all hallways and common spaces *[3 points if Moderate Rehab]* For all project types, in addition to the above requirements: • All systems and ductwork must be installed per manufacturer's recommendations • All bathroom fans must be ENERGY STAR-labeled and wired for adequate run-time. • If using central ventilation systems with rooftop fans, each fan must be direct-drive and variable-speed with speed controller mounted near the fan. Fans with design CFM 300-2000 must also have an ECM motor.
N/A		M , 5	**7.8 Dehumidification** *(Mandatory for properties in Climate Zones 1A, 2A, 3A, and 4A following Criterion 5.2a, 5.2b, or 5.4. Optional for all other properties.)* **Option 1:** Design, select, and install supplemental dehumidification equipment to keep relative humidity OR **Option 2**: Equip all dwelling units with dedicated space, drain, and electrical hook-ups for permanent supplemental dehumidification systems to be installed if needed and install interior RH monitoring equipment as described.
		3	**7.9 Construction Pollution Management** **Option 1:** Earn the EPA Indoor airPlus label OR **Option 2:** In all dwelling units, seal all heating, cooling, and ventilation return and supply floor ducts and returns throughout construction to prevent construction debris from entering. Flush all dwelling units after completion of construction and prior to occupancy for either 48 hours or with at least 14,000 ft3 per ft2 of floor area, then replace all air handling equipment filters.

		3	**7.10 Noise Reduction** **Option 1:** Test and demonstrate that noise levels in bedrooms meet 30 dB LAeq (continuous) and 45 dB LAmax, (single sound). OR **Option 2:** Provide a noise abatement plan specific to the site covering general noise mitigation techniques in accordance with 24 CFR 51B. OR Option 3: Ensure all exterior wall and party wall penetrations are sealed with acoustical sealant, all party walls and floor/ceiling assemblies have an STC rating of at least 55, and exterior windows and doors in projects near a significant exterior noise source have an STC rating of at least 35
		8	**7.11 Active Design: Promoting Physical Activity** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* **Option 1:** Encouraging Everyday Stair Usage (buildings that include stairs as the only means to travel from one floor to another are not eligible for this option.) Provide a staircase that is accessible and visible from the main lobby and is visible within a 25-foot walking distance from any point in the lobby per the specifications listed. Place point-of-decision signage. OR **Option 2:** Activity Spaces. Provide on-site dedicated recreation space with exercise or play opportunities for adults and/or children that is open and accessible to all residents; see criterion for specifics.
Yes		8	**7.12 Beyond ADA: Universal Design** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* Select and implement at least one of the Options with at least three different strategies in at least 75% units. **Option 1:** Create welcoming and accessible spaces that encourage equitable use and social connections. **Option 2:** Create spaces that are easy and intuitive to use and navigate. **Option 3:** Promote safety and create spaces that allow for human error. **Option 4:** Create spaces that can be accessed and used with minimal physical effort. **Option 5:** Create spaces with the appropriate size and space to allow for use, whatever the user's form of mobility, size, or posture.
		8	**7.13 Healing-Centered Design** *(All projects must comply with at least one of either Criterion 7.11, 7.12, or 7.13. Points are not available for that criterion, but, are available for projects that meet two or three of these criteria.)* Select and implement at least two of the Options with at least two different strategies listed in at least 75% units. **Option 1:** Provide an environment that promotes feelings of real and perceived safety. **Option 2:** Create flexible spaces that allow for personalization and/or manipulation to meet individual and community needs. **Option 3:** Connect residents and staff to a living landscape and the natural environment. **Option 4:** Utilize art and culture in project design and programming and promote social connectedness.
10	6		**7. HEALTHY LIVING ENVIRONMENT SUBTOTAL**

Yes	Maybe		8. OPERATIONS, MAINTENANCE + RESIDENT ENGAGEMENT
Yes		M	**8.1 Building Operations & Maintenance Manual and Plan** *(For all Multifamily projects)* Develop a manual with thorough building operations and maintenance (O&M) guidance and a complementary plan. The manual and plan should be developed over the course of the project design, development, and construction stages, and should include sections/chapters addressing the list of topics.
Yes		M	**8.2 Emergency Management Manual** *(For all Multifamily projects)* Provide a manual on emergency operations targeted toward operations and maintenance staff and other building-level personnel. The manual should address responses to various types of emergencies, leading with those that have the greatest probability of negatively affecting the project. The manual should provide guidance as to how to sustain the delivery of adequate housing throughout an emergency and cover a range of topics, including but not limited to: • communication plans for staff and residents • useful contact information for public utility and other service providers • infrastructure and building, "shutdown" procedures • plan for regular testing of backup energy systems, if these exist
Yes		M	**8.3 Resident Manual** Provide a guide for homeowners and renters that explains the intent, benefits, use, and maintenance of their home's green features and practices. The Resident Manual should encourage green and healthy activities per the list of topics.
Yes		M	**8.4 Walk-Throughs and Orientations to Property Operation** Provide a comprehensive walk-through and orientation for all residents, property manager(s), and buildings operations staff.
Yes		M	**8.5 Energy and Water Data Collection and Monitoring** For rental properties, upload project energy and water performance data in an online utility benchmarking platform annually for at least five years from time of construction completion per one of the four methods provided; grant Enterprise view access for that period. For owner-occupied units, collect and monitor utility data in a manner that allows for easy access and review.
0	0		8. OPERATIONS, MAINTENANCE + RESIDENT ENGAGEMENT SUBTOTAL
38	**6**		**TOTAL**

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Building Name: Linn Street Exchange Number of Units: 62 Permit Date: _____

Building Address: 1510 Linn St City: Cincinnati State: OH

Thermal Enclosure System **1. High-Performance Fenestration & Insulation**	Must Correct	Builder Verified [3]	Rater Verified [4]	N/A [5]
1.1 Fenestration meets or exceeds specification in Items 2.1 & 2.2 of the Natl Rater Design Review Checklist.	☐	☐	☐	-
1.2 Insulation meets or exceeds specification in Items 3.1 & 3.2 of the Natl Rater Design Review Checklist.	☐	Up to 10% ☐	☐	-
1.3 All insulation achieves Grade I install. per ANSI / RESNET / ICC 301. Alternatives in Footnote 6. [7]	☐	Up to 10% ☐	☐	-
1.4 Prescriptive Path: Window-to-wall ratio ≤ 30%. [8]	☐	☐	☐	☐
1.5 Heated plenums in unconditioned space or ambient conditions must meet the following requirements: [9]				
1.5.1 Sides of heated plenum are an air barrier and insulated to ≥ R-3ci in CZ 1-4; ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, [10] **AND;**	☐	☐	☐	☐
1.5.2 Insulation at top of heated plenum meets Item 3.6 where applicable. Otherwise, meets or exceeds the R-value for mass floors from the "All Other" column of Table 502.2(1) of 2009 IECC, [10, 11] **AND;**	☐	☐	☐	☐
1.5.3 Bottom of heated plenum must have at least R-13 insulation. [11, 12]	☐	☐	☐	☐
1.6 Garages with space heating must meet the following requirements: [9]				
1.6.1 Insulation on above grade walls and walls on the first story below grade ≥ R-5ci in CZ 5-6; ≥ R-7.5ci in CZ 7; ≥ R-9.5ci in CZ 8, [10] **AND;**	☐	☐	☐	☐
1.6.2 Ceiling insulation meets Item 3.6 where applicable. Otherwise, meets or exceeds the R-value for mass floors from the "All Other" column of Table 502.2(1) of 2009 IECC. [10]	☐	☐	☐	☐
2. Fully-Aligned Air Barriers [13] At each insulated location below, a complete air barrier is provided that is fully aligned as follows:				
Ceilings: At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays). [10, 14]				
2.1 Dropped ceilings / soffits below unconditioned attics, chase / dead space, and all other ceilings.	☐	☐	☐	☐
Walls: At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8. [10, 15]				
2.2 Walls behind showers, tubs, staircases, and fireplaces.	☐	☐	☐	☐
2.3 Architectural bump-outs, dead space, and all other exterior walls.	☐	☐	☐	-
Floors: At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. Alternatives in Footnotes 15 & 16. [16, 17, 18]				
2.4 Floors above garages, floors above unconditioned spaces, and cantilevered floors.	☐	☐	☐	☐
2.5 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof).	☐	☐	☐	☐
3. Reduced Thermal Bridging				
3.1 For insulated ceilings with attic space above (i.e., non-cathedralized), Grade I insulation extends to the inside face of the exterior wall below and is ≥ R-21 in CZ 1-5; ≥ R-30 in CZ 6-8. [10, 19]	☐	☐	☐	☐
3.2 For insulated ceilings with attic space above, attic access panels and drop-down stairs insulated ≥ R-10 or equipped with durable ≥ R-10 cover. [20]	☐	☐	☐	☐
3.3 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) ≥ R-21 in CZ 1-5; ≥ R-30 in CZ 6-8. [10]	☐	☐	☐	☐
3.4 For slabs on grade in CZ 4-8, 100% of slab edge insulated to ≥ R-5 at a depth of 2 ft., or 4 ft. for heated slabs in CZ 6-8, & aligned with the thermal boundary of the walls. [10, 21, 22]	☐	☐	☐	☐
3.5 For above-grade and at-grade concrete floor edges (e.g., podiums, balconies) in CZ 4-8, 100% of floor edge insulated to ≥ R-5 & aligned with the thermal boundary of the walls. At this boundary, concrete floors resting on mass walls must provide insulation that extends ≥8 ft. below the bottom of the floor edge & for floors resting on columns, insulation must surround the column, at a depth of 4ft. Alternatives in Fn. 24.[10,23]	☐	☐	☐	☐
3.6 For concrete slab floors in CZ 4-8 above ambient conditions, garages, or unconditioned spaces outside the thermal boundary, floor insulation meets the U-factor specified in Table 502.1.2 of the 2009 IECC for Group R when dwelling units are above the slab, & 'All Other' when common space is above the slab. [10, 25]	☐	☐	☐	☐
3.7 At above-grade walls and rim / band joists separating conditioned space from the exterior, one of the following options used: [26, 27]				
3.7.1 Continuous rigid insulation, insulated siding, or combination of the two is: ≥ R-3 in CZ 1-4; ≥ R-5 in CZ 5-8 [10, 27, 28, 29, 30], **OR**;	☐	☐	☐	☐
3.7.2 Structural Insulated Panels **OR**; Insulated Concrete Forms **OR**; Double-wall framing **OR**; [27, 28, 31]	☐	☐	☐	☐
3.7.3 For wood-framed walls in CZ 1-5 (all stories) & in CZ 6-8 (≤3 stories) only: 'advanced framing' details including all Items below: [27, 32]				
3.7.3a Corners insulated ≥ R-6 to edge [33], **AND**;	☐	☐	☐	☐
3.7.3b Headers above windows & doors insulated ≥ R-3 for 2x4 framing or equivalent cavity width, and ≥ R-5 for all other assemblies (e.g., with 2x6 framing) [34], **AND**;	☐	☐	☐	☐
3.7.3c Interior / exterior wall intersections insulated to same R-value as rest of exterior wall. [35]	☐	☐	☐	☐
3.7.3d In CZ 4C and 5, for > 3 stories, ≥ 5.5" framing depth used with wall cavity insulated ≥R-20.0.	☐	☐	☐	☐

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4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material.)	Must Correct	Builder Verified [3]	Rater Verified [4]	N/A [5]
The following items must be verified in dwelling units and common spaces to reduce air leakage to exterior, adjacent buildings, or unconditioned spaces.				
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed.	☐	☐	☐	-
4.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to ≥ R-10 in CZ 4-8. [10]	☐	☐	☐	☐
4.3 Continuous top plate or blocking is at top of walls adjoining unconditioned space including at balloon-framed parapets, and sealed.	☐	☐	☐	☐
4.4 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.	☐	☐	☐	☐
4.5 Rough opening around windows & exterior doors sealed. [36]	☐	☐	☐	-
4.6 Assemblies that separate attached garages from occupiable space sealed and, also, an air barrier installed, sealed, and aligned with these assemblies. [37]	☐	☐	☐	☐
4.7 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions made substantially air-tight with door seal and weatherstripping or equivalent gasket.	☐	☐	☐	☐
4.8 Attic access panels, roof hatches and drop-down stairs are gasketed (i.e., not caulked) or equipped with durable covers that are gasketed. [20]	☐	☐	☐	☐
The following items must be additionally verified in dwelling units, to reduce air leakage between conditioned spaces.				
4.9 Doors serving as a unit entrance from a corridor/stairwell made substantially air-tight with door seal and weatherstripping or equivalent gasket.	☐	☐	☐	☐
4.10 Rater-measured compartmentalization is no greater than 0.30 CFM50 per square feet of dwelling unit enclosure area, following procedures in ANSI / RESNET / ICC 380. [38]	☐	-	☐	
4.10.1 For dwelling units with forced air distribution systems without ducted returns and air handlers located in a closet or space adjacent to unconditioned space, the Rater-measured pressure difference between the space containing the air handler and the conditioned space during the compartmentalization test is no greater than 5 Pa. [39]	☐	-	☐	☐

HVAC System [40]		Must Correct	Rater Verified [4]	N/A [5]
5. Heating & Cooling Eqpt. Complete Track A - HVAC Grading by Rater [41] or Track B - HVAC Testing by FT Agent [42]				
Track A	5a.1 Blower fan volumetric airflow is Grade I or II per ANSI / RESNET / ACCA 310	☐	☐	☐
	5a.2 Blower fan watt draw is Grade I or II per ANSI / RESNET / ACCA 310	☐	☐	☐
	5a.3 Refrigerant charge is Grade I per ANSI / RESNET / ACCA 310. See Footnote 43 for exemptions.	☐	☐	☐
	5a.4 HVAC manufacturer & model number on installed equipment matches the HVAC Design Report in compliance with ANSI / RESNET / ACCA 310 or the HVAC Design Supplement to Std. 310 for Common Spaces and Central Systems. [44]	☐	☐	☐
Track B	5b.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box):[45] ☐ National HVAC Design Report (4.6-4.9 & 4.25-4.26) ☐ Written approval received from designer	☐	☐	-
	5b.2 External static pressure measured by Rater at contractor-provided test locations and documented below: [46] Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure: _____ IWC	☐	☐	☐
5.5 Prescriptive Path: Heating and cooling equipment serving dwelling units, common spaces, and garages meet the efficiency levels specified in the Exhibit X. Electric resistance space heating is not installed in dwelling units. [47]		☐	☐	☐
5.6 ERI Path: Heating and cooling equipment serving common spaces and garages, but not serving dwelling units, meet the efficiency levels specified in the Exhibit X. See Exhibit X for restrictions on electric resistance space heating. [47]		☐	☐	☐
5.7 National HVAC Functional Testing Checklist(s) collected prior to certification, with all HVAC systems in the building fully documented. Exception: Where credentialed HVAC Contractor(s) are completing the National HVAC Functional Testing Checklist, the checklist is not required to be collected for the systems they verify. [48]		☐	☐	☐
5.8 Rater has verified and documented that Functional Testing Agent(s) ("FT Agent(s)") completing the National HVAC Functional Testing Checklist(s) hold one of the required credentials and completed orientation, if applicable. [48] Credential(s): _____ FT Agent Name(s): _____		☐	☐	☐

Equipment Controls	Must Correct	LP Verified [49]	Rater Verified [4]	N/A [5]
5.9 All heating and cooling systems serving a dwelling unit have thermostatic controls within the dwelling unit.	☐	-	☐	☐
5.9.1 Prescriptive Path: Dwelling unit thermostats are programmable.	☐	-	☐	☐
5.10 Where present, stair and elevator shaft vents are equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems. Dampers are verified to be closed at the time of inspection.	☐	☐	☐	☐

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Equipment Controls (Continued)	Must Correct	LP Verified[49]	Rater Verified [4]	N/A [5]
5.11 Freeze protection systems, such as heat tracing of piping and heat exchangers, including self-regulating heat tracing, and garage / plenum heaters include automatic controls that are verified to shut off the systems when pipe wall or garage / plenum temperatures are above 40°F.	☐	☐	☐	☐
5.11.1 Where heat tracing is installed for freeze-protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.	☐	☐	☐	☐
5.12 Snow- and ice-melting systems include automatic controls that are verified to shut off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control is installed that is verified to shut off system when the outdoor temperature is above 40°F, so that the potential for snow or ice accumulation is negligible.	☐	☐	☐	☐
Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit				
5.13 For hydronic distribution systems, all terminal heating and cooling distribution equipment are separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.	☐	☐	☐	☐
5.14 Terminal units in hydronic distribution systems are equipped with pressure independent balancing valves or pressure independent control valves.	☐	☐	☐	☐
5.15 Piping of a heating or cooling system is insulated in accordance with Item 4.42 on the National HVAC Design Report, including where passing through planks or any other penetrations.	☐	☐	☐	☐
5.16 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, also installed with variable frequency drives.	☐	☐	☐	☐
6. Duct Quality Installation – *Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote.*	**Must Correct**		**Rater Verified [4]**	**N/A [5]**
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. [50]	☐		☐	☐
6.2 All bedrooms provided with transfer grilles, jump ducts, dedicated return ducts, and/or undercut doors. Bedrooms with a design supply airflow ≥ 150 CFM (per Item 5.2 on the National HVAC Design Report) achieve a Rater-measured pressure differential ≥ -5 Pa and ≤ +5 Pa with respect to the main body of the dwelling unit when all air handlers are operating. Townhouses only: In addition, bedrooms with a design supply airflow < 150 CFM achieve a Rater-measured pressure differential ≥ - 3 Pa and ≤ +3 Pa. See Footnote 51 for test configuration.	☐		☐	☐
6.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to ≥ R-6. [52]	☐		☐	☐
6.3.1 Prescriptive Path: Dwelling unit ductwork meets the location and insulation requirements specified in the ENERGY STAR Multifamily Reference Design.	☐		☐	☐
6.4 Rater-measured total duct leakage in dwelling units (and common spaces using ANSI / RESNET / ACCA 310) meets one of the following: [53, 54]				
6.4.1 Rough-in: Tested per allowances below, with air handler & all ducts, building cavities used as ducts, & duct boots installed. In addition, all duct boots sealed to finished surface, Rater-verified at final. [55] No ducted returns [39]: The greater of ≤ 3 CFM25 per 100 sq. ft. of CFA or ≤ 30 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton. One or two ducted returns [39]: The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM. Three or more ducted returns [39]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM.	☐		☐	☐
6.4.2 Final: Tested per allowances below, with the air handler & all ducts, building cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed. [56] No ducted returns [39]: The greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM. Additionally, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton. One or two ducted returns [39]: The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM. Three or more ducted returns [39]: The greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM.	☐		☐	☐
6.5 Townhouses only: Rater-measured duct leakage to the outside the greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25. [53, 57]	☐		☐	☐
6.6 Common Space: Supply, return, and exhaust ductwork and all plenums serving common spaces are sealed at all transverse joints, longitudinal seams, and duct wall penetrations with mastic, mastic tape, or internal aerosol-based sealant.	☐		☐	☐
6.7 Duct leakage of central exhaust ductwork serving four or more dwelling units, meets one of the following two options:				
6.7.1 Rough-in: Tested including horizontal run outs, trunks, branches, and take-offs up to, but not including the grilles, the leakage does not exceed 25% of exhaust fan flow. [58]	☐		☐	☐
6.7.2 Final: Tested inclusive of all ductwork between the fan and the grilles, the leakage does not exceed 30% of exhaust fan flow. [58]	☐		☐	☐

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7. Dwelling-Unit & Common Space Mechanical Vent. Systems ("Vent Systems") [59] & Inlets in Return Duct [60] (National HVAC Design Report Item # indicated in parenthesis)	**Must Correct**	**Rater Verified [4]**	**N/A [5]**
7.1 Ventilation manufacturer & model number on installed equipment matches either of the following (check box): [45] ☐ National HVAC Design Report ☐ Written approval received from designer	☐	☐	-
7.2 Rater-measured ventilation rate is within either ± 15 CFM or ±15% of dwelling unit design values (2.7), and meets or exceeds rates required by ASHRAE 62.2-2010. [61]	☐	☐	-
7.3 Measured ventilation rate is within either ± 15 CFM or ±15% of common space design values (2.9), and meets or exceeds rates required by ASHRAE 62.1-2010 (2.8). [62, 63]	☐	☐	☐
7.4 A ventilation override control installed and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). Townhouses only: In addition, the ventilation override control installed must be readily-accessible to the occupant.	☐	☐	-
7.5 For any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system (Complete if present; otherwise check "N/A"): [60]			☐
7.5.1 Controls automatically restrict airflow using a motorized damper during vent. Off-cycle and occupant override. [64]	☐	☐	-
7.5.2 Rater-measured vent. Rate is ≤ 15 CFM or 15% above design value at highest HVAC fan speed. Alt. in Fn. 65. [65]	☐	☐	-
7.6 If located in the dwelling unit, system fan rated ≤ 3 sones if intermittent, ≤ 2 sones if continuous, or exempted. [66]	☐	☐	-
7.7 If dwelling-unit Vent System controller operates the dwelling unit HVAC fan, then HVAC fan operation is intermittent and either the fan type is ECM / ICM (4.12), or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours. [67]	☐	☐	☐
7.8 In-unit bathroom fans or in-line fans are ENERGY STAR certified if used as part of the dwelling-unit mechanical ventilation system. [68]	☐	☐	☐
7.9 If central exhaust fans, ≤ 1 HP, are installed as part of the dwelling-unit mechanical ventilation system, then they are direct-drive, ECM, with variable speed controllers. If > 1 HP, their motors meet or exceed efficiency standards for NEMA Premium ™ motors. [69]	☐	☐	☐
7.10 Air inlet locations (Complete if ventilation air inlet locations were installed (2.23, 2.24); otherwise check "N/A"): [70, 71]	-	-	☐
7.10.1 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.	☐	☐	-
7.10.2 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources not exiting the roof, and ≥ 3 ft. distance from dryer exhausts and sources exiting the roof. [72]	☐	☐	-
7.10.3 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 inch mesh.	☐	☐	-

8. Local Mechanical Exhaust (National HVAC Design Report Item # indicated in parenthesis)

Dwelling Unit Mechanical Exhaust – In each dwelling unit kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: [59, 73]

Location		**Continuous Rate**	**Intermittent Rate [74]**	**Must Correct**	**Rater Verified [4]**	**N/A [5]**
8.1 Kitchen	Airflow	≥ 5 ACH, based on kitchen volume [75, 76] (Alternative in Fn. 75)	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume [75, 76, 77]	☐	☐	-
	Sound	Recommended: ≤ 1 sone	Recommended: ≤ 3 sones			
8.2 Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM	☐	☐	-
	Sound	Required: ≤ 2 sones	Recommended: ≤ 3 sones			

Mechanical Exhaust for Common Spaces [2] and Shared Garages			
8.3 Measured exhaust rates are ≥ ASHRAE 62.1-2010 rates (2c). [62]	☐	☐	☐
8.4 Where an exhaust system is installed in a shared garage, it is equipped with controls that sense CO and NO2.	☐	☐	☐
9. Filtration			
9.1 MERV 6+ filter(s) installed in each ducted mechanical system serving an individual dwelling unit, designed so all return and mechanically supplied outdoor air passes through filter(s) prior to conditioning, and located to facilitate access & regular service by the occupant, building owner, or building maintenance staff. [78]	☐	☐	☐
9.1.1 Filter access panel includes gasket and fits snugly against the exposed edge of filter when closed to prevent bypass. [79]	☐	☐	☐
10. Combustion Appliances			
10.1 Furnaces, boilers, and water heaters located within the building's pressure boundary are mechanically drafted or direct-vented. Alternatives in Footnote 82. [80, 81]	☐	☐	☐
10.2 Fireplaces located within the building's pressure boundary are direct-vented. [80, 81]	☐	☐	☐
10.3 No unvented combustion appliances other than cooking ranges or ovens are located inside the building's pressure boundary. [80]	☐	☐	☐

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Other	Must Correct	LP Verified[49]	Rater Verified [4]	N/A [5]
11. Domestic Hot Water				
11.1 Prescriptive Path: Hot Water Equipment Minimum Efficiency Levels (must meet one of the following):				
11.1.1 Where rated in EF or UEF, meet or exceed the ENERGY STAR Multifamily Reference Design [83]	☐	-	☐	☐
11.1.2 Where rated in Et or COP:				
11.1.2a For all Versions except Nat'l v1.2, ≥ 95% Et if electric and ≥ 85% Et for other fuels.	☐	-	☐	☐
11.1.2b For Nat'l v1.2, ≥ 2.0 COP for electric serving dwelling units, ≥ 95% Et for electric serving common spaces, and ≥ 90% Et for other fuels.	☐	-	☐	☐
11.2 ERI Path: Hot Water Equipment Min. Efficiency Levels for equipment serving common spaces but not dwelling units nor shared laundry:				
11.2.1 For non-electric equipment: if rated in EF or UEF, meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design; if rated in Et ≥85%, or for Nat'l v1.2 ≥ 90%. [83]	☐	-	☐	☐
11.2.2 For electric equipment: ≥ 0.93 UEF, 0.95 EF or 95% Et. [83]	☐	-	☐	☐
12. Lighting				
12.1 Common Space [2] Lighting Controls:				
12.1.1 ERI and Prescriptive Path: All common spaces [2] (including shared garages), except the building lobby, mechanical equipment rooms, and where automatic shutoff would endanger the safety of occupants [84], have occupancy sensors, programmed timers, or automatic bi-level lighting controls installed and operation has been verified.	☐	☐	☐	☐
12.1.2 ASHRAE Path only: All common spaces [2] (including shared garages), except the building lobby, mechanical equipment rooms, corridors, and stairwells and where automatic shutoff would endanger the safety of occupants [84], have occupancy sensors or automatic bi-level lighting controls installed and operation has been verified.	☐	☐	☐	☐
12.2 Exterior lighting controls: Fixtures, including parking lot fixtures, must include automatic switching on timers or photocell controls except fixtures intended for 24-hour operation, required for security, or associated with the electric meter for an individual dwelling unit.	☐	☐	☐	☐
12.3 Common Spaces [2] and Garages: 90% of installed lighting fixtures are integrated LED fixtures or contain LED lamps. See Footnote 85 for alternate options.	☐	☐	☐	☐
12.4 ERI Path: All exterior and common space lighting fixtures meet the efficiency requirements in the ENERGY STAR Multifamily Reference Design, except fixtures located on dwelling unit balconies. [88, 89]	☐	-	☐	☐
12.5 Prescriptive Path: All lighting fixtures (i.e., dwelling units, common spaces, and exterior) meet the efficiency requirements in the ENERGY STAR Multifamily Reference Design. [88, 89]	☐	-	☐	☐
12.6 Prescriptive Path: Dwelling unit overall in-unit lighting power density ≤ 0.75 W/ft^2. When calculating overall lighting power density, use 1.1 W/ft^2 where lighting is not installed. [86]	☐	-	☐	☐

13. Appliances and Plumbing Fixtures	Must Correct	Rater Verified [4]	N/A [5]
13.1 Prescriptive Path: Installed appliances are ENERGY STAR certified. Installed bathroom faucets, bathroom aerators, and showerheads are WaterSense labeled. [90]	☐	☐	☐
13.2 ERI Path: Where installed in common spaces, refrigerators and dishwashers are ENERGY STAR certified and showerheads are WaterSense labeled.	☐	☐	☐
13.3 Prescriptive Path: Shower compartments with multiple fixtures cannot be operated simultaneously OR the total flow rate per shower compartment must not exceed 1.75 gallons per minute, as rated at 80 psi.	☐	☐	☐
14. Whole Building Energy Consumption Data Acquisition Strategy			
14.1 For buildings 50,000 ft^2 and larger, a strategy that enables the collection of monthly or annual building-level energy consumption data (electricity, natural gas, chilled water, steam, fuel oil, propane, etc.) has been confirmed. [91]	☐	☐	☐

Rater Name: _____ Rater Pre-Drywall Inspection Date(s):[92] _____ Rater Initials: _____

Rater Company Name: _____

Rater Name: _____ Rater Final Inspection Date(s)[93]: _____ Rater Initials: _____

Rater Company Name: _____

Builder/Developer Employee: _____ Builder Inspection Date(s): _____ Builder Initials: _____

Builder/Developer Name: _____

Licensed Professional: _____ LP Inspection Date(s): _____ LP Initials: _____

Footnotes:

1. This Checklist applies to all dwelling units, sleeping units, common spaces [2], and garages (open or enclosed) in the building being certified, and where specified, parking lots. These requirements apply to all Paths, unless otherwise specified. These requirements do not apply to parking garages or lots where the cost of the energy use of the parking garage or lot is not the responsibility of the Builder/Developer, Building Owner or Property Manager. This Checklist does not apply to commercial or retail spaces. This Checklist does not apply to common spaces [2] that are located in buildings on the property without any dwelling or sleeping units. A 'sleeping unit' as defined by ANSI / RESNET / ICC 301, is a room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Where the term 'dwelling unit' is used in this Checklist, the requirement is also required of 'sleeping' units. The term 'building' refers to a structure that encompasses dwelling/sleeping units and (if present) common spaces, sharing one or more of the following attributes: a common street address, a common entrance or exit, central/shared mechanical systems, or structurally interdependent wall or roof systems. Attached structures such as townhouses and 4-story two-unit structures (commonly referred to as "2-over-2s") may be considered separate buildings if they are divided by a vertical fire separation wall from the foundation to the roof sheathing and share none of the other attributes listed above. A skyway or a breezeway that connects two structures is not considered a common entrance or exit.
2. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents.
3. At the discretion of the Rater, the builder or developer may verify up to eight items in Sections 1-4 of this Checklist. For the purpose of this Checklist, "Builder" represents either the builder or the developer. When this allowance is used for Item 1.2 or 1.3, a maximum of 10% of the total surface area of the non-adiabatic insulated assemblies are permitted to be builder-verified; the remainder must be verified by the Rater. When exercised, the builder's responsibility will be formally acknowledged by the builder, or their designated agent, signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
4. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining.

   As stated in the National Program Requirements, for Townhouses, all items shall be verified for each certified home and sampling protocols shall not be used. For other multifamily building types, Raters who operate under an MRO or an HCO Sampling Protocol are permitted to verify any Checklist Item designated "Rater Verified" using an MRO or HCO-approved sampling protocol. No parties other than Raters are permitted to use sampling to complete this Checklist.
5. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the building or conflicts with local requirements.
6. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation ≥ R-3 in Climate Zones 1 to 4, ≥ R-5 in Climate Zones 5 to 8; [10] b) Grade II batts are permitted to be used in floors if they fill the full width and depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
7. Ensure compliance with this requirement using ANSI / RESNET / ICC 301 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is certified under, with approved exceptions listed at www.energystar.gov/ERIExceptions.
8. Window-to-Wall ratio is taken as the sum of all window area divided by the total exterior above-grade wall area. All decorative glass and skylight window area contribute to the total window area to above-grade wall ratio (WWR). Spandrel sections of curtain wall systems contribute to the above-grade wall area.
9. Compliance with Items 1.5 and 1.6 is not required for buildings pursuing the ASHRAE Path, but the energy used by the heating systems must be modeled following the requirements in the Simulation Guidelines, available at www.energystar.gov/mfguidance.
10. For all Versions except National v1.2, the 2009 IECC Climate Zone designations are applicable, as defined and illustrated in Section R301 of the code. For National v1.2, the 2021 IECC Climate Zone designations are applicable, as defined and illustrated in Section R301 of the code. Note that some locations have shifted to a different Climate Zone in the 2021 IECC compared to prior editions.
11. Where conditioned space is above the plenum, in lieu of insulating the top of the plenum, the bottom of the plenum may be used to comply with Items 1.5.2 and 1.5.3, if its insulation meets the requirements of Item 1.5.2 and, where applicable, Item 3.6. When using this alternative, the bottom of the plenum must meet all the requirements for floor insulation which include a fully-aligned air barrier as described in Footnote 13 and Grade I installation per Item 1.3.
12. The bottom of the heated plenum is permitted to be suspended ceiling tiles or other non-air barrier material. If fiberglass insulation is installed, it must be paper-faced. This insulation shall achieve a Grade I or Grade II install.
13. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.

    Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.

    If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.

14. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings, unless the ceiling is adiabatic.
15. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which ≥ 40% of the total gross wall area is below-grade.
16. EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8. [10]
17. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.
18. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
19. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation. Note that if the minimum designated values are used, then higher insulation values may be needed elsewhere to meet Item 1.2. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and / or high-density insulation.
20. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping. Low-slope roof hatch covers to be insulated to R-5 minimum.
21. Slab edge insulation is required for slab-on-grade floors with a floor surface less than 24 inches below grade. Slab perimeter insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of an interior, or exterior, slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. The following alternatives apply:
    a. Slab assemblies with an F-Factor equivalent to that of the insulation required in Item 3.4 may be used. F-Factors shall be determined using Table A6.3.1-1 from ASHRAE 90.1-2022 Appendix A. See www.energystar.gov/F-Factor for more details.
    b. The thermal break is permitted to be created using ≥ R-3 rigid insulation on top the slab. In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
22. Where an insulated wall separates a garage, patio, courtyard, porch, or other unconditioned space from the conditioned space of the building, slab perimeter insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab, if the slab is in contact with the ground, ambient, or unconditioned space at that interface. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the building's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted and non-exempted details is available at: www.energystar.gov/slabedge. If an exemption is used, then the Total UA Compliance option (5c) within the Multifamily Workbook must be used to demonstrate compliance with Item 1.2 if the ASHRAE Path or Prescriptive Path is used, and may be used to demonstrate compliance if the ERI Path is used. F-Factors shall be determined using Table A6.3.1-1 from ASHRAE 90.1-2022 Appendix A. See www.energystar.gov/F-Factor for more details.
23. Item 3.5 does not apply to the repeated concrete floor perimeter edges of a multistory building as those are subject to Item 3.7.1. Item 3.5 also does not apply where floor insulation meeting the requirements of Item 3.6 is installed above the slab and provides a continuous thermal boundary where it intersects the wall..
24. For the following podium constructions, a minimum of 8ft insulation is not required below the floor edge:
    a) Where podium wall is less than 8ft in height, insulation must instead be installed for the full height of the podium.
    b) For podiums that are at-grade or continue below-grade, insulate to a minimum of 8ft below the bottom of the slab edge, or a depth of 2ft., or 4 ft. for heated slabs in CZ 6-8, below-grade.
    c) Where a minimum of 4ft of insulation is installed on both interior and exterior surfaces of the wall.
    d) For podiums where the horizontal slab is not in direct contact with the exterior wall and R-5 insulation is provided at the slab edge, continuous with the under-slab insulation. See www.energystar.gov/slabedge for example.

    EPA has developed the following alternatives to comply with Item 3.5, instead of installing the insulation required:

    a) Projected concrete floors may use one of the options below:
        i. Install minimum R-2 insulation at the floor edge between conditioned space and the projected slab, AND:
            a. ASHRAE and Prescriptive Paths: Use the Total UA Compliance option (5c) within the Multifamily Workbook to demonstrate compliance with Item 1.2 and include a row that represents the floor edge.
            b. ERI Path: Model the floor edge using the R-value of the insulation provided (e.g., not the R-value of above-grade wall).
        ii. Install minimum R-5 insulation, above and below the concrete slab that extends horizontally for a minimum of 4 ft. Insulation installed on top of slab shall be covered by a durable floor surface. See www.energystar.gov/slabedge for example. When demonstrating compliance with Item 1.2, R-1 insulation may be associated with the area of the wall that is uninsulated due to the projected slab.
    b) All podiums and projected concrete floors, in lieu of installing the insulation required in Item 3.5, meet all of the following requirements:

i. Use the Total UA Compliance option (5c) within the Multifamily Workbook to demonstrate compliance with Item 1.2 and use the following U-factors:
   a. Where the above grade wall is in contact with a concrete floor above conditioned space, include a row that represents the floor-edge condition using a U-Factor of 1.20.
   b. Where the above grade wall is in contact with a concrete floor above unconditioned space, include a row that represents the floor-edge condition using a U-Factor of 1.64.

ii. Where using the ASHRAE or ERI Paths, in the energy model the concrete floor edge area must be modeled with R-0.

25. While EPA recommends insulating interior columns for a minimum of R-5 for 4 vertical feet and vertically along other areas of discontinuity, such as where walls intersect the concrete slab; this is not required.

26. Item 3.7 is applicable to walls that are adjacent to other buildings. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from this Item. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: www.energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf.

    Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 3.7 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide ≥ 50% of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 502.1.2. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 3.7 shall be checked.

27. Walls and rim / band joists using steel or other metal framing shall meet the reduced thermal bridging requirements by complying with Item 3.7.1 of the Checklist and may not demonstrate compliance using Item 3.7.2 or 3.7.3.

28. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentionally designed details. This exemption does not apply to steel columns or the repeated concrete floor perimeter edges of a multistory building. To calculate the exempted wall area, the Rater shall sum the areas of the following features that either prevent the use of, or interrupt, continuous insulation when they are present in the design: architectural details (e.g., wing walls, shading devices, roof overhangs, projected balconies, brick returns, stone window sills, metal panels, or masonry fireplaces); cladding details (e.g., non-thermally broken shelf angles, metal clips, metal brackets, and metal z-girts; but not stand-off shelf angles, screws, bolts, or brick ties); mechanical openings (e.g., PTACs, PTHPs, through-wall air conditioners). It shall be apparent to the Rater that the exempted areas are intentionally designed details, or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the building.

29. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details listed in Item 3.7.3 shall be met for those wall sections.

30. In a building undergoing a gut rehabilitation, continuous interior insulation may be used in lieu of continuous exterior rigid insulation or insulated siding. This alternative does not require continuous interior insulation where a floor intersects an exterior wall, it only requires it from floor to ceiling. Continuous interior insulation is required where the demising wall intersects the exterior wall; however, it may be exempted per Footnote 28.

31. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Item 3.7.1 of the Checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.

32. Rim / band joists are exempt from this requirement. For the purpose of this requirement, "≤ 3 stories" refers to any portion of the building elevation where the wood-framed walls do not exceed 3 stories in height. Partial floors that meet the definition of a mezzanine or loft, as defined by the 2012 IRC, do not count as a story. All 'advanced framing' details shall be met except where the builder, architect, or engineer provides a framing plan that encompasses the details in question, indicating that structural members are required at these locations and including the rationale for these members (e.g., full-depth solid framing is required at wall corners or interior / exterior wall intersections for shear strength, a full-depth solid header is required above a window to transfer load to jacks studs, or additional jack studs are required to support transferred loads). The Rater shall retain a copy of the detail and rationale for their records, but need not evaluate the rationale to certify the building.

33. All exterior corners shall be constructed to allow access for the installation of ≥ R-6 insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.

34. Compliance options include continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly. R-value requirement refers to manufacturer's nominal insulation value.

35. Insulation shall run behind interior / exterior wall intersections using ladder blocking, full length 2x6 or 1x6 furring behind the first partition stud, drywall clips, or other equivalent alternative.

36. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam. [10]

37. For dwelling or sleeping units adjacent to garages, EPA recommends, but does not require, carbon monoxide (CO) alarms installed in a central location in the immediate vicinity of each separate sleeping zone and according to NFPA 720.

38. Where a sampling protocol is permitted in accordance with the National or California Program Requirements, at least 20% of the dwelling or sleeping units adjacent to a garage shall be selected for testing.

39. A 'ducted return' is defined as a continuous duct made of sheet metal, duct board, or flexible duct that connects one or more return grilles to the return-side inlet of the air handler. Any other approach to convey air from return or transfer grille(s) to the air handler, such as the use of building cavities, does not constitute a 'ducted return'. Where there are no 'ducted returns', the duct leakage test shall include the leakage from the air handler and supply side of the forced air system. Where building cavities used to return air to the air handler are included in the duct leakage test, the allowances for "One or two ducted returns" shall be permitted.
40. This section of the Checklist is designed to meet ASHRAE 62.1-2010 or later, ASHRAE 62.2-2010 or later, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance or by occupant behavior). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
41. To be eligible for Track A – HVAC Grading by Rater, dwelling units must have at least one unitary HVAC system including air conditioners or heat pumps up to 65 kBtuh, or furnaces up to 125 kBtuh (i.e., within the scope of ANSI / RESNET / ACCA Standard 310). Track A – HVAC Grading by Rater shall use ANSI / RESNET / ACCA 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under for all dwelling units.
42. For Track A, all unitary HVAC Systems including air conditioners and heat pumps up to 65 kBtuh and furnaces up to 125 kBtuh serving individual dwelling units shall comply with 5a.1 through 5a.4 for the building to be certified. Common spaces with those systems may choose to use ANSI / RESNET / ACCA 310 and complete Items 5a.1 through 5a.3, or to complete Item 5a.4 and Sections 2 and 3 on the National HVAC Functional Testing Checklist.

    For Track B, Item 5b.1 is applicable for all systems. Item 5b.2 is applicable to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). All systems shall comply with 5b.1 and 5b.2, as applicable, for the building to be certified.

    If, based on the selected Track, an Item in Section 5 is not applicable to any systems in the building, the Rater shall mark 'N/A' for that Item.
43. If the non-invasive procedure in ANSI / RESNET / ACCA 310 is not permitted to be used during the final inspection of a unit (i.e., due to the equipment type or to outdoor air temperatures that do not meet the requirements of the non-invasive method), then the unit is permitted to be certified with a default refrigerant charge designation of Grade III. Note that in these circumstances, the weigh-in method procedure in ANSI / RESNET / ACCA 310 may still be used to pursue a Grade I designation.
44. While this verification is completed as part of ANSI / RESNET / ACCA 310, it must also be documented in this checklist.
45. If installed equipment does not match the National HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated National HVAC Design Report) confirming that the installed equipment meets the requirements of the National HVAC Design Report. In addition, the Rater shall verify that all installed equipment are still exempted types per Footnote 29 of the National HVAC Design Report or, if no longer an exempted type, shall re-review Section 4b of the National Rater Design Review Checklist to ensure compliance with all requirements (e.g., full completion of HVAC Design Report, HVAC design tolerances). In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor or Functional Testing Agent after installation is complete.
46. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the dwelling unit. Ductless systems and systems with a total amount of supply ductwork or distribution building cavities ≤ 10 ft. in length are exempted from this requirement. The Rater is also not required to measure external static pressure for multi-split systems and may mark "N/A".
47. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in Exhibit X. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 5.11, or stairwells where automatic thermostatic controls prevent operation above 50°F.
48. Functional Testing Agents must hold an approved credential, as listed at www.energystar.gov/ftas, or must be a representative of the Original Equipment Manufacturer (OEM), or a contractor credentialed by an HVAC Quality Installation Training and Oversight Organization (H-QUITO), if not completing Sections 6 and higher. Functional Testing Agents may not be the installing contractor, nor employed by the same company as the installing contractor, unless they are a credentialed contractor. An explanation of the credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at www.energystar.gov/findhvac. A directory of other FT Agents can be found at www.energystar.gov/ftas. Raters can confirm FT Agents have met the requirements by documenting they are listed in a directory. For Track A Sections 2 and 3 of the National HVAC Functional Testing Checklist do not need to be completed for systems using ANSI / ACCA / RESNET 310 and meeting Items 5a.1 – 5a.3.
49. At the discretion of the Rater, a Licensed Professional (LP), (i.e., a Registered Architect or Professional Engineer in good standing and with a current license), may verify any of the items in Sections 5, 11, and 12 of this Checklist, where a checkbox is provided for "LP Verified". When exercised, the LP's responsibility will be formally acknowledged by the LP signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
50. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
51. Item 6.2 does not apply to ventilation ducts, exhaust ducts, or non-ducted systems. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. When verifying this requirement, doors separating bedrooms from the main

body of the dwelling unit (e.g., a door between a bedroom and a hallway) shall be closed and doors to rooms that can only be entered from the bedroom (e.g., a closet, a bathroom) shall be open. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.

52. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit mechanical ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
53. Items 6.4 and 6.5 generally apply to the ducts of space heating, space cooling, and dwelling-unit mechanical ventilation systems.

    However, visual inspection is permitted in lieu of testing for the following system types: 1) a dwelling-unit mechanical ventilation system not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves; 2) a space heating or space cooling system for which the ducts and air handler are in conditioned space and the total supply duct length of the system, including all supply trunks and branches, is ≤ 10 ft; and 3) a space heating or space cooling system that serves more than one dwelling unit. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.

    For duct systems requiring testing, duct leakage shall be determined and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis.
54. Note that compliance with Item 6.4.1 or 6.4.2 in conjunction with Section 4a of the National Rater Design Review Checklist automatically achieves Grade I total duct leakage per ANSI / RESNET / ACCA 310.
55. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test.
56. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
57. Testing of duct leakage to the outdoors can be waived in accordance with the 2nd or 3rd alternative of ANSI / RESNET / ICC 301, Table 4.2.2 (1), footnote (w). Alternatively, testing of duct leakage to outdoors can be waived in accordance with Section 5.5.2 of ANSI / RESNET / ICC 380 if total duct leakage, at rough-in or final, is ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25, whichever is larger. Guidance to assist partners with these alternatives, including modeling inputs, is available at www.energystar.gov/newhomesguidance.
58. For the purpose of computing leakage allowance, at rough-in, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 133% of the sum of the design exhaust airflow of the dwelling units served by that fan. At final, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 143% of the sum of the design exhaust airflow of the dwelling units served by that fan. To calculate central exhaust duct leakage allowance, EPA recommends using worksheet 3b of the Multifamily Workbook. Measured fan flow (either at the fan itself or the total airflow measured from all exhaust grilles served by the fan) may be used in lieu of the rated fan flow to determine the leakage allowance. Duct leakage shall be tested at the design or average operating pressure and shall use the procedures in the *RESNET Guidelines for Multifamily Energy Ratings*, available at www.resnet.us/blog/resnet-adopts-guidelines-for-multifamily-energy-ratings/. Where testing at the design or average operating pressure is not feasible, testing at 50 Pa is permitted, however the following flow equation must be used to determine the leakage allowance at 50 Pa.

    $$CFM_{50} = CFM_{design} / [P_{design}^{(0.65)} / 50^{(0.65)}]$$

    No less than 50% of the ductwork, based on total linear feet, shall be tested and must include ductwork other than the main trunks. Where portions of ductwork are tested, rather than entire risers, the percentage of leakage allowed is based upon the design airflow of the dwelling units that are exhausted in that portion. Where failures occur, the percentage of total linear feet required to be tested increases by 10%.

    Where aerosol-based sealant is used on 100% of the exhaust ductwork between the fan and the grilles, the duct-sealing contractor is permitted to perform the test, but sampling is not permitted. Where tested at 25 Pa, the leakage allowance is permitted to be reduced according to the equation above by substituting "25" for "50". The Rater is not required to witness these tests. Where aerosol-based sealant is used on some but not all ductwork, the ductwork selected for testing must be representative of all sealing strategies used. This test is not required of central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.
59. As defined by ANSI / RESNET / ICC 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
60. Item 7.5 applies to any outdoor air inlet connected to a ducted return of the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). This Item does not apply to HVAC systems without a ducted return.
61. The dwelling-unit ventilation air flows and local exhaust air flows shall be determined and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. In Item 7.2, the dwelling-unit ventilation rates required by ASHRAE 62.2-2010 can be calculated using the Multifamily Workbook or the following equation: 0.01 x Conditioned Floor Area + 7.5 x (number of bedrooms + 1). For sleeping units, the following equation must be used: 0.01 x Conditioned Floor Area + 7.5 x (number of beds). Where local codes do not permit dwelling-unit ventilation to exceed ASHRAE 62.2-2010 rates, Rater-measured ventilation rate is permitted to be 0-15 CFM less than rates required by ASHRAE 62.2-2010. Designers are permitted to provide multiple combinations of a design ventilation airflow rate, run-time per cycle, and cycle time. When multiple combinations are provided, the Rater shall first assess the run-time setting of the installed system and use that to determine the corresponding design ventilation rate. The Rater-measured ventilation rate must fall within the program-specified tolerance relative to that design ventilation rate.
62. While common spaces are not under the scope of ANSI / RESNET / ICC 380, the ventilation air flow and exhaust air flows in common spaces shall be measured in accordance with the procedures in ANSI / RESNET / ICC 380. The air flows may be measured by a Rater or a certified air-balancing contractor under the observation of a Rater. Sampling is only permitted where airflows are measured directly by the Rater. Where a system provides supply air that is a mix of return and outdoor air, and not 100% outdoor air, the outdoor air airflow shall be measured

and compared to the total supply airflow to determine percentage of outdoor air supplied. This percentage shall be applied to airflow measured at supply registers to determine outdoor air provided for comparison to design airflow rates. Where the building has total corridor space ≤ 250 ft^2 and does not contain any of the other common spaces which require outdoor air per Item 2.2 of the National HVAC Design Report, outdoor air is not required to be provided to the corridor.

63. For permits on or before 01/01/2024, where outdoor air is supplied via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
64. For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.

    In dwelling / sleeping units in multifamily buildings, but not townhouses, automatic restriction of airflow is exempted if a manual shutoff damper is used with a continuous exhaust ventilation system and is readily-accessible, labeled as the override, and not used as a balancing damper.
65. When assessing the ventilation rate, the highest HVAC fan speed applicable to ventilation mode shall be used (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, then test in this mode). If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required.

    When required, the ventilation airflow through the inlet shall be measured and documented by a Rater using ANSI / RESNET / ICC 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the schedule defined by the HCO or MRO that the building is being certified under. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
66. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.7 of the National HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grille. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
67. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
68. Bathroom fans with a rated flow rate ≥ 500 CFM and heat/energy recovery ventilation fans are exempted from the requirement to be ENERGY STAR certified.
69. As an alternative to meeting or exceeding the efficiency standards for NEMA Premium motors, documentation that an exhaust fan motor has a fan energy index (FEI) ≥ 1.2 at the design point of operation OR a fan efficacy ≥ 1.1 CFM/Watt is permitted.
70. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building owner or maintenance staff. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.10 and the Rater shall mark "N/A".
71. Two alternatives to the required 10 ft. distance are provided: 1) inlets providing outdoor air to a dwelling unit are permitted to be ≥ 5 ft. of stretched-string distance from outlets of both exhaust dwelling-unit mechanical ventilation systems and local mechanical exhaust systems, and 2) the outlet and inlet of ERV's and HRV's may use a smaller distance if allowed by the manufacturer of the system. If the second alternative is used, the manufacturer's instructions shall be collected for documentation purposes.
72. Known contamination sources include, but are not limited to, stacks, vents, exhausts, and vehicles.
73. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
74. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
75. Where 5 ACH is selected, kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume. As an alternative to 5 ACH for Dwelling Units and Sleeping Units (but not Townhouses), 50 CFM of continuous exhaust is permitted to be used, regardless of kitchen volume. In such cases, the edge of the exhaust fan or intake grille shall be located within 10 ft of the edge of the range, as measured horizontally on the floor plan.
76. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 or later are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown, ≥ 6 in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at www.energystar.gov/newhomesguidance. As an alternative to Item 8.1, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) Phius or PHI certified, or b) provide both dwelling-unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 1.0 ACH50 or ≤ 0.05 CFM50 per sq. ft. of Enclosure Area. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.

77. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
78. Based upon, ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space with a total amount of supply ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. While filters are recommended for mini-split systems, HRV's, and ERV's, these systems, ducted or not, typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the requirements. HVAC filters located in the attic shall be considered accessible to the occupant, building owner, or building maintenance staff if either 1) drop-down stairs, a pull-down ladder, or door provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter or 2) the filter location enables arm-length access from a portable ladder without the need to step into the attic and the height of the ceiling access panel or the bottom of the wall access panel where access is provided is ≤ 12 ft.
79. Sealing mechanisms comparable to a gasket are also permitted to be used. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grille.
80. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
81. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
82. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed.
83. Where water heater efficiency is rated in Uniform Energy Factor (UEF) rather than Energy Factor (EF), the EF may be calculated from the Uniform Energy Factor (UEF) using the RESNET EF Calculator 2017. The calculated EF must meet the efficiency levels specified in the ENERGY STAR Multifamily Reference Design. Alternatively, electric water heaters serving dwelling units in buildings following National Version 1 or National Version 1.1, or serving common spaces following any Version, are permitted to be rated at 0.92 UEF instead of 0.93 UEF if the water heater rated storage volume is ≤ 50 gallons and the water heater height is ≤ 40 inches.
84. For common spaces where automatic lighting controls are not installed due to safety concerns associated with automatic lighting shutoff, the architect or engineer must provide the specific location(s) where this concern is applicable. The Rater shall retain a copy of the email or letter that documents the location(s) for their records and check the box in the "Rater Verified" column. For Item 12.1.1, this exemption does not apply to corridors or stairwells; where safety is a concern in those spaces, the ASHRAE Path should be pursued.
85. As an alternative to the efficiency requirements in Item 12.3, installed lighting may instead meet the following lighting power allowances. In common spaces (except garages), for ERI and Prescriptive Path, total installed lighting power for the combined common spaces ^{2} must not exceed ASHRAE 90.1-2007 allowances for those combined spaces, using the Space-by-Space or Building Area Method. For ASHRAE Path, total installed lighting power for the combined common spaces ^{2} must not exceed ASHRAE 90.1-2007 allowances for those combined spaces, using the Space-by-Space or Building Area Method, by more than 20%. In addition, for ASHRAE Path, where the proposed lighting power in a given space is modeled with 30% or greater savings compared to the allowance in the Simulation Guidelines, field measurement of footcandles is required. For all Paths, see Footnote 86 and 87 for allowances.
In shared garages, installed lighting shall not exceed 0.24 W/ft^2.
86. Senior housing buildings can use the space-by-space allowances for 'facilities for the visually impaired' in ASHRAE 90.1-2016 Appendix G Table G3.7 for spaces used primarily by building residents. For example, 1.15 W/SF lighting power allowance may be used for the corridors in the baseline. To qualify for the increased allowance, the building must be designed to comply with the light levels in ANSI / IES RP-28 and must provide housing for seniors and/or people with special visual needs. Prescriptive Path dwelling unit overall in-unit lighting power density is permitted to be ≤ 1.3 W/SF, using 1.65 W/SF where lighting is not installed.
87. Lighting power density values from ASHRAE 90.1-2007 Section 9 for Space-by-Space Method for typical common spaces in multifamily properties are shown in the table below. Buildings following the Building Area method, the lighting power density is 0.7 W/ft^2. For spaces not shown, refer to ASHRAE 90.1-2007 Section 9.

ASHRAE Space Type	Lighting Power Densities (W/ft^2)	ASHRAE Space Type	Lighting Power Densities (W/ft^2)	ASHRAE Space Type	Lighting Power Densities (W/ft^2)
Lobby / Elevator	1.3	Corridor / Transition	0.5	Office	1.1
Active Storage (e.g., trash chute / room, janitor closet)	0.8	Stairs – Active	0.6	Lounge / Recreation / Community Room / Computer Room	1.2
Inactive Storage (e.g., tenant storage)	0.3	Restroom	0.9	Electrical / Mechanical	1.5
Exercise Area / Room	0.9	Laundry Room	1.3	Workshop	1.9

88. This requirement applies to exterior lighting fixtures that are attached to the building, but does not apply to landscape or parking lot lighting fixtures.

89. For Prescriptive Path dwelling units, ENERGY STAR certified fixtures or light bulbs are required; however, the Rater is only responsible for verifying that the installed lighting meets the Tier I or Tier II definition specified in ANSI / RESNET / ICC 301. For locations outside the dwelling unit, as an alternative to ENERGY STAR certified fixtures or light bulbs, integrated LED fixtures or fixtures containing LED or fluorescent lamps are permitted. Note that for all locations in Version 1.2, light fixtures must be integrated LED fixtures or contain LED lamps and not fluorescent.
90. Appliances include refrigerators, dishwashers, clothes washers, and clothes dryers. Where an appliance type is not eligible for ENERGY STAR certification, (e.g., commercial dryers) the appliance is exempt from this requirement. Where a bathroom faucet or aerator is not eligible for WaterSense certification, (e.g., public use lavatory faucets) the fixture is exempt from this requirement.
91. Building area shall be calculated according to Gross Floor Area as defined by ENERGY STAR Portfolio Manager, which specifies to measure from the outside surface of exterior walls and includes all areas inside the building and excludes parking areas. Refer to the ENERGY STAR Portfolio Manager Glossary for a complete definition. Strategies include: an agreement with the utility companies to provide the aggregated building-level data, in a spreadsheet format or directly through Portfolio Manager; OR evidence that securing signed utility data release forms will be a mandatory component of all lease agreements; OR installation of a building-level energy monitor, data acquisition system, or utility-owned energy meter. If an energy monitor is installed, the builder shall provide the building operator with the manufacturer's documentation and operations manual. EPA recommends, but does not require, that one of these strategies also be implemented in buildings 25,000-49,999 ft^2.
92. Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection.

    If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Furthermore, it is not acceptable to complete a Sampled Rating on a unit that has missed the pre-drywall inspection. Additional information is available in the Technical Bulletin: Pre-Drywall Inspection Is Always Required.
93. Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.

Exhibit X – Prescriptive Minimum Heating and Cooling Equipment Efficiencies based on Version the building is certified to. Version 1, Version 1.1, and Oregon and Washington Version 1.2: †

Equipment Type	Minimum Efficiency
Room AC (window, through-wall, ductless mini-splits)	ENERGY STAR certified
Air conditioners, air cooled (<13 Kbtu/h)	13 SEER
Air conditioners, air cooled (≥13 and <65 Kbtu/h)	See Reference Design
Air conditioners, air cooled (≥65 and <240 Kbtu/h)	11.5 EER/12.0 IEER
Air conditioners, air cooled (≥240 and < 760 Kbtu/h)	10.0 EER/10.5 IEER
Electric resistance space heating [47]	• Not permitted in any dwelling unit using the Prescriptive Path • Electric resistance heating specified in common spaces and garages have a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls
Warm-Air Furnace (<225 KBtu/h, common spaces)	78% AFUE or 80% Et
Warm-Air Furnace (<225 KBtu/h, dwelling units)	See Reference Design. For PTAC, use 80% Et
Warm-Air Furnace (≥225 KBtu/h)	80% Et (gas) or 81% Et (oil)
Packaged Terminal Air Conditioner (PTAC < 7 kBtu/h)	11.9 EER
Packaged Terminal Air Conditioner (PTAC > 15 kBtu/h)	9.5 EER
Packaged Terminal Air Conditioner (≥7 and ≤15 KBtu/h)	14.0 – (0.300 X Cap/1000) EER
Packaged Terminal Heat Pump (PTHP)	Cooling: 14.0– (0.3 X Cap/1000) EER Heating: 3.7– (0.052 X Cap/1000) COP
Air cooled heat pump (≥13 and <65 KBtu/h)	See Reference Design
Air cooled heat pump (≥65 and <240 KBtu/h)	Cooling: 11.1 EER/11.6 IEER Heating: 3.3 COP (@47°F DB)
Air cooled heat pump (≥240 KBtu/h)	Cooling: 9.6 EER/9.6 IEER Heating: 3.2 COP (@47°F DB)
Water-source heat pump (<135 KBtu/h)	Cooling: 14.0 EER(86°F entering water) Heating: 4.2 COP(68°F entering water)
Boilers, hot water (<300,000 Btu/h)	See Reference Design
Boilers, hot water (≥300,000 Btu/h)	86% E_t (89% E_t if using heat pumps)
VRF Air Conditioners and Heat Pumps	See Tables 6.8.1I and 6.8.1J of ASHRAE 90.1-2010
Air-cooled chillers with or without condenser	10.0 EER / 12.5 IPLV
Water-cooled chiller, positive displacement (<75 tons)	0.780 kW/ton (Full load) / 0.630 kW/ton (IPLV)
Water-cooled chiller, positive displacement (75-150 tons)	0.775 kW/ton (Full load) / 0.615 kW/ton (IPLV)
Water-cooled chiller, positive displacement (150-300tons)	0.680 kW/ton (Full load) / 0.580 kW/ton (IPLV)
Water-cooled chiller, positive displacement (>300 tons)	0.620 kW/ton (Full load) / 0.540 kW/ton (IPLV)
Water-cooled, centrifugal (<300 tons)	0.634 kW/ton (Full load) / 0.596 kW/ton (IPLV)
Water-cooled, centrifugal (≥300 and <600 tons)	0.576 kW/ton (Full load) / 0.549 kW/ton (IPLV)
Water-cooled, centrifugal (≥600 tons)	0.570 kW/ton (Full load) / 0.539 kW/ton (IPLV)
Air-cooled absorption single effect chiller	0.6 COP
Water-cooled absorption single effect chiller	0.7 COP
Absorption double effect indirect-fired chiller	1.0 COP (Full load) / 1.05 COP (IPLV)
Absorption double effect direct-fired chiller	1.0 COP (Full load) / 1.00 COP (IPLV)
Open-loop propeller or axial fan cooling towers*	>40 gpm/hp (@95°F entering water, 85°F leaving water, 75°F wb entering air)
Closed-loop propeller or axial fan cooling towers*	>15 gpm/hp (@102°F entering water, 90°F leaving water, 75°F wb entering air)
Open-loop centrifugal fan cooling towers*	>22 gpm/hp (@95°F entering water, 85°F leaving water, 75°F wb entering air)
Closed-loop centrifugal fan cooling towers*	>8 gpm/hp (@102°F entering water, 90°F leaving water, 75°F wb entering air)
Air source DX-DOAS (dehumidification mode)	4.0 ISMRE
Air source DX-DOAS (heat pump, heating mode)	2.7 ISCOP
Other DX-DOAS (e.g., water source)	See ASHRAE 90.1-2016; Table 6.8.1-15

Cap means the rated capacity of the product in Btu/h. If < 7,000 Btu/h, use 7,000; if > 15,000, use 15,000 in calculation.
† For Equipment Types not listed here, minimum efficiencies shall be based on those listed in ASHRAE 90.1-2010.
*Cooling tower fan motors must be equipped with VFD controlled by a temperature sensor on the condenser water supply pipe.

Version 1.2:

For Equipment Types not listed here, minimum efficiencies shall be based on 5% improvement over those listed in ASHRAE 90.1-2019. Use the efficiency values for "after 1/1/2023" where listed.

Equipment Type	CZ 1-4 [10]	CZ 4C-8 [10]
Room AC (window, through-wall)	ENERGY STAR certified	
Air conditioners, air cooled (Split system & single package)		
Air conditioners, air cooled (<65 kBtu/h)	See Reference Design	
Air conditioners, air cooled (≥65 and <135 kBtu/h)	15.7 IEER	14.6 IEER
Air conditioners, air cooled (≥135 and <240 kBtu/h)	15.1 IEER	14.0 IEER
Air conditioners, air cooled (≥240 and < 760 kBtu/h)	14.1 IEER	13.0 IEER
Electric resistance space heating [47]	• Not permitted in any dwelling unit using the Prescriptive Path • Electric resistance heating specified in common spaces has a total heating capacity ≤ 12 kBtu/h (3.5 kW) per enclosed space and has automatic thermostatic controls	
Warm-Air Furnace (<225 kBtu/h, common spaces)	See Reference Design	CZ 5-8 90% AFUE
Warm-Air Furnace (≥225 kBtu/h, common spaces)	80% Et	81% Et
Warm-Air Furnace (dwelling units)	See Reference Design	
Packaged Terminal Air Conditioner (PTAC), w/gas-fired heat (dwelling units)	80% Et	82% Et, AND 0.25 cfm50/ft2 avg per unit
PTAC (dwelling units)	12.5 EER	11.9 EER
PTAC (common spaces)	<7 kBtu/h: 12.5 EER	<7 kBtu/h: 11.9 EER
	≥7 and ≤15 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	>15 kBtu/h: 10.0 EER	>15 kBtu/h: 9.5 EER
Packaged Terminal Heat Pump (PTHP) (cooling) †	<7 kBtu/h: 12.5 EER	<7 kBtu/h: 11.9 EER
PTHP (dwelling units, cooling) †	≥7 and ≤ 10 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤ 15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	> 10 kBtu/h: 11.5 EER	> 15 kBtu/h: 9.5 EER
PTHP (common spaces, cooling) †	≥7 and ≤ 15 kBtu/h: 14.7 - (0.320 X Cap/1000) EER	≥7 and ≤ 15 kBtu/h: 14.0 - (0.300 X Cap/1000) EER
	>15 kBtu/h: 10.0 EER	>15 kBtu/h: 9.5 EER
PTHP (dwelling units, heating) †	< 8 kBtu/h: 3.3 COP ≥ 8 kBtu: 3.7– (0.052 X Cap/1000)	3.4 COP
PTHP (common spaces, heating) †	<7 kBtu/h: 3.3 COP	<10.5 kBtu/h: 3.4 COP
	≥7 and ≤15 kBtu/h: 3.7– (0.052 X Cap/1000) COP	≥10.5 and ≤12 kBtu/h: 3.3 COP
	> 15 kBtu/h: 2.9 COP	> 12 kBtu/h: 3.2 COP
Air cooled heat pump (Split system and single package) †		
Air cooled heat pump (<65 kBtu/h)	See Reference Design	
Air cooled heat pump (≥65 and <135 kBtu/h)	15.1 IEER, 3.5 COP	
Air cooled heat pump (≥135 and <240 kBtu/h)	14.4 IEER, 3.4 COP	
VRF Air Conditioners and Heat Pumps†	16.2 IEER, 3.3 COP	
Water-loop heat pump (WLHP) (<135 kBtu/h) †	15.0 EER, 4.5 COP	
Boilers, hot water (<300,000 Btu/h, dwelling units)	See Reference Design	
Boilers, hot water (≥300,000 Btu/h, dwelling units)	CZ 1-3 80% Et CZ 4 86% Et (89% Et with WLHP)	95% Et (90% Et with WLHP)
Boilers, hot water (common Spaces)	CZ 1-3 80% AFUE or Et CZ 4 86% AFUE or Et	86% AFUE or Et

Cap means the rated capacity of the product in Btu/h.

† Where domestic hot water is provided by heat pump water heaters, the systems noted above with an † may instead meet the efficiency listed in ASHRAE 90.1-2019. Use the efficiency values for “after 1/1/2023” where listed.

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