

# REQUEST for PROPOSALS



## Scattered Sites Single Family Homes Rehab - Phase 1

**PROPOSAL DUE DATE: JULY 14, 2022 by 2:00 P.M.**

**Julia A. Gibbs  
Procurement Coordinator**

**COLUMBIA HOUSING AUTHORITY  
NOTICE TO BIDDERS**

Columbia Housing Authority will receive sealed bids for Project named Columbia Scattered Site Rehab Phase I.

Columbia, South Carolina

Bids will be received until 1:00 p.m. local time on the 14th day of July 2022 at the offices of Columbia Housing Authority located at 1917 Harden Street, Columbia, South Carolina, 29204. There will not be any in person bid opening. No in person drop-offs of bids.

A pre-bid meeting shall take place on the 30th day, of June 2022 at 1:00 p.m. at Columbia Housing Authority located at 1917 Harden Street, Columbia, South Carolina, 29204.

Bidders to obtain bid documents by contacting the architect at [info@1919architects.com](mailto:info@1919architects.com) or the Columbia Housing Authority.

Bids will be e-mailed to [jgibbs@columbiahousingsc.org](mailto:jgibbs@columbiahousingsc.org) or mail a thumb drive to 1917 Harden Attn: Juila Gibbs and clearly marked "**Columbia SFH Rehab Phase I**". Please mark mailed envelopes with Columbia SFH Rehab Phase 1.

Bid Bond executed by the bidder and acceptable sureties in an amount of not less than 5% of the base bid shall be submitted with each bid. Failure to submit an acceptable bid bond with the bid will result in the rejection of the bid.

Attention is called to the provisions for Equal Employment Opportunity and payment of not less than the minimum salaries and wages set forth in the bid documents. This project will require compliance to the Davis-Bacon Wage Decisions and the Section 3 requirements as listed in the contract documents.

All Contractors who are awarded construction related contracts must document Affirmative Action to ensure Equal Opportunity in Employment. This documentation is subject to review by the Regional Office of the Department of Labor. As a part of normal contract administration, Columbia Housing Authority is responsible for determining the Contractor's compliance with the Equal Employment Opportunity Clause and Affirmative Action Requirements as well as the Contractor's performance in executing those requirements.

All MBE/DBE/WBE Contractors, Subcontractors and Suppliers are encouraged to participate on Columbia Housing Authority projects.

Columbia Housing Authority reserves the right to accept or reject any and all bids and to waive any and all technicalities.

No bid shall be withdrawn for a period of (90) calendar days subsequent to the opening of the bids without the written consent of Columbia Housing Authority.

**COLUMBIA HOUSING AUTHORITY**

# PROJECT MANUAL

## SCATTERED SITE SINGLE FAMILY HOME REHAB PHASE I

Columbia, South Carolina

Architect Project #21-12740

### Owner:

Columbia Housing Authority  
1917 Harden Street,  
Columbia, South Carolina 29204

### Architect:

1919 Architects  
4000 Morsay Drive,  
Rockford, IL 61107



June 6, 2022

## TABLE OF CONTENTS

### **INTRODUCTORY INFORMATION, BIDDING & CONTRACT DOCUMENTATION**

	Notice to Bidder .....	1
	HUD Instruction to Bidders (HUD-5369) .....	1-5
	Bid Requirements .....	1
	Bid Form .....	1-2
	Bid Bond .....	1-2
	Hold Harmless Agreement.....	1
	Non-Collusive Affidavit.....	1
	Certification of Non-Segregated Facilities .....	1
	Section 3 Agreement .....	1-2
	Representations, Certificates, & Other Statements of Bidders (HUD-5369A)....	1-4
	Sample Agreement.....	1-2
	General Conditions (HUD-5370) .....	1-19
	Federal Labor Standards Provisions (HUD-4010).....	1-5
	Wage Rates- Davis-Bacon Wage Decisions.....	1-5
	Special Conditions.....	1-3
	Request for Acceptance of Subcontractors .....	1
00 6000	Project Forms .....	00 6000 – 1
00 7300	Supplementary Conditions .....	00 7300 – 1-3

### **DIVISION 01 – GENERAL REQUIREMENTS**

01 1000	Summary.....	01 1000 – 1-2
01 2100	Allowances.....	01 2100 – 1-2
01 2300	Alternates .....	01 2300 – 1-2
01 2500	Substitution Procedures .....	01 2500 – 1-4
01 2600	Contract Modification Procedures .....	01 2600 – 1-3
01 2900	Payment Procedures .....	01 2900 – 1-4
01 3000	Administrative Requirements.....	01 3000 – 1-2
01 3100	Project Management and Coordination.....	01 3100 – 1-6
01 3300	Submittal Procedures .....	01 3300 – 1-7
01 3516	Alteration Project Procedures .....	01 3516 – 1-9
01 4000	Quality Requirements.....	01 4000 – 1
01 5000	Temporary Facilities and Controls.....	01 5000 – 1
01 6000	Product Requirements.....	01 6000 – 1
	Product Substitution Approval Form .....	1
01 7300	Execution .....	01 7300 – 1-7
01 7700	Closeout Procedures.....	01 7700 – 1-5
01 7823	Operation and Maintenance Data.....	01 7823 – 1-4
01 7839	Project Record Documents.....	01 7839 – 1-4

### **TECHNICAL SPECIFICATIONS**

#### **DIVISION 02 – EXISTING CONDITIONS**

02 4119	Selective Demolition.....	02 4119 – 1-5
---------	---------------------------	---------------

#### **DIVISION 03 – CONCRETE**

03 2000	Concrete Reinforcing .....	03 2000 – 1-2
03 3000	Cast-In-Place Concrete .....	03 3000 – 1-14

#### **DIVISION 04 – MASONRY**

04 0120.64	Brick Masonry Repointing .....	04 0120.64 – 1-9
04 0123	Brick Masonry Repair .....	04 0123 – 1-4
04 2000	Unit Masonry.....	04 2000 – 1-8

**DIVISION 06 – WOODS, PLASTICS, AND COMPOSITES**

06 1000	Rough Carpentry.....	06 1000 – 1-4
06 1600	Sheathing.....	06 1600 – 1-3
06 2000	Finish Carpentry.....	06 2000 – 1-3
06 4023	Interior Architectural Woodwork.....	06 4023 – 1-6
06 6100	Solid Surface Tub Surrounds.....	06 6100 – 1-2
06 6113	Stimulated Stone Fabrications .....	06 6113 – 1-7
06 7300	Composite Decks and Railings.....	06 7300 – 1-4

**DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

07 2100	Thermal Insulation.....	07 2100 – 1-2
07 2126	Blown Insulation .....	07 2126 – 1-2
07 2129	Sprayed Insulation .....	07 2129 – 1-2
07 2500	Weather Barriers .....	07 2500 – 1-9
07 3113	Asphalt Shingle Roof.....	07 3113 – 1-6
07 7100	Roof Specialties .....	07 7100 – 1-1
07 9200	Joint Sealants.....	07 9200 – 1-5

**DIVISION 08 – OPENINGS**

08 1100	Steel Doors .....	08 1100 – 1-5
08 1600	Composite Doors .....	08 1600 – 1-4
08 3100	Attic Access Door.....	08 3100 – 1-2
08 7100	Door Hardware .....	08 7100 – 1-10

**DIVISION 09 – FINISHES**

09 2116	Gypsum Board Assemblies .....	09 2116 – 1-3
09 9000	Interior, Exterior, and Paints and Coatings .....	09 9000 – 1-10

**DIVISION 10 – SPECIALTIES**

10 2800	Toilet Accessories .....	10 2800 – 1-3
10 5623	Wiring Shelving.....	10 5623 – 1-3

**DIVISION 11 – EQUIPMENT**

11 3100	Residential Appliances.....	11 3100 – 1-3
---------	-----------------------------	---------------

**DIVISION 12 – FURNISHINGS**

12 2113	Horizontal Louver Blinds.....	12 2113 – 1-2
12 3530	Residential Casework .....	12 3530 – 1-5
12 3600	Countertops.....	12 3600 – 1-2

**DIVISION 22 - PLUMBING**

22 05 00	COMMON WORK RESULTS FOR PLUMBING.....	22 05 00 – 1-19
22 05 17	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING.....	22 05 17 – 1-5
22 05 18	ESCUTCHEONS FOR PLUMBING PIPING.....	22 05 18 – 1-3
22 05 23	GENERAL-DUTY VALVES FOR PLUMBING PIPING.....	22 05 23 – 1-13
22 05 29	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT.....	22 05 29 – 1-13

22 05 53	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT.....	22 05 53 – 1-7
22 07 19	PLUMBING PIPING INSULATION.....	22 07 19 – 1-20
22 11 16	DOMESTIC WATER PIPING.....	22 11 16 – 1-13
22 13 16	SANITARY WASTE, STORM DRAINAGE AND VENT PIPING.....	22 13 16 – 1-13
22 33 00	GAS, DOMESTIC WATER HEATERS.....	22 33 00 – 1-8
22 42 00	PLUMBING FIXTURES.....	22 42 00 – 1-12

**DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING**

23 05 00	COMMON WORK RESULTS FOR HVAC.....	23 05 00 – 1-22
23 05 53	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT.....	23 05 53 – 1-5
23 05 93	TESTING, ADJUSTING, AND BALANCING FOR HVAC.....	23 05 93 – 1-16
23 07 00	HVAC INSULATION.....	23 07 00 – 1-23
23 23 00	REFRIGERANT PIPING.....	23 23 00 – 1-12
23 31 13	METAL DUCTS.....	23 31 31 – 1-14
23 33 00	AIR DUCT ACCESSORIES.....	23 33 00 – 1-12
23 34 23	HVAC POWER VENTILATORS.....	23 34 23 – 1-5
23 37 13	DIFFUSERS, REGISTERS, AND GRILLES.....	23 37 13 – 1-3
23 51 00	BREECHINGS, CHIMNEYS, AND STACKS.....	23 51 00 – 1-3
23 81 19	SELF-CONTAINED AIR-CONDITIONERS.....	23 81 19 – 1-11

**DIVISION 26 – ELECTRICAL**

26 05 00	COMMON WORK RESULTS FOR ELECTRICAL.....	26 05 00 – 1-6
26 05 19	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.....	26 05 19 – 1-5
26 05 26	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.....	26 05 26 – 1-6
26 05 29	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.....	26 05 29 – 1-6
26 05 33	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS.....	26 05 33 – 1-7
26 05 53	IDENTIFICATION FOR ELECTRICAL SYSTEMS.....	26 05 53 – 1-7
26 09 43	NETWORK LIGHTING CONTROLS.....	26 09 43 – 1-8
26 24 16	PANELBOARDS.....	26 24 16 – 1-10
26 27 26	WIRING DEVICES.....	26 27 26 – 1-9
26 28 16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS.....	26 18 16 – 1-5
26 51 00	INTERIOR LIGHTING.....	26 51 00 – 1-9

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

32 12 16	ASPHALT PAVING.....	32 12 16 – 1-5
32 13 13	CONCRETE PAVING.....	32 13 13 – 1-5

**END TABLE OF CONTENTS**

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**COLUMBIA HOUSING AUTHORITY**

**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

### Table of Contents

Clause	Page
1. Bid Preparation and Submission	1
2. Explanations and Interpretations to Prospective Bidders	1
3. Amendments to Invitations for Bids	1
4. Responsibility of Prospective Contractor	1
5. Late Submissions, Modifications, and Withdrawal of Bids	1
6. Bid Opening	2
7. Service of Protest	2
8. Contract Award	2
9. Bid Guarantee	3
10. Assurance of Completion	3
11. Preconstruction Conference	3
12. Indian Preference Requirements	3

### 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, except 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 be 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.

## **BID REQUIREMENTS**

All Bidders seeking to do business with Columbia Housing Authority are required to submit with any bid the following:

1. Bid Form with Addenda acknowledged
2. Bid Guarantee Equal to 5% of the Base Bid in the form of:
  - a. Bid Bond secured by Surety
  - b. Certified Check
  - c. Bank Draft
  - d. U.S. Bonds at par value.
3. Hold Harmless Agreement
4. Non-Collusive Affidavit
5. Certification of Non-Segregated Facilities
6. Contractor Certification/Contract Clause Section 3, 24 CFR Part 135 Document #00672 (Section 3 Agreement)
7. Representations, Certifications, and other Statements of Bidders Public and Indian Housing Programs (HUD 5369A)
8. One (1) original and one (1) copy of the bid packet requirements

**Any bid which fails to include any of these items may be considered as a nonresponsive bid.**

Any questions concerning the bid requirements should be directed to Ron Billy, 1919 Architects, at (815) 229-8222 or [ron@1919architects.com](mailto:ron@1919architects.com).

**BID FORM**

BID FOR: Scattered Site Single Family Home Rehab Phase I

TO: Columbia Housing Authority  
1917 Harden Street  
Columbia, South Carolina 29204

Sir/Madam:

1. The undersigned, having familiarized \_\_\_\_\_ with the local conditions affecting the cost of the work, and with the Specifications (including Invitation for Bids, Instructions to Bidders, this Bid Form, the form of Bid Bond, the Non-collusive Affidavit, the form of Performance and Payment Bond or Bonds, the General Conditions, the Special Conditions, and the General Scope of Work), and acknowledging receipt of Addenda No. \_\_\_\_\_ through \_\_\_\_\_, (if any thereto), as prepared by 1919 Architects and on file in the office of 1919 Architects, 4000 Morsay Dr., Rockford, Illinois 61107, hereby proposes to:
1. Furnish all bonds and insurance required by the Bidding Documents.
  2. Accomplish the work in accordance with the Contract.
  3. Complete all work, as shown and specified herein, within 150 consecutive calendar days from the date of the Notice to Proceed.

**Base Bid:**

Include all work called for, and/or specified, and described within Contract Documents

1. For the lump sum of: \_\_\_\_\_ (\$\_\_\_\_\_).

**Alternate Bids:**

Deductive Alternate Bid No. 1: Provide Plastic Laminate countertops in lieu of specified quartz.

1. For the lump sum fee of \_\_\_\_\_ (\$\_\_\_\_\_).

In submitting this bid, it is understood that the right is reserved by Columbia Housing Authority to reject any and all bids. If written notice of the acceptance of this bid is mailed, faxed or delivered to the undersigned within 90 calendar days after the opening thereof, or at any time thereafter before this bid is withdrawn, the undersigned agrees to execute and deliver a contract in the prescribed form and furnish the required bond within ten (10) days after the contract is presented for signature.

Bid Security in the sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), in the form of \_\_\_\_\_ is submitted herewith in

accordance with the Specifications.

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 submitting of proposals for the contract for which this proposal is submitted.

The bidder represents that it ( ) has, ( ) has not, participated in a previous contract or subcontract subject to the equal opportunity clause prescribed by Executive Orders 10925, 11114, or 11246, or the Secretary of Labor; that they ( ) have, ( ) have not, filed all required compliance reports; and that representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards. (The above representation need not be submitted in connection with the contracts or sub-contracts which are exempt from the clause.)

**Certification of Nonsegregated Facilities.** By signing this bid, the bidder certifies that they do not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. They certify further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The bidder agrees that breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" 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 which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom or otherwise. They further agree that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontractors exceeding \$10,000.00 which are not exempt from the provisions of the Equal Opportunity clause; that they will retain such certifications in their files; and that they will forward a notice to their proposed subcontractors as provided in the instructions to bidders.

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

DATE: \_\_\_\_\_, 20\_\_\_\_. \_\_\_\_\_  
(Name of Bidding Entity)

Official Address: \_\_\_\_\_  
BY: \_\_\_\_\_

\_\_\_\_\_  
TITLE: \_\_\_\_\_

\_\_\_\_\_  
(SIGN ORIGINAL ONLY)

\_\_\_\_\_

**BID BOND**

KNOW ALL PERSONS BY THESE PRESENTS, that We the undersigned,

\_\_\_\_\_

\_\_\_\_\_  
(Name of Principal)

as Principal, and \_\_\_\_\_

(Name of Surety)

are held and firmly bound unto the Columbia Housing Authority hereinafter called the "Local Authority", in the penal sum of:

\_\_\_\_\_ Dollars (\$\_\_\_\_\_), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITIONING OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying bid, dated \_\_\_\_\_, 20\_\_\_\_ for

\_\_\_\_\_  
\_\_\_\_\_

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified therein after the opening of the same, or, if no period be specified, within ninety (90) days after the said opening, and shall within the period specified therefore, or, if no period be specified, within ten (10) days after the prescribed forms are presented to them for signature, enter into a written contract with the Local Authority in accordance with the bid as accepted, and give bond with good and sufficient surety or sureties, as may be required, for the faithful performance and proper fulfillment of such contract or in the event of the withdrawal of said bid within the period specified, or the failure to enter into such contract and give such bond within the time specified, if the Principal shall pay the bid and amount for which the Local Authority may procure the required work or supplies or both, if the latter amount be in excess of the former, then the above obligation shall be void and of no effect, otherwise to remain in full force and virtue.

IN WITNESS THEREOF, the above-bounden parties have executed this instrument under their seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to the authority of its governing body.

\_\_\_\_\_  
(Individual Principal) (SEAL)

\_\_\_\_\_  
(Business Address)

\_\_\_\_\_  
(Individual Principal) (SEAL)

\_\_\_\_\_  
(Business Address)



Attest:

\_\_\_\_\_

\_\_\_\_\_  
(Corporate Principal)

\_\_\_\_\_  
(Business Address)

By \_\_\_\_\_ (SEAL)

\_\_\_\_\_

\_\_\_\_\_

Attest:

\_\_\_\_\_

\_\_\_\_\_  
(Corporate Surety)

\_\_\_\_\_  
(Address)

By \_\_\_\_\_ (SEAL)

\_\_\_\_\_

\_\_\_\_\_

(Power-of-attorney for person signing for surety company must be attached to bond)

HOLD HARMLESS AGREEMENT

All contracts for outside services require that the contractor hold the OWNER (Columbia Housing Authority) harmless of any liability.

The following hold harmless clause is hereby entered into between the OWNER (Columbia Housing Authority) and

\_\_\_\_\_ (Contractor).

"In consideration of your permitting us, our servants, or agents, employees and representatives from time to time to enter upon or to place or maintain equipment upon premises owned or controlled by you for the purposes of servicing our account, we agree to indemnify and hold harmless the Owner and its agents and employees from and against all claims for personal injury or property damage, including attorney's fees that may be incurred by the Owner in defending such claims, rising out of or resulting from the performance of the work and caused in whole or in part by any negligent act or omission of the Owner vendor, or anyone directly or indirectly employed by the Owner vendor or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Owner vendor, under Workers Compensation Acts, Disability Acts, or other Employee Benefit Acts."

\_\_\_\_\_  
Date

\_\_\_\_\_  
Owner (Columbia Housing Authority)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Contractor

**NON-COLLUSIVE AFFIDAVIT**

State of: South Carolina  
County of: Richland

\_\_\_\_\_ being first duly sworn, deposes and says:

That he/she is \_\_\_\_\_ of the party making the foregoing proposal or bid, that such proposal or bid in genuine and not collusive or sham; that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, sought by agreement or collusion or communication of conference, with any person to fix the bid price any other bidder, or to fix any overhead, profit of cost element of bid price, or that of any other bidder, or to secure any advantage against Columbia 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 bidder is an individual

\_\_\_\_\_  
Partner, if bidder is a partnership

\_\_\_\_\_  
Officer, if bidder is a corporation

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 2022.

\_\_\_\_\_  
Notary signature and stamp

**CERTIFICATE OF NON-SEGREGATED FACILITIES**

We, \_\_\_\_\_ (Company)  
Certify that we do not and will not maintain or provide for our employees any segregated facilities at any of our establishments, and that we do not and will not permit our employees to perform their services at any location, under our control, where segregated facilities are maintained. We understand and agree that breach of this certification is a violation of Equal Opportunity clause required by Executive Order 11246, amended.

As used in this certification, the term "segregated facilities" 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 which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom or otherwise.

We further agree that (except where we have obtained identical certifications from proposed Subcontractors for specific time periods) we will obtain identical certifications from proposed Subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that we will retain such certification in our files; and that we will forward the following notice to such proposed Subcontractors (except where the proposed Subcontractors have submitted identical certifications for specific time periods).

**NOTICE TO PROSPECTIVE SUBBUILDERS OF REQUIREMENT FOR CERTIFICATION OF NON-SEGREGATED FACILITIES.** A certification of Non-segregated facilities as required by the 9 May 1967 order on Elimination of Segregated Facilities, by the Secretary of Labor (32 Fed. Reg. 7439, 19 May 1967), must be submitted from the provisions either for each subcontract or for all subcontracts during a period (i.e. quarterly, semi-annually, or annually).

**NOTE:** Whoever knowingly and willfully makes any false, fictitious or fraudulent representation may be liable to criminal prosecution under 18 U.S.C. 1001.

\_\_\_\_\_  
(Name of Company)

By: \_\_\_\_\_

Date: \_\_\_\_\_

Title: \_\_\_\_\_

### SECTION 3 AGREEMENT

- 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 135, which implements 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 135 regulation.
- 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 a 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 qualification 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 regulation in 24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision to the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulation in 24 CFR Part 135. 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 135.
- 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 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR Part 135.
- F. Noncompliance with HUD's regulations in 24 CFR Part 135 may result in sanctions; termination of this contract for default, debarment and/or suspension from future HUD assisted contracts.
- G. With respect to the 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 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).
- H. **By signing and submitting this bid packet, the contractor and their subcontractors agree to comply with HUD's regulation in 24 CFR Part 135, which implements Section 3.**

The above is respectfully submitted by:

---

Name of Bidder

Date

---

Bidder's Federal ID Number

---

Business Address, City, State, Zip Code

---

Signature

Title

Telephone Number

**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

### Table of Contents

Clause	Page
1. Certificate of Independent Price Determination	1
2. Contingent Fee Representation and Agreement	1
3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions	1
4. Organizational Conflicts of Interest Certification	2
5. Bidder's Certification of Eligibility	2
6. Minimum Bid Acceptance Period	2
7. Small, Minority, Women-Owned Business Concern Representation	2
8. Indian-Owned Economic Enterprise and Indian Organization Representation	2
9. Certification of Eligibility Under the Davis-Bacon Act	3
10. Certification of Nonsegregated Facilities	3
11. Clean Air and Water Certification	3
12. Previous Participation Certificate	3
13. Bidder's Signature	3

### 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)(1) 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)(1) 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.

[ ] [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 operations 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 commercial, 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)

Project Number: \_\_\_\_\_

Job Title: \_\_\_\_\_

## Columbia Housing Authority

### AGREEMENT

**THIS AGREEMENT** is made this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, by and between Columbia Housing Authority, (herein "CHA"), and \_\_\_\_\_, (herein "Contractor").

**WITNESSETH**, that the Contractor and the CHA, for the consideration stated herein, mutually agree as follows:

#### ARTICLE I – STATEMENT OF WORK.

The Contractor shall furnish all labor, materials, and equipment necessary to perform and complete all work required in strict accordance with the Contract Documents, as defined in Article IV below.

#### ARTICLE II – THE CONTRACT PAYMENTS.

CHA shall pay the Contractor for the full performance of the contract, subject to any properly agreed upon additions and deductions as provided in the specifications, the sum of:

\_\_\_\_\_ (\$ \_\_\_\_\_).

This amount shall be paid according to the process set forth in the General Conditions.

#### ARTICLE III – TIME OF COMPLETION.

The Contractor shall begin actual performance hereunder within 5 calendar days from the date of the Notice to Proceed and all work to be performed by the Contractor shall be completed within \_\_\_\_\_ calendar days after the date of the Notice to Proceed (the Completion Date). Notwithstanding the foregoing, the Contractor shall be excused from completing full performance by the Completion Date if, during the progress of the work, delay is authorized in writing by CHA, in its reasonable judgment, for any one or more of the following unforeseen or unavoidable causes:

- a. Inclement weather.
- b. Any act or neglect of CHA.
- c. Changes in the Scope of Work that are approved in writing by CHA.
- d. Any strike that is not the result of any action or inaction of the Contractor.
- e. Flood or natural disaster.
- f. Other good cause, as approved in writing by the CHA.

In the event of any such authorized delay, the Completion Date shall be extended for such reasonable time as is mutually agreed in writing CHA shall make all final decisions on the justifiability of causes offered by the Contractor as a basis for any requested extension(s) of time for performance.

**ARTICLE IV – CONTRACT DOCUMENTS.**

The Contract Documents that are incorporated herein and made a part of this agreement are the following:

- a. Special Conditions
- b. General Conditions
- c. Specifications
- d. Drawings for Construction
- e. Addenda, if any

**ARTICLE V – THE AGREEMENT WITH SUBCONTRACTORS.**

The General Contractor shall submit one (1) complete originally executed copy of any Agreement between the General Contractor and any Subcontractor for the CHA’s files. All subcontractor agreements shall require each subcontractor to be bound to all of the Contract Documents that are relevant to the work to be performed by the subcontractor.

**ARTICLE VI – CONTRACTOR INFORMATION**

If Contractor is an individual, doing business under any name other than the individual’s name, provide the following information:

Individual’s full name: \_\_\_\_\_

Business Name: \_\_\_\_\_

If Contractor is an entity, provide the following information:

Type of entity: \_\_\_\_\_

State of formation: \_\_\_\_\_

Qualified to transaction business in Indiana? : Yes \_\_\_\_\_ No \_\_\_\_\_

**ARTICLE VII – GENERAL**

This instrument, together with the Contract Documents, form the entire agreement between the parties hereto. Contractor acknowledges that he has read and understands this agreement and the Contract Documents. In the event that any provision in any of the documents that make up the Contract Documents conflicts with any provisions of any other such document, the provision of the document first enumerated in the list in Article IV shall govern, except as otherwise specifically stated. The various provisions in any Addendum shall be construed in the order of preference of the document which it modifies.

No work under this agreement shall commence until the Contractor receives a Notice to Proceed issued by CHA.

This agreement may be executed in counterparts, each of which shall be an original, but all of which when taken together shall constitute one agreement.

**IN WITNESS THEREOF**, the parties hereto have caused this instrument to be executed in **two (2)** original counterparts as of the day and year first above written.

**ATTEST:**

_____	<b>Columbia Housing Authority</b>
<i>Contractor</i>	<i>CHA</i>
_____	_____
<i>By</i>	<i>By</i>
_____	_____
<i>Date</i>	<i>Date</i>
_____	_____
<i>Printed Name</i>	<i>Printed Name</i>
_____	_____
<i>Title</i>	<i>Title</i>
_____	<b>1917 Harden Street</b>
<i>Address</i>	<i>Address</i>
_____	_____
	<b>Columbia, South Carolina, 29204</b>
_____	_____
<b>T:</b>	<b>T:</b>

**CERTIFICATION:**

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the entity named as Contractor herein; that \_\_\_\_\_ who signed this agreement on behalf of the Contractor was then \_\_\_\_\_ of said entity; that said agreement was duly signed for and on behalf of said entity by authority of its governing body, and is within the scope of its corporate powers.

\_\_\_\_\_  
(Corporate Seal)  
\_\_\_\_\_

# General Conditions for Construction Contracts - Public Housing Programs

U.S. Department of Housing and Urban Development  
Office of Public and Indian Housing  
OMB Approval No. 2577-0157 (exp. 3/31/2020)

**Applicability. This form is applicable to any construction/development contract greater than \$150,000.**

This form includes those clauses required by OMB's common rule on grantee procurement, implemented at HUD in 2 CFR 200, and those requirements set forth in Section 3 of the Housing and Urban Development Act of 1968 and its amendment by the Housing and Community Development Act of 1992, implemented by HUD at 24 CFR Part 135. The form is required for construction contracts awarded by Public Housing Agencies (PHAs).

The form is used by Housing Authorities in solicitations to provide necessary contract clauses. If the form were not used, HAs would be unable to enforce their contracts.

Public reporting burden for this collection of information is estimated to average 1.0 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. Responses to the collection of information are required to obtain a benefit or to retain a benefit.

The information requested does not lend itself to confidentiality.

HUD may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB number.

Clause		Page	Clause		Page
1.	Definitions	2	<b>Administrative Requirements</b>		
2.	Contractor's Responsibility for Work	2	25.	Contract Period	9
3.	Architect's Duties, Responsibilities and Authority	2	26.	Order of Precedence	9
4.	Other Contracts	3	27.	Payments	9
<b>Construction Requirements</b>			28.	Contract Modifications	10
5.	Preconstruction Conference and Notice to Proceed	3	29.	Changes	10
6.	Construction Progress Schedule	3	30.	Suspension of Work	11
7.	Site Investigation and Conditions Affecting the Work	3	31.	Disputes	11
8.	Differing Site Conditions	4	32.	Default	11
9.	Specifications and Drawings for Construction	4	33.	Liquidated	12
10.	As-Built Drawings	5	34.	Termination of Convenience	12
11.	Material and Workmanship	5	35.	Assignment of Contract	12
12.	Permits and Codes	5	36.	Insurance	12
13.	Health, Safety, and Accident Prevention	6	37.	Subcontracts	13
14.	Temporary Buildings and Transportation Materials	6	38.	Subcontracting with Small and Minority Firms, Women's Business Enterprise, and Labor Surplus Area Firms	13
15.	Availability and Use of Utility Services	6	39.	Equal Employment Opportunity	13
16.	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements	6	40.	Employment, Training, and Contracting Opportunities for Low-Income Persons, Section 3 of the Housing and Urban Development Act of 1968	14
17.	Temporary Buildings and Transportation Materials	7	41.	Interest of Members of Congress	15
18.	Clean Air and Water	7	42.	Interest of Members, Officers, or Employees and Former Members, Officers, or Employees	15
19.	Energy Efficiency	7	43.	Limitations on Payments Made to Influence	15
20.	Inspection and Acceptance of Construction	7	44.	Royalties and Patents	15
21.	Use and Possession Prior to	8	45.	Examination and Retention of Contractor's Records	15
22.	Warranty of Title	8	46.	Labor Standards-Davis-Bacon and Related Acts	15
23.	Warranty of	8	47.	Non-Federal Prevailing Wage Rates	19
24.	Prohibition Against	9	48.	Procurement of Recovered	19

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## 1. Definitions

- (a) "Architect" means the person or other entity engaged by the PHA to perform architectural, engineering, design, and other services related to the work as provided for in the contract. When a PHA uses an engineer to act in this capacity, the terms "architect" and "engineer" shall be synonymous. The Architect shall serve as a technical representative of the Contracting Officer. The Architect's authority is as set forth elsewhere in this contract.
  - (b) "Contract" means the contract entered into between the PHA and the Contractor. It includes the forms of Bid, the Bid Bond, the Performance and Payment Bond or Bonds or other assurance of completion, the Certifications, Representations, and Other Statements of Bidders (form HUD-5370), these General Conditions of the Contract for Construction (form HUD-5370), the applicable wage rate determinations from the U.S. Department of Labor, any special conditions included elsewhere in the contract, the specifications, and drawings. It includes all formal changes to any of those documents by addendum, change order, or other modification.
  - (c) "Contracting Officer" means the person delegated the authority by the PHA to enter into, administer, and/or terminate this contract and designated as such in writing to the Contractor. The term includes any successor Contracting Officer and any duly authorized representative of the Contracting Officer also designated in writing. The Contracting Officer shall be deemed the authorized agent of the PHA in all dealings with the Contractor.
  - (d) "Contractor" means the person or other entity entering into the contract with the PHA to perform all of the work required under the contract.
  - (e) "Drawings" means the drawings enumerated in the schedule of drawings contained in the Specifications and as described in the contract clause entitled Specifications and Drawings for Construction herein.
  - (f) "HUD" means 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. HUD has agreed, subject to the provisions of an Annual Contributions Contract (ACC), to provide financial assistance to the PHA, which includes assistance in financing the work to be performed under this contract. As defined elsewhere in these General Conditions or the contract documents, the determination of HUD may be required to authorize changes in the work or for release of funds to the PHA for payment to the Contractor. Notwithstanding HUD's role, nothing in this contract shall be construed to create any contractual relationship between the Contractor and HUD.
  - (g) "Project" means the entire project, whether construction or rehabilitation, the work for which is provided for in whole or in part under this contract.
  - (h) "PHA" means the Public Housing Agency organized under applicable state laws which is a party to this contract.
  - (i) "Specifications" means the written description of the technical requirements for construction and includes the criteria and tests for determining whether the requirements are met.
  - (l) "Work" means materials, workmanship, and manufacture and fabrication of components.
- (a) The Contractor shall furnish all necessary labor, materials, tools, equipment, and transportation necessary for performance of the work. The Contractor shall also furnish all necessary water, heat, light, and power not made available to the Contractor by the PHA pursuant to the clause entitled Availability and Use of Utility Services herein.
  - (b) The Contractor shall perform on the site, and with its own organization, work equivalent to at least [ ] (12 percent unless otherwise indicated) of the total amount of work to be performed under the order. This percentage may be reduced by a supplemental agreement to this order if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the PHA.
  - (c) At all times during performance of this 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 who is satisfactory to the Contracting Officer and has authority to act for the Contractor.
  - (d) The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence, and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The Contractor shall hold and save the PHA, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract.
  - (e) The Contractor shall lay out the work from base lines and bench marks indicated on the drawings and be responsible for all lines, levels, and measurements of all work executed under the contract. The Contractor shall verify the figures before laying out the work and will be held responsible for any error resulting from its failure to do so.
  - (f) The Contractor shall confine all operations (including storage of materials) on PHA premises to areas authorized or approved by the Contracting Officer.
  - (g) The Contractor shall at all times keep the work area, including storage areas, free from accumulations of waste materials. After completing the work and before final inspection, the Contractor shall (1) remove from the premises all scaffolding, equipment, tools, and materials (including rejected materials) that are not the property of the PHA and all rubbish caused by its work; (2) leave the work area in a clean, neat, and orderly condition satisfactory to the Contracting Officer; (3) perform all specified tests; and, (4) deliver the installation in complete and operating condition.
  - (h) The Contractor's responsibility will terminate when all work has been completed, the final inspection made, and the work accepted by the Contracting Officer. The Contractor will then be released from further obligation except as required by the warranties specified elsewhere in the contract.

## 3. Architect's Duties, Responsibilities, and Authority

- (a) The Architect for this contract, and any successor, shall be designated in writing by the Contracting Officer.

## 2. Contractor's Responsibility for Work

- (b) The Architect shall serve as the Contracting Officer's technical representative with respect to architectural, engineering, and design matters related to the work performed under the contract. The Architect may provide direction on contract performance. Such direction shall be within the scope of the contract and may not be of a nature which: (1) institutes additional work outside the scope of the contract; (2) constitutes a change as defined in the Changes clause herein; (3) causes an increase or decrease in the cost of the contract; (4) alters the Construction Progress Schedule; or (5) changes any of the other express terms or conditions of the contract.
- (c) The Architect's duties and responsibilities may include but shall not be limited to:
- (1) Making periodic visits to the work site, and on the basis of his/her on-site inspections, issuing written reports to the PHA which shall include all observed deficiencies. The Architect shall file a copy of the report with the Contractor's designated representative at the site;
  - (2) Making modifications in drawings and technical specifications and assisting the Contracting Officer in the preparation of change orders and other contract modifications for issuance by the Contracting Officer;
  - (3) Reviewing and making recommendations with respect to - (i) the Contractor's construction progress schedules; (ii) the Contractor's shop and detailed drawings; (iii) the machinery, mechanical and other equipment and materials or other articles proposed for use by the Contractor; and, (iv) the Contractor's price breakdown and progress payment estimates; and,
  - (4) Assisting in inspections, signing Certificates of Completion, and making recommendations with respect to acceptance of work completed under the contract.

#### 4. Other Contracts

The PHA may undertake or award other contracts for additional work at or near the site of the work under this contract. The Contractor shall fully cooperate with the other contractors and with PHA 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 the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor or by PHA employees

### Construction Requirements

#### 5. Pre-construction Conference and Notice to Proceed

- (a) Within ten calendar days of contract execution, and prior to the commencement of work, the Contractor shall attend a preconstruction conference with representatives of the PHA, its Architect, and other interested parties convened by the PHA. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The PHA will provide the Contractor with the date, time, and place of the conference.
- (b) The contractor shall begin work upon receipt of a written Notice to Proceed from the Contracting Officer or designee. The Contractor shall not begin work prior to receiving such notice.

#### 6. Construction Progress Schedule

- (a) The Contractor shall, within five days after the work commences on the contract or another period of time determined by the Contracting Officer, prepare and submit to the Contracting Officer for approval three copies of a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring labor, materials, and equipment). 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. If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments or take other remedies under the contract until the Contractor submits the required schedule.
- (b) The Contractor shall enter the actual progress on the chart as required by the Contracting Officer, and immediately deliver three copies of the annotated schedule to the Contracting Officer. If the Contracting Officer determines, upon the basis of inspection conducted pursuant to the clause entitled Inspection and Acceptance of Construction, herein that the Contractor is not meeting the approved schedule, the Contractor shall take steps necessary to improve its progress, including those that may be required by the Contracting Officer, without additional cost to the PHA. In this circumstance, the Contracting Officer 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 the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained.
- (c) Failure of the Contractor to comply with the requirements of the Contracting Officer under this clause shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the Contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the Default clause of this contract.

#### 7. Site Investigation and Conditions Affecting the Work

- (a) 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, (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. 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 the PHA, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the PHA.

- (b) The PHA assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the PHA. Nor does the PHA assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

## 8. Differing Site Conditions

- (a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) 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.
- (b) The Contracting Officer shall investigate the site conditions promptly after receiving the notice. 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. If the conditions do materially so differ and cause an increase or decrease in the 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 the PHA within ten days after receipt of such instructions and, in any event, before proceeding with the work. An equitable adjustment in the contract price, the delivery schedule, or both shall be made under this clause and the contract modified in writing accordingly.
- (c) No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed in (a) above for giving written notice may be extended by the Contracting Officer.
- (d) No request by the Contractor for an equitable adjustment to the contract for differing site conditions shall be allowed if made after final payment under this contract.

## 9. Specifications and Drawings for Construction

- (a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. 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. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be

promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

- (b) 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 the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by", or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.
- (c) Where "as shown" "as indicated", "as detailed", or of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place" that is "furnished and installed".
- (d) "Shop drawings" means drawings, submitted to the PHA by the Contractor, subcontractor, or any lower tier subcontractor, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i.e., form, fit, and attachment details) of materials of equipment. 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. The PHA may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.
- (e) 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. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the PHA's reasons therefore. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer 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 variations described and approved in accordance with (f) below.
- (f) 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. If the Architect approves any such variation and the Contracting Officer concurs, the Contracting Officer 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.
- (g) It shall be the responsibility of the Contractor to make timely requests of the PHA for such large scale and full size drawings, color schemes, and other additional information, not already in his possession, which shall be

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required in the planning and production of the work. Such requests may be submitted as the need arises, but each such request shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay.

- (h) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the PHA and one set will be returned to the Contractor. As required by the Contracting Officer, the Contractor, upon completing the work under this contract, shall furnish a complete set of all shop drawings as finally approved. These drawings shall show all changes and revisions made up to the time the work is completed and accepted.
- (i) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all shop drawings prepared by subcontractors are submitted to the Contracting Officer.

#### 10. As-Built Drawings

- (a) "As-built drawings," as used in this clause, 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. "As-built drawings" shall be synonymous with "Record drawings."
- (b) As required by the Contracting Officer, the Contractor shall provide the Contracting Officer accurate information to be used in the preparation of permanent as-built drawings. 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.
- (c) This clause shall be included in all subcontracts at any tier. It shall be the responsibility of the Contractor to ensure that all as-built drawings prepared by subcontractors are submitted to the Contracting Officer.

#### 11. Material and Workmanship

- (a) All equipment, material, and articles furnished under this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract. 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. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of, and as approved by the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.
- (b) Approval of equipment and materials.
  - (1) The Contractor shall obtain the Contracting Officer's approval of the machinery and mechanical and other equipment to be incorporated into the work. When requesting approval, the Contractor shall furnish to the Contracting Officer 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. When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work. When requesting approval, the Contractor shall provide full information concerning the material or articles. Machinery, equipment, material, and articles that do not have the required approval shall be installed or used at the risk of subsequent rejection.

- (2) When required by the specifications or the Contracting Officer, the Contractor shall submit appropriately marked samples (and certificates related to them) for approval at the Contractor's expense, with all shipping charges prepaid. 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.
- (3) Certificates shall be submitted in triplicate, describing each sample submitted for approval and certifying that the material, equipment or accessory complies with contract requirements. The certificates shall include the name and brand of the product, name of manufacturer, and the location where produced.
- (4) Approval of a sample shall not constitute a waiver of the PHA right to demand full compliance with contract requirements. Materials, equipment and accessories may be rejected for cause even though samples have been approved.
- (5) 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. The Contracting Officer may require laboratory test reports on items submitted for approval or may approve materials on the basis of data submitted in certificates with samples. Check tests will be made on materials delivered for use only as frequently as the Contracting Officer determines necessary to insure compliance of materials with the specifications. 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.
- (6) After approval, samples will be kept in the Project office until completion of work. They may be built into the work after a substantial quantity of the materials they represent has been built in and accepted.
- (c) Requirements concerning lead-based paint. The Contractor shall comply with the requirements concerning lead-based paint contained in the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. 4821-4846) as implemented by 24 CFR Part 35.

#### 12. Permits and Codes

- (a) The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules and regulations. Notwithstanding the requirement of the Contractor to comply with the drawings and specifications in the contract, all work installed shall comply with all applicable codes and regulations as amended by any

waivers. Before installing the work, the Contractor shall examine the drawings and the specifications for compliance with applicable codes and regulations bearing on the work and shall immediately report any discrepancy it may discover to the Contracting Officer. Where the requirements of the drawings and specifications fail to comply with the applicable code or regulation, the Contracting Officer shall modify the contract by change order pursuant to the clause entitled Changes herein to conform to the code or regulation.

- (b) The Contractor shall secure and pay for all permits, fees, and licenses necessary for the proper execution and completion of the work. Where the PHA 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.

### 13. Health, Safety, and Accident Prevention

- (a) In performing this contract, the Contractor shall:
- (1) 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;
  - (2) Protect the lives, health, and safety of other persons;
  - (3) Prevent damage to property, materials, supplies, and equipment; and,
  - (4) Avoid work interruptions.
- (b) For these purposes, the Contractor shall:
- (1) Comply with regulations and standards issued by the Secretary of Labor at 29 CFR Part 1926. Failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act (Public Law 91-54, 83 Stat. 96), 40 U.S.C. 3701 et seq.; and
  - (2) Include the terms of this clause in every subcontract so that such terms will be binding on each subcontractor.
- (c) 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 disease, or damage to property, materials, supplies, or equipment, and shall report this data in the manner prescribed by 29 CFR Part 1904.
- (d) The Contracting Officer shall notify the Contractor of any noncompliance with these requirements and of the corrective action required. 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. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to take corrective action promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not base any claim or request for equitable adjustment for additional time or money on any stop order issued under these circumstances.
- (e) The Contractor shall be responsible for its subcontractors' compliance with the provisions of this clause. The Contractor shall take such action with respect to any subcontract as the PHA, the Secretary of Housing and Urban Development, or the Secretary of Labor shall direct as a means of enforcing such provisions.

### 14. Temporary Heating

The Contractor shall provide and pay for temporary heating, covering, and enclosures necessary to properly protect all work and materials against damage by dampness and cold, to dry out the work, and to facilitate the completion of the work. Any permanent heating equipment used shall be turned over to the PHA in the condition and at the time required by the specifications.

### 15. Availability and Use of Utility Services

- (a) The PHA shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. 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 the PHA or, where the utility is produced by the PHA, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.
- (b) The Contractor, at its expense and in a manner satisfactory to the Contracting Officer, 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. Before final acceptance of the work by the PHA, the Contractor shall remove all the temporary connections, distribution lines, meters, and associated paraphernalia.

### 16. 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 site, 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. 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 directed by the Contracting Officer.
- (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. 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 the Contracting Officer, 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. 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 planes 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 the commencement of any work.
- (j) The Contractor shall indemnify and save harmless the PHA from any damages on account of 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 the PHA 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. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

#### 17. Temporary Buildings and Transportation of Materials

- (a) Temporary buildings (e.g., storage sheds, shops, offices, sanitary facilities) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the PHA. 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. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.
- (b) The Contractor shall, as directed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. 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. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

#### 18. Clean Air and Water

The contractor shall comply with the Clean Air Act, as amended, 42 USC 7401 et seq., the Federal Water Pollution Control Water Act, as amended, 33 U.S.C. 1251 et seq., and standards issued pursuant thereto in the facilities in which this contract is to be performed.

#### 19. Energy Efficiency

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 (Pub.L. 94-163) for the State in which the work under the contract is performed.

#### 20. Inspection and Acceptance of Construction

- (a) Definitions. As used in this clause -
  - (1) "Acceptance" means the act of an authorized representative of the PHA by which the PHA approves and assumes ownership of the work performed under this contract. Acceptance may be partial or complete.
  - (2) "Inspection" means examining and testing the work performed under the contract (including, when appropriate, raw materials, equipment, components, and intermediate assemblies) to determine whether it conforms to contract requirements.
  - (3) "Testing" means that element of inspection that determines the properties or elements, including functional operation of materials, equipment, or their components, by the application of established scientific principles and procedures.
- (b) 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. All work is subject to PHA inspection and test at all places and at all reasonable times before acceptance to ensure strict compliance with the terms of the contract.
- (c) PHA inspections and tests are for the sole benefit of the PHA and do not: (1) relieve the Contractor of responsibility for providing adequate quality control measures; (2) relieve the Contractor of responsibility for loss or damage of the material before acceptance; (3) constitute or imply acceptance; or, (4) affect the continuing rights of the PHA after acceptance of the completed work under paragraph (j) below.
- (d) The presence or absence of the PHA 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. All instructions and approvals with respect to the work shall be given to the Contractor by the Contracting Officer.
- (e) 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 the Contracting Officer. The PHA 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 reinspection or retest necessary. The PHA 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.

- (f) The PHA may conduct routine inspections of the construction site on a daily basis.
- (g) The Contractor shall, without charge, replace or correct work found by the PHA not to conform to contract requirements, unless the PHA decides that it is in its interest to accept the work with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.
- (h) If the Contractor does not promptly replace or correct rejected work, the PHA may (1) by contract or otherwise, replace or correct the work and charge the cost to the Contractor, or (2) terminate for default the Contractor's right to proceed.
- (i) If any work requiring inspection is covered up without approval of the PHA, it must, if requested by the Contracting Officer, be uncovered at the expense of the Contractor. If at any time before final acceptance of the entire work, the PHA 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. 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. 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.
- (j) The Contractor shall notify the Contracting Officer, 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. If the Architect determines that the state of preparedness is as represented, the PHA will promptly arrange for the inspection. Unless otherwise specified in the contract, the PHA shall accept, as soon as practicable after completion and inspection, all work required by the contract or that portion of the work the Contracting Officer determines and designates can be accepted separately. Acceptance shall be final and conclusive except for latent defects, fraud, gross mistakes amounting to fraud, or the PHA's right under any warranty or guarantee.

## 21. Use and Possession Prior to Completion

- (a) The PHA shall have the right to take possession of or use any completed or partially completed part of the work. Before taking possession of or using any work, the Contracting Officer shall furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the PHA intends to take possession of or use. However, failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract. The PHA's possession or use shall not be deemed an acceptance of any work under the contract.
- (b) While the PHA has such possession or use, the Contractor shall be relieved of the responsibility for (1) the loss of or damage to the work resulting from the PHA's possession or use, notwithstanding the terms of the clause entitled Permits and Codes herein; (2) all maintenance costs on the areas occupied; and, (3) furnishing heat, light, power, and water used in the areas

occupied without proper remuneration therefore. If prior possession or use by the PHA delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

## 22. Warranty of Title

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.

## 23. Warranty of Construction

- (a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (j) of this clause, 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. This warranty shall continue for a period of \_\_\_\_\_ (one year unless otherwise indicated) from the date of final acceptance of the work. If the PHA takes possession of any part of the work before final acceptance, this warranty shall continue for a period of (one year unless otherwise indicated) from the date that the PHA takes possession.
- (b) The Contractor shall remedy, at the Contractor's expense, any failure to conform, or any defect. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to PHA-owned or controlled real or personal property when the damage is the result of—
  - (1) The Contractor's failure to conform to contract requirements; or
  - (2) Any defects of equipment, material, workmanship or design furnished by the Contractor.
- (c) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for (one year unless otherwise indicated) from the date of repair or replacement.
- (d) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect or damage.
- (e) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the PHA shall have the right to replace, repair or otherwise remedy the failure, defect, or damage at the Contractor's expense.
- (f) 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:
  - (1) Obtain all warranties that would be given in normal commercial practice;
  - (2) Require all warranties to be executed in writing, for the benefit of the PHA; and,
  - (3) Enforce all warranties for the benefit of the PHA.
- (g) In the event the Contractor's warranty under paragraph (a) of this clause has expired, the PHA may bring suit at its own expense to enforce a subcontractor's, manufacturer's or supplier's warranty.

- (h) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defect of material or design furnished by the PHA nor for the repair of any damage that results from any defect in PHA furnished material or design.
- (i) Notwithstanding any provisions herein to the contrary, the establishment of the time periods in paragraphs (a) and (c) above relate only to the specific obligation of the Contractor to correct the work, and have no relationship to the time within which its obligation to comply with the contract may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to its obligation other than specifically to correct the work.
- (j) This warranty shall not limit the PHA's rights under the Inspection and Acceptance of Construction clause of this contract with respect to latent defects, gross mistakes or fraud.

**24. Prohibition Against Liens**

The Contractor is prohibited from placing a lien on the PHA's property. This prohibition shall apply to all subcontractors at any tier and all materials suppliers.

**Administrative Requirements**

**25. Contract Period**

this contract within \_\_\_\_\_ calendar days of the effective date of the contract, or within the time schedule established in the notice to proceed issued by the Contracting Officer.

**26. Order of Provisions**

In the event of a conflict between these General Conditions and the Specifications, the General Conditions shall prevail. 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. In the event of such a conflict, applicable federal law, regulation, and Executive Order shall prevail.

**27. Payments**

- (a) The PHA shall pay the Contractor the price as provided in this contract.
- (b) The PHA shall make progress payments approximately every 30 days as the work proceeds, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer. The PHA may, subject to written determination and approval of the Contracting Officer, make more frequent payments to contractors which are qualified small businesses.
- (c) Before the first progress payment under this contract, the Contractor shall furnish, in such detail as requested by the Contracting Officer, 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. The breakdown shall be approved by the Contracting Officer and must be acceptable to HUD. If the contract covers more than one project, the Contractor shall furnish a separate breakdown for each. 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 price. The Contractor shall prorate its overhead and profit over the construction period of the contract.

- (d) The Contractor shall submit, on forms provided by the PHA, periodic estimates showing the value of the work performed during each period based upon the approved submitted not later than \_\_\_\_\_ days in advance of the date set for payment and are subject to correction and revision as required. The estimates must be approved by the Contracting Officer with the concurrence of the Architect prior to payment. If the contract covers more than one project, the Contractor shall furnish a separate progress payment estimate for each.
- (e) Along with each request for progress payments and the required estimates, the Contractor shall furnish the following certification, or payment shall not be made: I hereby certify, to the best of my knowledge and belief, that:
  - (1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;
  - (2) 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,
  - (3) 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.

\_\_\_\_\_  
Name:

\_\_\_\_\_  
Title:

\_\_\_\_\_  
Date:

- (f) Except as otherwise provided in State law, the PHA shall retain ten (10) percent of the amount of progress payments until completion and acceptance of all work under the contract; except, that if upon completion of 50 percent of the work, the Contracting Officer, after consulting with the Architect, determines that the Contractor's performance and progress are satisfactory, the PHA may make the remaining payments in full for the work subsequently completed. If the Contracting Officer subsequently determines that the Contractor's performance and progress are unsatisfactory, the PHA shall reinstate the ten (10) percent (or other percentage as provided in State law) retainage until such time as the Contracting Officer determines that performance and progress are satisfactory.
- (g) The Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration when computing progress payments.

Material delivered to the Contractor at locations other than the site may also be taken into consideration if the Contractor furnishes satisfactory evidence that (1) it has acquired title to such material; (2) the material is properly stored in a bonded warehouse, storage yard, or similar suitable place as may be approved by the Contracting Officer; (3) the material is insured to cover its full value; and (4) the material will be used to perform this contract. Before any progress payment which includes delivered material is made, the Contractor shall furnish such documentation as the Contracting Officer may require to assure the protection of the PHA's interest in such materials. The Contractor shall remain responsible for such stored material notwithstanding the transfer of title to the PHA.

- (h) All material and work covered by progress payments made shall, at the time of payment become the sole property of the PHA, but this shall not be construed as (1) relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or, (2) waiving the right of the PHA to require the fulfillment of all of the terms of the contract. In the event the work of the Contractor has been damaged by other contractors or persons other than employees of the PHA in the course of their employment, the Contractor shall restore such damaged work without cost to the PHA and to seek redress for its damage only from those who directly caused it.
- (i) The PHA shall make the final payment due the Contractor under this contract after (1) completion and final acceptance of all work; and (2) presentation of release of all claims against the PHA arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. Each such exception shall embrace no more than one claim, the basis and scope of which shall be clearly defined. The amounts for such excepted claims shall not be included in the request for final payment. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned.
- (j) Prior to making any payment, the Contracting Officer may require the Contractor to furnish receipts or other evidence of payment from all persons performing work and supplying material to the Contractor, if the Contracting Officer determines such evidence is necessary to substantiate claimed costs.
- (k) The PHA shall not; (1) determine or adjust any claims for payment or disputes arising there under between the Contractor and its subcontractors or material suppliers; or, (2) withhold any moneys for the protection of the subcontractors or material suppliers. The failure or refusal of the PHA to withhold moneys from the Contractor shall in nowise impair the obligations of any surety or sureties under any bonds furnished under this contract.

## 28. Contract Modifications

- (a) Only the Contracting Officer has authority to modify any term or condition of this contract. Any contract modification shall be authorized in writing.
- (b) The Contracting Officer may modify the contract unilaterally (1) pursuant to a specific authorization stated in a contract clause (e.g., Changes); or (2) for administrative matters which do not change the rights or

responsibilities of the parties (e.g., change in the PHA address). All other contract modifications shall be in the form of supplemental agreements signed by the Contractor and the Contracting Officer.

- (c) When a proposed modification requires the approval of HUD prior to its issuance (e.g., a change order that exceeds the PHA's approved threshold), such modification shall not be effective until the required approval is received by the PHA.

## 29. Changes

- (a) The Contracting Officer 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 changes:
  - (1) In the specifications (including drawings and designs);
  - (2) In the method or manner of performance of the work;
  - (3) PHA-furnished facilities, equipment, materials, services, or site; or,
  - (4) Directing the acceleration in the performance of the work.
- (b) Any other written order or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating (1) the date, circumstances and source of the order and (2) that the Contractor regards the order as a change order.
- (c) Except as provided in this clause, no order, statement or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.
- (d) If any change under this clause 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, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for a adjustment based on defective specifications, no proposal for any change under paragraph (b) above shall be allowed for any costs incurred more than 20 days (5 days for oral orders) before the Contractor gives written notice as required. In the case of defective specifications for which the PHA is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.
- (e) The Contractor must assert its right to an adjustment under this clause within 30 days after (1) receipt of a written change order under paragraph (a) of this clause, or (2) the furnishing of a written notice under paragraph (b) of this clause, by submitting a written statement describing the general nature and the amount of the proposal. If the facts justify it, the Contracting Officer may extend the period for submission. The proposal may be included in the notice required under paragraph (b) above. No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.
- (f) 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:

- (1) Direct Costs. Materials (list individual items, the quantity and unit cost of each, and the aggregate cost); Transportation and delivery costs associated with materials; Labor breakdowns by hours or unit costs (identified with specific work to be performed); Construction equipment exclusively necessary for the change; Costs of preparation and/ or revision to shop drawings resulting from the change; Worker's Compensation and Public Liability Insurance; Employment taxes under FICA and FUTA; and, Bond Costs when size of change warrants revision.
- (2) Indirect Costs. Indirect costs may include overhead, general and administrative expenses, and fringe benefits not normally treated as direct costs.
- (3) Profit. The amount of profit shall be negotiated and may vary according to the nature, extent, and complexity of the work required by the change. The allowability of the direct and indirect costs shall be determined in accordance with the Contract Cost Principles and Procedures for Commercial Firms in Part 31 of the Federal Acquisition Regulation (48 CFR 1-31), as implemented by HUD Handbook 2210.18, in effect on the date of this contract. The Contractor shall not be allowed a profit on the profit received by any subcontractor. Equitable adjustments for deleted work shall include a credit for profit and may include a credit for indirect costs. 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.
- (g) 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.
- (h) The Contracting Officer shall act on proposals within 30 days after their receipt, or notify the Contractor of the date when such action will be taken.
- (i) Failure to reach an agreement on any proposal shall be a dispute under the clause entitled Disputes herein. Nothing in this clause, however, shall excuse the Contractor from proceeding with the contract as changed.
- (j) Except in an emergency endangering life or property, no change shall be made by the Contractor without a prior order from the Contracting Officer.

### 30. Suspension of Work

- (a) 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 the PHA.
- (b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted (1) by an act of the Contracting Officer in the administration of this contract, or (2) by the Contracting Officer'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. However, no adjustment shall be made under this clause 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.

- (c) A claim under this clause shall not be allowed (1) for any costs incurred more than 20 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, (2) 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 not later than the date of final payment under the contract.

### 31. Disputes

- (a) "Claim," as used in this clause, 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, the adjustment or interpretation of contract terms, or other relief arising under or relating to the contract. 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. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim. The submission may be converted to a claim by complying with the requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.
- (b) Except for disputes arising under the clauses entitled Labor Standards - Davis Bacon and Related Acts, 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 this clause.
- (c) All claims by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the PHA against the Contractor shall be subject to a written decision by the Contracting Officer.
- (d) The Contracting Officer shall, within 60 (unless otherwise indicated) days after receipt of the request, decide the claim or notify the Contractor of the date by which the decision will be made.
- (e) The Contracting Officer's decision shall be final unless the Contractor (1) appeals in writing to a higher level in the PHA in accordance with the PHA's policy and procedures, (2) refers the appeal to an independent mediator or arbitrator, or (3) files suit in a court of competent jurisdiction. Such appeal must be made within (30 unless otherwise indicated) days after receipt of the Contracting Officer's decision.
- (f) 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 the Contracting Officer.

### 32. Default

- (a) If 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, the Contracting Officer 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. In this event, the PHA 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. The Contractor and its sureties shall be liable for any damage to the PHA 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. This liability includes any increased costs incurred by the PHA in completing the work.

- (b) The Contractor's right to proceed shall not be terminated or the Contractor charged with damages under this clause if—
- (1) The delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor. Examples of such causes include (i) acts of God, or of the public enemy, (ii) acts of the PHA or other governmental entity in either its sovereign or contractual capacity, (iii) acts of another contractor in the performance of a contract with the PHA, (iv) fires, (v) floods, (vi) epidemics, (vii) quarantine restrictions, (viii) strikes, (ix) freight embargoes, (x) unusually severe weather, or (xi) delays of subcontractors or suppliers at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and the subcontractors or suppliers; and
  - (2) The Contractor, within days (10 days unless otherwise indicated) from the beginning of such delay (unless extended by the Contracting Officer) notifies the Contracting Officer in writing of the causes of delay. The Contracting Officer shall ascertain the facts and the extent of the delay. If, in the judgment of the Contracting Officer, the findings of fact warrant such action, time for completing the work shall be extended by written modification to the contract. The findings of the Contracting Officer shall be reduced to a written decision which shall be subject to the provisions of the Disputes clause of this contract.
- (c) 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 the PHA.

### 33. Liquidated Damages

- (a) If the Contractor fails to complete the work within the time specified in the contract, or any extension, as specified in the clause entitled Default of this contract, the Contractor shall pay to the PHA as liquidated damages, the sum of \$ \_\_\_\_\_ [Contracting Officer insert amount] for each day of delay. If different completion dates are specified in the contract for separate parts or stages of the work, the amount of liquidated damages shall be assessed on those parts or stages which are delayed. To the extent that the Contractor's delay or nonperformance is excused under another clause in this contract, liquidated damages shall not be due the PHA. The Contractor remains liable for damages caused other than by delay.
- (b) If the PHA terminates the Contractor's right to proceed, the resulting damage will consist of liquidated damages until such reasonable time as may be required for final

completion of the work together with any increased costs occasioned the PHA in completing the work.

- (c) If the PHA does not terminate the Contractor's right to proceed, the resulting damage will consist of liquidated damages until the work is completed or accepted.

### 34. Termination for Convenience

- (a) 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 the PHA. 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 such termination becomes effective.
- (b) If the performance of the work is terminated, either in whole or in part, the PHA shall be liable to the Contractor for reasonable and proper costs resulting from such termination upon the receipt by the PHA of a properly presented claim setting out in detail: (1) the total cost of the work performed to date of termination less the total amount of contract payments made to the Contractor; (2) the cost (including reasonable profit) 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 the PHA to the Contractor or by the Contractor to the subcontractor or supplier; (3) the cost of preserving and protecting the work already performed until the PHA or assignee takes possession thereof or assumes responsibility therefore; (4) the actual or estimated cost of legal and accounting services reasonably necessary to prepare and present the termination claim to the PHA; and (5) an amount constituting a reasonable profit on the value of the work performed by the Contractor.
- (c) The Contracting Officer will act on the Contractor's claim within days (60 days unless otherwise indicated) of receipt of the Contractor's claim.
- (d) Any disputes with regard to this clause are expressly made subject to the provisions of the Disputes clause of this contract.

### 35. Assignment of Contract

The Contractor shall not assign or transfer any interest in this contract; except that claims for monies due or to become due from the PHA under the contract may be assigned to a bank, trust company, or other financial institution. Such assignments of claims shall only be made with the written concurrence of the Contracting Officer. 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 the Contracting Officer.

### 36. Insurance

- (a) Before commencing work, the Contractor and each subcontractor shall furnish the PHA with certificates of insurance showing the following insurance is in force and will insure all operations under the Contract:
- (1) Workers' Compensation, in accordance with state or Territorial Workers' Compensation laws.
  - (2) Commercial General Liability with a combined single limit for bodily injury and property damage of not less than \$ \_\_\_\_\_ [Contracting Officer insert amount]

per occurrence to protect the Contractor and each subcontractor against claims for bodily injury or death and damage to the property of others. This shall cover the use of all equipment, hoists, and vehicles on the site(s) not covered by Automobile Liability under (3) below. If the Contractor has a "claims made" policy, then the following additional requirements apply: the policy must provide a "retroactive date" which must be on or before the execution date of the Contract; and the extended reporting period may not be less than five years following the completion date of the Contract.

- (3) Automobile Liability 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 \$ \_\_\_\_\_ [Contracting Officer insert amount] per occurrence.
- (b) Before commencing work, the Contractor shall furnish the PHA 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. The Builder's Risk Insurance shall be for the benefit of the Contractor and the PHA as their interests may appear and each shall be named in the policy or policies as an insured. The Contractor in installing equipment supplied by the PHA shall carry insurance on such equipment from the time the Contractor takes possession thereof until the Contract work is accepted by the PHA. 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. It need not be carried on landscape work. 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 the PHA. The Contractor may terminate this insurance on buildings as of the date taken over for occupancy by the PHA. The Contractor is not required to carry Builder's Risk Insurance for modernization work which does not involve structural alterations or additions and where the PHA's existing fire and extended coverage policy can be endorsed to include such work.
- (c) All insurance shall be carried with companies which are financially responsible and admitted to do business in the State in which the project is located. If any such insurance is due to expire during the construction period, the Contractor (including subcontractors, as applicable) shall not permit the coverage to lapse and shall furnish evidence of coverage to the Contracting Officer. 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 30 days prior written notice has been given to the Contracting Officer.

### 37. Subcontracts

- (a) Definitions. As used in this contract -
- (1) "Subcontract" means any contract, purchase order, or other purchase agreement, including modifications and change orders to the foregoing, entered into by a subcontractor to furnish supplies, materials, equipment, and services for the performance of the prime contract or a subcontract.

- (2) "Subcontractor" means any supplier, vendor, or firm that furnishes supplies, materials, equipment, or services to or for the Contractor or another subcontractor.
- (b) 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 programs by any agency of the United States Government or of the state in which the work under this contract is to be performed.
- (c) 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.
- (d) 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 to the work of subcontractors.
- (e) Nothing contained in this contract shall create any contractual relationship between any subcontractor and the PHA or between the subcontractor and HUD.

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

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 solicitation lists;
- (b) Ensuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
- (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;
- (d) Establishing delivery schedules, where the requirements of the contract permit, which encourage participation by small and minority businesses and women's business enterprises; and
- (e) 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.

### 39. Equal Employment Opportunity

During the performance of this contract, the Contractor agrees as follows:

- (a) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, or handicap.
- (b) 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, national origin, or handicap. Such action shall include, but not be limited to, (1) employment, (2) upgrading, (3) demotion, (4) transfer, (5) recruitment or recruitment advertising, (6) layoff or termination, (7) rates of pay or other forms of compensation, and (8) 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 the Contracting Officer that explain this clause.
- (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 this clause, 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, Section 503 of the Rehabilitation Act of 1973, as amended, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto. 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 this clause or any rule, regulation, 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. 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.
- (i) The Contractor shall include the terms and conditions of this clause in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor. 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 litigation to protect the interests of the United States.
- (j) Compliance with the requirements of this clause shall be to the maximum extent consistent with, but not in derogation of, compliance with section 7(b) of the Indian Self-Determination and Education Assistance Act and the Indian Preference clause of this contract.

**40. Employment, Training, and Contracting Opportunities for Low-Income Persons, Section 3 of the Housing and Urban Development Act of 1968.**

- (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 135, 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 135 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 135, 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 135. 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 135.
- (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 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR Part 135.
- (f) Noncompliance with HUD's regulations in 24 CFR Part 135 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).

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#### 41. Interest of Members of Congress

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.

#### 42. Interest of Members, Officers, or Employees and Former Members, Officers, or Employees

No member, officer, or employee of the PHA, 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 the PHA 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.

#### 43. Limitations on Payments made to Influence Certain Federal Financial Transactions

- (a) The Contractor agrees to comply with Section 1352 of 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: 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; or the modification of any Federal contract, grant, loan, or cooperative agreement.
- (b) 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.

#### 44. Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringement of any patent rights and shall save the PHA harmless from loss on account thereof; except that the PHA 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 infringement. If, however, the Contractor has reason to believe that any design, process or product specified is an infringement of a patent, the Contractor shall promptly notify the Contracting Officer. Failure to give such notice shall make the Contractor responsible for resultant loss.

#### 45. Examination and Retention of Contractor's Records

- (a) The PHA, HUD, or Comptroller General of the United States, or any of their duly authorized representatives shall, until 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.
- (b) The Contractor agrees to include in first-tier subcontracts under this contract a clause substantially the same as paragraph (a) above. "Subcontract," as used in this clause, excludes purchase orders not exceeding \$10,000.
- (c) The periods of access and examination in paragraphs (a) and (b) above for records relating to (1) appeals under the Disputes clause 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 the PHA, 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.

#### 46. Labor Standards - Davis-Bacon and Related Acts

If the total amount of this contract exceeds \$2,000, the Federal labor standards set forth in the clause below shall apply to the development or construction work to be performed under the contract.

- (a) Minimum Wages.
  - (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 (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 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 regular 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 in 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

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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.

- (2) (i) 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. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when all the following criteria have been met: (A) The work to be performed by the classification requested is not performed by a classification in the wage determination; and (B) The classification is utilized in the area by the construction industry; and (C) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (ii) 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. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 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.
- (iii) 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. The Administrator, or an authorized representative, will issue a determination within 30 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.
- (iv) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (a)(2)(ii) or (iii) of this clause 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.
- (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.
- (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. 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.

- (b) Withholding of funds. 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 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. 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.
- (c) Payrolls and basic records.
- (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. 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), 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 costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of 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. 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.

- (2) (i) The Contractor shall submit weekly 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. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under subparagraph (c)(1) of this clause. This information may be submitted in any form desired. Optional Form WH-347 (Federal Stock Number 029-005-00014-1) is available for this purpose and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. 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.)
- (ii) 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 under paragraph (c) (1) of this clause 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 indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3; 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 into the contract.
- (iii) 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" required by subparagraph (c)(2)(ii) of this clause.
- (iv) 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 Section 3729 of Title 31 of the United States Code.
- (3) The Contractor or subcontractor shall make the records required under subparagraph (c)(1) 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. 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. 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.

- (d) (1) Apprentices. Apprentices will 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 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 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 OATELS 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 in this paragraph, 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 a 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 journeyman 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 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. 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.
- (2) Trainees. Except as provided in 29 CFR 5.16, 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. 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 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 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. 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. 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. 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 performed until an acceptable program is approved.

- (3) Equal employment opportunity. The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.
- (e) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.
- (f) Contract termination; debarment. A breach of this contract clause may be grounds for termination of the contract and for debarment as a Contractor and a subcontractor as provided in 29 CFR 5.12.
- (g) 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.
- (h) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this clause 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 the PHA, HUD, the U.S. Department of Labor, or the employees or their representatives.
- (i) Certification of eligibility.
  - (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 the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

- (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 section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
  - (3) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.
- (j) Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.
    - (1) Overtime requirements. 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 times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.
    - (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set forth in subparagraph (j)(1) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. 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. Such liquidated damages shall be computed with respect to each individual laborer or mechanic (including watchmen and guards) employed in violation of the provisions set forth in subparagraph (j)(1) of this clause, 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 required by provisions set forth in subparagraph (j)(1) of this clause.
    - (3) 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 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 as provided in the provisions set forth in subparagraph (j)(2) of this clause.
  - (k) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts all the provisions contained in this clause, 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. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all these provisions.

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#### 47. Non-Federal Prevailing Wage Rates

- (a) 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:
  - (1) The applicable wage rate determined by the Secretary of Labor pursuant to the Davis-Bacon Act (40 U.S.C. 3141 et seq.) 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.

#### 48. Procurement of Recovered Materials.

- (a) In accordance with Section 6002 of 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) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition. 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: (1) are not reasonably available in a reasonable period of time; (2) 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 (3) are only available at an unreasonable price.
- (b) Paragraph (a) of this clause shall apply to items purchased under this contract where: (1) the Contractor purchases in excess of \$10,000 of the item under this contract; or (2) during the preceding Federal fiscal year, the Contractor: (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.



## Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

**A. 1. (i) Minimum Wages.** All laborers and mechanics employed or working upon the site of the work, 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 (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 I(b)(2) of 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 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 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. HUD shall approve an additional classification and wage rate and fringe benefits therefor 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, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 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. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

**(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, will issue a determination within 30 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. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

**(d)** The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, 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 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.

**(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. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

**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, 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. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

**3. (i) Payrolls and basic records.** Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. 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), 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, 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. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

**(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 will 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. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. 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. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

**(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 A.3.(ii)(b).

(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 Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) 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 will 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 Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 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 Training, Employer and Labor Services 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 a 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 Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, 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.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, 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. 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 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 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 will 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 will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, 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 the contract clauses in this paragraph.

**7. Contract termination; 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 and 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. (i) Certification of Eligibility.** 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 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 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 1 01 0, 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 Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

**11. Complaints, Proceedings, or Testimony by Employees.** No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

**B. Contract Work Hours and Safety Standards Act.** The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

**(1) Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics 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 times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

**(2) Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. 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. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, 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 required by the clause set forth in subparagraph (1) of this paragraph.

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**(3) 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 any other Federal contract with the same prime contract, 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 as provided in the clause set forth in subparagraph (2) of this paragraph.

**(4) Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph 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 subparagraphs (1) through (4) of this paragraph.

**C. Health and Safety.** The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

**(1)** No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

**(2)** The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

**(3)** The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

## Wage Rates

"General Decision Number: SC20220060 02/25/2022

Superseded General Decision Number: SC20210060

State: South Carolina

Construction Type: Residential

County: Richland County in South Carolina.

RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022

\* SUSC2016-003 10/18/2017

	Rates	Fringes
CARPENTER.....	\$ 14.53 **	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 13.59 **	0.00
DRYWALL HANGER.....	\$ 12.00 **	0.00
ELECTRICIAN.....	\$ 17.55	0.00
LABORER: Common or General.....	\$ 11.20 **	0.00
OPERATOR:		
Backhoe/Excavator/Trackhoe.....	\$ 18.85	0.00
PAINTER (Brush and Roller).....	\$ 13.20 **	0.00
PLUMBER.....	\$ 14.17 **	0.00
ROOFER.....	\$ 15.00	0.00

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$15.00) or 13658 (\$11.25). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the

Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate



changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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#### WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on

- a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

**Columbia Housing Authority  
SPECIAL CONDITIONS**

1.) **PROJECT SITE(S)**

The Contractor shall visit the site and acquaint themselves with all existing conditions as they affect the work specified. All questions concerning this project shall be referred to 1919 Architects 4000 Morsay Drive, Rockford, IL 61107, (815) 229-8222, attention Ron Billy or ron@1919architects.com

2.) **TIME OF COMPLETION**

The work is to be commenced at the time stipulated in the Notice to Proceed, by the contract, and shall be fully complete within One Hundred Fifty (150) calendar days.

3.) **LIQUIDATED DAMAGES**

As actual damages for any delay in completion are impossible to determine, the Contractor and his sureties shall be liable for and shall pay to Columbia Housing Authority (CHA) the sum of Five Hundred Fifty Dollars (\$550.00) as fixed, agreed and liquidated damages for each calendar day of delay until the work is totally completed and accepted by Columbia Housing Authority and its Authorized Representatives (Architect). Any amount of liquidated damages shall be deducted from any final balance owed to the Contractor prior to final payment. See Article 33 of the HUD General Conditions.

4.) **GENERAL CONTRACTOR AND SUBCONTRACTOR HOLD HARMLESS AGREEMENT**

The Contractor shall indemnify and hold harmless Columbia Housing Authority and its employees from and against all claims for personal injury and/or property damage, including claims against CHA, its agents or servants, arising out of any claims, and all losses and expenses, including attorneys fees that may be incurred by CHA defending such claims, arising out of or resulting from the performance of the work and caused in whole or in part by a party indemnified hereunder, In any and all claims against CHA or any of its agents or servants by an employee of a Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damage, compensation or benefits payable by or for the Contractor or Subcontractor under Workers Compensation Act, Disability Acts, or their Employee Benefits Acts.

5.) **ACCESS TO WORK**

Columbia Housing Authority shall provide the General Contractor with access to work areas at all times.

6.) **LIST OF SUBCONTRACTOR**

Contractor shall list subcontractor who will perform any portion of the work as requested. Contractor shall furnish partial waivers of lien starting with the second payout request from subcontractor and suppliers with **full waivers of liens being submitted prior to final payment.**

7.) **GUARANTEES AND WARRANTIES**

Contractor shall guarantee and warranty all materials and workmanship to be free of defects for a period of one year from the date of acceptance of said work by Columbia Housing Authority and shall replace at Contractor's expense, any work that may be found defective within said one-year period. Contractor shall also deliver all Manufacturer's Warranties in excess of the above as offered by the Manufacturer or specified in other sections.

8.) **LOCAL LABOR**

The Contractor shall endeavor to the greatest extent feasible, to provide opportunities for training and employment for lower income residents of the project area and to award subcontracts for work in

connection with the project to business concerns which are located in or owned in substantial part by persons residing in the area of the project as described in Section 3 of the HUD Act of 1968, as amended,

24 CFR Part 135.

9.) **RESPONSIBILITY OF CONTRACTOR**

Except as otherwise specifically stated in the Contract Documents and Technical Specifications, the Contractor shall provide and pay for all labor, tools, equipment, levies, fees, permits or other expenses and all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in this Contract or Construction complete in every respect within the specified time. Contractor shall keep the vegetation in the work area, from back-of-curb of the adjacent streets, mowed to a height of not greater than 6-inches.

10.) **COMMUNICATIONS**

All notices, demands, requests, instructions, approvals, proposals and claims must be in writing. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Form of Agreement or at such other office as the Contractor may from time to time designate in writing to the Owner or his Authorized Representative.

11.) **CONTRACT DOCUMENTS AND DRAWINGS**

The Contractor shall be furnished without charge Contract Documents, including Technical Specifications and Drawings as follows: General Contractor - 3 sets. Additional copies requested by the Contractor will be furnished at cost.

12.) **TEMPORARY SERVICES**

The Contractor is responsible for providing their own power and other utilities that may be needed.

13.) **LEAD BASED PAINT**

**No** Lead Based Paint of any type shall be used.

14.) **APPROVALS**

The Contractor and any subcontractors must not cut into existing structures without prior written approval of Columbia Housing Authority or its Authorized Representative.

15.) **EEO AFFIRMATIVE ACTION PLAN STATEMENT OF POLICY**

The Contractor must certify and submit to CHA an Equal Employment Affirmative Action Plan Statement of Policy equal to the required form contained in the Bid Requirements.

16.) **RECORD RETENTION**

Federal Regulation CFR 24, Section 85.36 requires all Contractor and Subcontractor who work on any CHA projects to maintain all accounting records related to a project for minimum of (3) years after final payment.

17.) **BUILDING MATERIALS**

Building materials known to be environmentally hazardous, or containing environmentally hazardous ingredients such as, but not limited to Lead, Mercury, Arsenic, Silver and Asbestos, will not be purchased or used by Contractor or subcontractor doing maintenance, construction or rehabilitation of Columbia Housing Authority properties.

18.) **WORKDAY DEFINITION**

A workday shall consist of 8 hours from 8:00 AM to 4:00 PM local time Monday through Friday. If work requires access to CHA locations or properties that are closed on CHA holidays, no work will be conducted.

19.) **INSURANCE**

Pursuant to the requirements of the insurance pool in which the CHA participates, the Contractor and all subcontractor must name the CHA as an additional insured on their liability insurance policies.

Although a contract may be awarded, Notice to Proceed will not be issued until proof of the additional insured requirements has been presented to the CHA from the Contractor's and any subcontractor's insurance companies. This must occur within 10 days of the award of contract. The Contractor and any subcontractor shall maintain the minimum insurance coverage and limits of liability required under the General Conditions and supplemented below until all work is completed and accepted by the CHA.

1. Workmen's Compensation and Occupational Disease: Statutory Limits.
2. Employer's Liability: \$100,000.00, Coverage "B" may be required if work is considered hazardous, i.e., asbestos.
3. Comprehensive General Liability Insurance:
  - a. Bodily Injury: \$1,000,000.00 Each Person/Each Occurrence
  - b. Property Damage: \$1,000,000.00 Each Occurrence
4. Contractor Protective Liability Coverage may be included for a period of not less than one (1) year after Final Payment to the Contractor if work is such that there could be a lawsuit; i.e., plumbing
5. Comprehensive Automobile Liability Insurance: This insurance shall include non-owned, hired or rented vehicles as well as owned vehicles.
  - a. Bodily Injury: \$1,000,000.00 Each Person/Each Occurrence, Combined Single Limit
6. Builder's Risk may be required if project is extremely large new construction or renovation: Full Value of Contract. Maximum Deductible: \$2,500.00.
7. Umbrella Excess Liability required but may be waived for smaller projects at the discretion of CHA: \$1,000,000.00.

**END OF SECTION**

REQUEST FOR ACCEPTANCE OF SUBCONTRACTORS

TO: All Bidders

DATE: \_\_\_\_\_

PROJECT #:21-12740

Scattered Site Single Family Homes Rehab

Ladies and Gentlemen:

In accordance with our prime contract for \_\_\_\_\_ of this project, we request acceptance of the following proposed subcontractor to perform work or to supply material as indicated below:

1. (Name)  
  
(Address)
  
2. Scope of work (state kind of work if labor, or material or both and give Specification reference):
  
3. **The subcontractor's** non-collusive affidavit in the form required by our contract is furnished herewith (original only, attached to the original of this request).
4. We warrant that the provisions provided by our contract to be inserted in each subcontract will be inserted in this subcontract.
5. We certify that this proposed subcontractor is not ineligible to receive awards of contracts from the United States as evidenced by the list or lists of such contractors maintained by HUD.
6. There will be no assignment of interest in this subcontract except as follows (if none, so state).
7. Terms of payment. Price \$ \_\_\_\_\_
8. Remarks:

\_\_\_\_\_  
(Prime Contractor)

By \_\_\_\_\_

Title \_\_\_\_\_

**\* If a sales agent, identify the manufacturer under "Remarks". If for a sub-subcontract, identify principle subcontractor under "Remarks."**

APPROVAL OR REJECTION

The proposed subcontractor named above is \_\_\_\_\_.

If accepted, the contracting party giving such acceptance assumes no responsibility in connection with the form or terms of the subcontract nor the performance of the subcontractor and this form will not be returned.

If rejected, the reason(s) will be briefly stated herein, and this form will be returned within 10 days after receipt.

\_\_\_\_\_  
(Date)

\_\_\_\_\_  
(Contracting Officer)

## **DOCUMENT 00 6000 - FORMS**

### **1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS**

- A. The General Conditions for Project are based on HUD-5370, "General Conditions for Construction Contracts."
- B. The Supplementary Conditions for Project are enumerated in Section 00 7300.

### **1.2 CLARIFICATION AND MODIFICATION FORMS**

- A. Form for Requests for Information (RFIs): AIA Document G716, "Request for Information (RFI)."
- B. Change Order Form: AIA Document G701, "Change Order."
- C. Form of Change Directive: AIA Document G714, "Construction Change Directive."

### **1.3 PERIODIC PAYMENT FORMS**

- A. HUD 51000 – SCHEDULE OF AMOUNTS FOR CONTRACT PAYMENTS
- B. HUD 5372 – CONSTRUCTION PROGRESS SCHEDULE
- C. Application and Certificate for Payment: AIA Document G702
- D. Continuation Sheet: AIA Document G703

### **1.4 CLOSEOUT FORMS**

- A. Form of Substantial Completion: AIA Document G704, "Certificate of Substantial Completion."

**END OF DOCUMENT**

## SECTION 00 7300 - SUPPLEMENTARY CONDITIONS

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions defined in HUD 5370 and other provisions of the contract documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

### PART 2 - ADDITIONAL CONDITIONS

#### 2.1 ACCEPTANCE OF BIDS

- A. Owner has the right to negotiate with the low bidder if Bid exceeds the budget.

#### 2.2 INSURANCE COVERAGE

- A. Each Subcontractor shall carry the following insurance coverages:
  - 1. Workers Compensation
    - a. Statutory Limits
    - b. \$1,000,000 Each Accident
  - 2. Employer's Liability
    - a. \$100,000 (Coverage B)
  - 3. Comprehensive General Liability Insurance Bodily Injury
    - a. \$1,000,000 Each Person
    - b. \$1,000,000 Each Occurrence
    - c. \$1,000,000 Aggregate
  - 4. Property Damage
    - a. \$1,000,000 Each Occurrence
    - b. \$1,000,000 Aggregate, or
  - 5. Excess (Umbrella)
    - a. \$1,000,000 Combined Single Limit
  - 6. Comprehensive Automobile Liability Insurance Bodily Injury
    - a. \$300,000 Each Person
    - b. \$500,000 Each Accident
    - c. \$500,000 Aggregate
  - 7. Property Damage
    - a. \$100,000 Each Accident, or,
    - b. \$500,000 Combined Single Limit
- B. This insurance must include non-owned, hired and rented vehicles, as well as owned vehicles.
- C. Each Subcontractor shall submit to General Contractor the Certificates of Insurance for them self and any subcontractor before work begins.

#### 2.3 WAIVERS OF LIENS

- A. Contractor shall list subcontractors who will perform any portion of the work.



- B. Based on that list, Contractor shall furnish a partial waiver of liens, starting with first payout request from subcontractors and suppliers, with full waiver of liens being submitted prior to final payment.

#### **2.4 GUARANTEES**

- A. Contractor shall guarantee all materials and workmanship to be free of defects for a period of one year from date of acceptance by the owner of said work. Contractor shall replace at their own expense any work that may be found defective within said one-year period.
- B. Contractor shall also deliver all manufacturers' Warranties for installed items with warranties in excess of the above, as offered by manufacturer or specified in the various Technical Specifications Sections.

#### **2.5 RESPONSIBILITY OF CONTRACTOR**

- A. Except as otherwise specifically stated in the Contract Documents and Technical Specifications, the Contractor shall provide and pay for all labor, tools, equipment, levies, fees and like expenses as well as all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in the Contract, complete in every respect within the specified time.

#### **2.6 CONTRACT DOCUMENTS AND DRAWINGS**

- A. Contractor shall be furnished without charge Contract Documents, including Drawings and Project Manual with Technical Specifications, three (3) sets.
- B. Contractor will also be given access to Tyson and Billy Architect's website to download PDF copies of the Contract Documents for reproduction at their own cost.

#### **2.7 CONFLICT OF DIRECTIONS**

- A. A. Where specific requirements appear to be at variance with the laws, ordinances or other applicable regulations, the Bidder shall secure an interpretation from the Owner or its representative prior to submitting bids. Failure to comply with the above request will result in the Bidder bearing expenses of correcting work to conform with any and all legal requirements.

#### **2.8 HAZARDOUS MATERIALS**

- A. Building materials known to be environmentally hazardous, or containing environmentally hazardous ingredients such as, but not limited to, Lead Mercury, Arsenic, Silver and Asbestos, shall not be purchased or used on this Project.

#### **2.9 UTILITY FEES**

- A. Permit and hook-up fees imposed by utility companies, city, count, and state shall be deemed to be included in the Contract. Bidder shall verify such amounts with the appropriate authorities prior to bidding.

#### **2.10 RETAINAGE**

- A. 10% shall be withheld from each progress payment until the date of substantial completion at which time the retainage will remain at 10% for the remainder of the project.

## **2.11 PERMIT**

- A. Contractor shall obtain any and all construction permits required by the City of Sycamore Building Department. The Architect will be providing procedural assistance.

## **2.12 DEFINITIONS**

- A. Product: Refers to new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. "Product" may also include existing materials or components required for reuse.
- B. Furnish or Supply: To supply and deliver, unload, inspect for damage.
- C. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, and make ready for use.
- D. Provide: To furnish or supply, plus install.
- E. Project Manual: The volume usually assembled for the Work which includes the Bid Documents, Contract Documents, Soils Investigations and Technical Specifications.

**END OF SECTION**

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

#### 1.4 PROJECT INFORMATION

- A. Project Identification: Scattered Site Single Family Home Rehab Phase I.

1. Project Location: Columbia, South Carolina.

- B. Owner: Columbia Housing Authority, 1917 Harden Street, Columbia, SC 29204

1. Owner's Representative: Brad Ward

- C. Architect: Tyson and Billy Architects.

1. Architect's Representative: Ronald G. Billy, Jr.

## 1.5 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. New kitchens and bathrooms for the scattered site single family homes. Work to include patching and painting of drywall and doors. The units to receive new flooring, new light fixtures, new receptacles and switches along with new cover plates, New roofing with accessories, new deck replacement, new bathroom accessories, and tree removal.
- B. Type of Contract:
  - 1. Project will be constructed under a single prime contract.

## 1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Each Contractor shall have full use of Project site for construction operations during construction period.
- B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

## 1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 3:30 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: Not allowed.
- C. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances within the existing building on Project site is not permitted.
- D. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

## 1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## **SECTION 01 2100 - ALLOWANCES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
  - 1. Unit-cost allowances.

#### **1.02 SELECTION AND PURCHASE**

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Architect and/or Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

#### **1.03 SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance sum.
- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### **1.04 DELIVERY AND STORAGE**

- A. Arrange for delivery of products purchased under an allowance, from place of delivery to Project site, including any storage required during transport to the site.
- B. Do not deliver such products until any facilities required for storage are in proper condition.
- C. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

### **1.05 UNIT-COST ALLOWANCES**

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include applicable taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

### **1.06 ADJUSTMENT OF ALLOWANCES**

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
  - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
  - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
  - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

### **1.07 SCHEDULE OF ALLOWANCES**

Allowance No. 1: Unit-Cost Allowance: Include the sum of \$8,380.00/Unit for the replacement of receptacles and cover plates in each room including the replacement of GFI receptacles in the kitchen and bathroom. Light switches and cover plates in each room to be included in this unit cost.

**END OF SECTION**

## SECTION 012300 - ALTERNATES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

#### 1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on their bids for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

#### 1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.



PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. A1: Countertops.

1. Base Bid: Countertops to be quartz by Cambria.
2. Alternate: Plastic laminate.

END OF SECTION 012300

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
  - 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. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - h. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - i. Cost information, including a proposal of change, if any, in the Contract Sum.
  - j. 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.
  - k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 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.

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROCEDURES

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

## 1.7 SUBSTITUTIONS

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

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Substitution request is fully documented and properly submitted.
  - c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - e. Requested substitution is compatible with other portions of the Work.
  - f. Requested substitution has been coordinated with other portions of the Work.
  - g. Requested substitution provides specified warranty.
  - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
  1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 26 00 – Contract Modification Procedures**

SECTION 012600- CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 26 00 – Contract Modification Procedures**

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
- 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

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

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 26 00 – Contract Modification Procedures**

1.7 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on form acceptable to the architect. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600



## SECTION 01 29 00 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

#### 1.3 DEFINITIONS

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

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's Project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.

- b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
  5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site.
  6. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
  7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

## 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the 25<sup>th</sup> day of the month or as mutually agreed upon. The period covered by each Application for Payment is one month, ending on the last day of the month.
  1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 and HUD 51000 Schedule Amounts for Contract Payments as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Combined Contractor's construction schedule consistent with the HUD 5370 (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  5. Products list (preliminary if not final).
  6. Schedule of unit prices.
  7. Submittal schedule (preliminary if not final).
  8. List of Contractor's staff assignments.
  9. List of Contractor's principal consultants.
  10. Copies of building permits.
  11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  12. Initial progress report.
  13. Report of preconstruction conference.
  14. Certificates of insurance and insurance policies.
  15. Performance and payment bonds.
  16. Data needed to acquire Owner's insurance.
  17. Certified Payrolls
  18. Section 3 Compliance Tracking
  19. MBE/WBE Compliance Tracking
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. Evidence that claims have been settled.
  5. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Administration of Contract: Provide administrative requirements for the proper coordination and completion of work including the following:
  - 1. Supervisory personnel.
- B. Reports: Submit daily and special reports.
- C. Work Schedule: Submit progress schedule, updated monthly.
- D. Submittal Schedule: Prepare submittal schedule; coordinate with progress schedule.
- E. Schedule of Values: Submit schedule of values.
- F. Schedule of Tests: Submit schedule of required tests including payment and responsibility.
- G. Emergency Contacts: Submit and post a list of emergency telephone numbers and address for individuals to be contacted in case of emergency.
- H. Record Documents: Submit record drawings and specifications; to be maintained and annotated by Contractor as work progresses.

1.2 SUBMITTALS

- A. Types of Submittals: Provide types of submittals listed in individual sections and number of copies required below.
  - 1. Shop drawings, reviewed and annotated by the Contractor – electronically to the architect
  - 2. Product data - electronically.
  - 3. Inspection and test reports - electronically.
  - 4. Warranties -One (1) original and electronic copy.
  - 5. Closeout submittals – 2 hard copies and an electronic copy.
- B. Submittal Procedures: Comply with project format for submittals. Comply with submittal procedures established by Architect including Architect's submittal and shop drawing stamp. Provide required resubmittals if original submittals are not approved. Provide distribution of approved copies including modifications after submittals have been approved.
- C. Samples and Shop Drawings: Samples and shop drawings shall be prepared specifically for this project. Shop drawings shall include dimensions and details, including adjacent construction and related work. Note special coordination required. Note any deviations from requirements of the Contract Documents.
- D. Warranties: Provide warranties as specified; warranties shall not limit length of time for remedy of damages Owner may have by legal statute. Contractor, supplier or installer responsible for performance of warranty shall sign warranties.

PART 2 PRODUCTS - Not applicable to this Section

PART 3 EXECUTION - Not applicable to this Section

END OF SECTION

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

- B. Key Personnel Names: Within 7 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.

1.6 REQUEST FOR INFORMATION (RFI)

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



DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Owner name.
  3. Owner's Project number.
  4. Name of Architect.
  5. Architect's Project number.
  6. Date.
  7. Name of Contractor.
  8. RFI number, numbered sequentially.
  9. RFI subject.
  10. Specification Section number and title and related paragraphs, as appropriate.
  11. Drawing number and detail references, as appropriate.
  12. Field dimensions and conditions, as appropriate.
  13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  14. Contractor's signature.
  15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or form acceptable to the Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

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

#### 1.7 PROJECT MEETINGS

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

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

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

1. Attendees: Authorized representatives of Owner and Architect; Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Critical work sequencing and long lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Use of web-based Project software.
    - g. Procedures for processing field decisions and Change Orders.
    - h. Procedures for RFIs.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures.
    - l. Preparation of Record Documents.
    - m. Use of the premises and existing building.
    - n. Work restrictions.
    - o. Working hours.
    - p. Owner's occupancy requirements.
    - q. Responsibility for temporary facilities and controls.
    - r. Procedures for moisture and mold control.
    - s. Procedures for disruptions and shutdowns.
    - t. Construction waste management and recycling.
    - u. Parking availability.
    - v. Office, work, and storage areas.
    - w. Equipment deliveries and priorities.
    - x. First aid.
    - y. Security.
    - z. Progress cleaning.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 31 00 – Project Management and Coordination**

commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
  - c. Review present and future needs of each contractor present, including the following:
    - 1) Interface requirements.
    - 2) Status of submittals.
    - 3) Deliveries.
    - 4) Off-site fabrication.
    - 5) Access.
    - 6) Site use.
    - 7) Temporary facilities and controls.
    - 8) Work hours.
    - 9) Hazards and risks.
    - 10) Progress cleaning.
    - 11) Quality and work standards.
    - 12) Status of RFIs.
    - 13) Proposal Requests.
    - 14) Change Orders.
    - 15) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 33 00 – Submittal Procedures**

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

B. Related Requirements:

- 1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 2. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 3. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 4. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.3 DEFINITIONS

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

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

- 1. Project name.
- 2. Date.

DIVISION 1 – GENERAL REQUIREMENTS

**Section 01 33 00 – Submittal Procedures**

3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

## 1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

## DIVISION 1 – GENERAL REQUIREMENTS

### **Section 01 33 00 – Submittal Procedures**

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
  - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 14 days for initial review of each submittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

#### 1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 33 00 – Submittal Procedures**

- e. Testing by recognized testing agency.
  - f. Application of testing agency labels and seals.
  - g. Notation of coordination requirements.
  - h. Availability and delivery time information.
4. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
    - f. Specification paragraph number and generic name of each item.
  3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
  4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
  5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing



## DIVISION 1 – GENERAL REQUIREMENTS

### **Section 01 33 00 – Submittal Procedures**

color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
  - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
  - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
  
- C. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
  
- E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
  
- F. Certificates:
  1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
  2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
  5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
  6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

DIVISION 1 – GENERAL REQUIREMENTS

**Section 01 33 00 – Submittal Procedures**

G. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.
  - d. Product and manufacturers' names.
  - e. Description of product.
  - f. Test procedures and results.
  - g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
  1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
  - 1. PDF Submittals: Architect and Construction Manager will indicate, via markup on each submittal, the appropriate action.
  - 2. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.
    - a. Actions taken by indication on Project management software website have the following meanings:
- B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will discard submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

## SECTION 013516 - ALTERATION PROJECT PROCEDURES

### 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 special procedures for alteration work.

#### 1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.

- L. Strip: To remove existing finish down to base material unless otherwise indicated.

#### 1.4 COORDINATION

- A. Alteration Work Subschedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
  - 1. Schedule construction operations in sequence required to obtain best Work results.
  - 2. Coordinate sequence of alteration work activities to accommodate the following:
    - a. Owner's continuing occupancy of portions of existing building.
    - b. Owner's partial occupancy of completed Work.
    - c. Other known work in progress.
    - d. Tests and inspections.
  - 3. Detail sequence of alteration work, with start and end dates.
  - 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
  - 5. Use of elevator and stairs.
  - 6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.
- B. Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

#### 1.5 PROJECT MEETINGS FOR ALTERATION WORK

- A. Preliminary Conference for Alteration Work: Before starting alteration work, Architect will conduct conference at Project site.
  - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, specialists, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
  - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
    - a. Alteration Work Subschedule: Discuss and finalize; verify availability of materials, specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Fire-prevention plan.
    - c. Governing regulations.
    - d. Areas where existing construction is to remain and the required protection.

- e. Hauling routes.
  - f. Sequence of alteration work operations.
  - g. Storage, protection, and accounting for salvaged and specially fabricated items.
  - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
  - i. Qualifications of personnel assigned to alteration work and assigned duties.
  - j. Requirements for extent and quality of work, tolerances, and required clearances.
  - k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
3. Reporting: Architect will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at monthly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
  2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
    - a. Alteration Work Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
    - b. Schedule Updating: Revise Contractor's Alteration Work Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
      - 1) Interface requirements of alteration work with other Project Work.
      - 2) Status of submittals for alteration work.
      - 3) Access to alteration work locations.
      - 4) Effectiveness of fire-prevention plan.
      - 5) Quality and work standards of alteration work.
      - 6) Change Orders for alteration work.
  3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

## 1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
  - 1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed at Project site.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Alteration Work Subschedule:
  - 1. Submit alteration work subschedule within seven 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.

## 1.8 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 three 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. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- C. 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.

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.
- D. 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.
- E. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

## 1.9 STORAGE AND HANDLING OF SALVAGED MATERIALS

### A. Salvaged Materials:

1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

### B. Salvaged Materials for Reinstallation:

1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

### C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

### D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.



- E. Storage Space:
  - 1. Owner will arrange for limited on-site location(s) for free storage of salvaged material. This storage space does not include security for stored material.
  - 2. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

#### 1.10 FIELD CONDITIONS

- A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of 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. 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 (300 mm)** or more.

#### PART 2 - PRODUCTS - (Not Used)

#### PART 3 - EXECUTION

##### 3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
  - 1. Use only proven protection methods, appropriate to each area and surface being protected.
  - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
  - 3. Erect temporary barriers to form and maintain fire-egress routes.
  - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
  - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
  - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
  - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
  - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.
- B. Temporary Protection of Materials to Remain:

1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
  2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. 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.
- D. Utility and Communications Services:
1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
  2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
  3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. 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 functioning properly.
1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
  2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

### 3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
1. Comply with NFPA 241 requirements unless otherwise indicated.
  2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
    - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
  2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
  3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
  4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
    - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
    - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
    - e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.
- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

### 3.3 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 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.

#### 3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
  - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 013516

SECTION 01 40 00  
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality Monitoring: Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality. Perform quality control procedures and inspections during installation.
- B. Standards: Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Tolerances: Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate. Comply with manufacturers' tolerances.
- D. Reference Standards: For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- E. Manufacturer's Field Services: When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to perform the following as applicable, and to initiate instructions when necessary.
  - 1. Observe site conditions.
  - 2. Conditions of surfaces and installation.
  - 3. Quality of workmanship

PART 2 PRODUCTS - Not applicable to this Section

PART 3 EXECUTION - Not applicable to this Section

END OF SECTION

SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Services: Provide temporary services and utilities, including payment of utility costs including the following.
  - 1. Water (potable and non-potable).
  - 2. Lighting and power.
  - 3. Metering.
  - 4. Telephone.
  - 5. Toilet facilities.
  - 6. Materials storage.
  
- B. Construction Facilities: Provide construction facilities, including payment of utility costs including the following.
  - 1. Construction equipment.
  - 2. Dewatering and pumping.
  - 3. Enclosures.
  - 4. Heating.
  - 5. Lighting.
  - 6. Elevator.
  - 7. Access.
  - 8. Roads.
  
- C. Security and Protection: Provide security and protection requirements including the following.
  - 1. Fire extinguishers.
  - 2. Building enclosure and lock-up.
  - 3. Environmental protection.
  - 4. Pest control during and at the end of construction.
  - 5. Snow and ice removal if applicable.
  
- D. Personnel Support: Provide personnel support facilities including the following.
  - 1. Contractor's field office.
  - 2. Sanitary facilities.
  - 3. Drinking water.
  - 4. Project identification sign.
  - 5. Cleaning.

PART 2 PRODUCTS - Not applicable to this Section

PART 3 EXECUTION - Not applicable to this Section

END OF SECTION

SECTION 01 60 00  
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manufacturers: Provide products from one manufacturer for each type or kind as applicable. Provide secondary materials as acceptable to manufacturers of primary materials.
- B. Product Selection: Provide products selected or equal approved by Architect. Products submitted for substitution shall be submitted with complete documentation and include construction costs of substitution including related work.
- C. Substitutions: Request for substitution must be in writing. Conditions for substitution include:
  - 1. An 'or equal' phrase in the specifications.
  - 2. Specified material cannot be coordinated with other work.
  - 3. Specified material is not acceptable to authorities having jurisdiction.
  - 4. Substantial advantage is offered to the Owner in terms of cost, time, or other valuable consideration.
- D. Substitution Requests: Substitutions shall be submitted prior to award of contract, unless otherwise acceptable. Approval of shop drawings, product data, or samples containing substitutions is not an approval of a substitution unless an item is clearly presented as a substitution at the time of submittal.

PART 2 PRODUCTS - Not applicable to this Section

PART 3 EXECUTION - Not applicable to this Section

END OF SECTION

# SUBSTITUTION APPROVAL FORM

**PROJECT:**     **Scattered Site Single Family Home Rehab**  
                  **Columbia, South Carolina**  
                  **(20-12740)**

Request for substitution **requires burden of proof on Proposer** and constitutes a representation that the submitter:

- |                          |                          |  |
|--------------------------|--------------------------|--|
| Yes                      | No                       |  |
| <input type="checkbox"/> | <input type="checkbox"/> | Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product in all respects.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Will provide the same warranty for the substitution as for the specified product.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.  |
| <input type="checkbox"/> | <input type="checkbox"/> | Certifies that the cost data presented is complete and includes all related cost under this contract except architect's redesign fees and that he waives claims for additional costs or time extension related to the substitution which may subsequently become apparent. |
| <input type="checkbox"/> | <input type="checkbox"/> | Will reimburse Owner and 1919 Architects for review or redesign services associated with re-approval by authorities.   |

Submit three (3) copies of request for substitution for consideration. Limit each request to one proposed substitution. **Substitution Approval Form** must be included with each request. Include product identification, including manufacturer's name and model no.

Submit Itemized comparison of the proposed substitution with product specified; List significant variations. Provide data relating to changes in construction schedule.

Submit list of changes required in other work or products.

**PRODUCT SPECIFIED:**

Manufacturer: \_\_\_\_\_

Model #: \_\_\_\_\_

Cost: \_\_\_\_\_

**PROPOSED SUBSTITUTION:**

Manufacturer: \_\_\_\_\_

Model #: \_\_\_\_\_

Cost: \_\_\_\_\_

**COST DIFFERENCE:** \_\_\_\_\_

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

1919 Architects  
\_\_\_\_\_  
Architect Firm

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Approved**      **Not Approved**

Comments: \_\_\_\_\_  
\_\_\_\_\_



## SECTION 01 7300 - EXECUTION

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section features general administrative and procedural requirements governing execution of the Work including:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 01 3300 "Submittal Procedures" for submitting reports of surveys.
  - 2. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
  - 3. Section 07 8400 "Firestopping" for patching penetrations in fire-rated construction.

#### 1.02 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

#### 1.03 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
  - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. 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 affecting by cutting and patching operations.
  - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.
- B. Final Property Survey: Submit PDF copy showing the Work performed and record survey data.

#### 1.05 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  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. Equipment supports.
    - d. Piping, ductwork, vessels, and equipment.
    - e. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. General: 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.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.
  - 2. List of detrimental conditions, including substrates.
  - 3. List of unacceptable installation tolerances.
  - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### **3.02 PREPARATION**

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

### **3.03 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a registered land surveyor or professional engineer to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### **3.04 FIELD ENGINEERING**

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of **[two]** **<Insert number>** permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a registered land surveyor or professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
  - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

### **3.05 INSTALLATION**

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, 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.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
  - 1. Comply with Section 01 7700 "Closeout Procedures" for repairing or removing and replacing defective Work.

### **3.06 CUTTING AND PATCHING**

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.

- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.07 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.08 STARTING AND ADJUSTING**

- A. Coordinate schedule for start-up of various equipment and systems
- B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer. Verify that wiring and support components for equipment are complete and tested.
- C. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions. Require presence of personnel called out in applicable individual specifications Sections.
- D. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- E. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- F. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- G. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."
- H. Submit to Architect a written report that equipment or system has been properly installed and is functioning correctly.

### **3.09 DEMONSTRATION AND INSTRUCTION**

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
  - 1. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

### **3.10 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION**

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
- B. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
  - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.



DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 77 00 – Closeout Procedures**

- C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 3. Complete final cleaning requirements.
  - 4. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

DIVISION 1 – GENERAL REQUIREMENTS

**Section 01 77 00 – Closeout Procedures**

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report.
  5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit on digital media acceptable to Architect by email to Architect.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
    - i. Vacuum and mop concrete.
    - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

DIVISION 1 – GENERAL REQUIREMENTS

**Section 01 77 00 – Closeout Procedures**

- k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - l. Remove labels that are not permanent.
  - m. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

END OF SECTION 017700

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 23 – Operation and Maintenance Data**

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit on digital media acceptable to Architect by email to Architect. Enable reviewer comments on draft submittals.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 23 – Operation and Maintenance Data**

- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 **FORMAT OF OPERATION AND MAINTENANCE MANUALS**

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
  - 1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
  - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 23 – Operation and Maintenance Data**

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
  1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  1. Include procedures to follow and required notifications for warranty claims.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 23 – Operation and Maintenance Data**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823



DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 39 – Project Record Documents**

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
1. Record Drawings.
  2. Record Specifications.
  3. Record Product Data.
  4. Miscellaneous record submittals.
- B. Related Requirements:
1. Section 017700 "Closeout Procedures" for general closeout procedures.
  2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit two set(s) of marked-up record prints.
  2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit one paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and one of file prints.
      - 3) Submit record digital data files and one two set(s) of plots.
      - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
      - 2) Print each drawing, whether or not changes and additional information were recorded.
    - c. Final Submittal:

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 39 – Project Record Documents**

- 1) Submit record digital data files and three set(s) of record digital data file plots.
  - 2) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 39 – Project Record Documents**

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Format: Annotated PDF electronic file with comment function enabled.
  3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  4. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as paper copy.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

DIVISION 1 – GENERAL REQUIREMENTS  
**Section 01 78 39 – Project Record Documents**

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

## **SECTION 0 24119 - SELECTIVE DEMOLITION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section Features:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" for restrictions on use of the premises, phasing requirements and Owner-occupancy requirements.
  - 2. Section 01 7300 "Execution" for cutting and patching of new work and existing work to be repaired.
  - 3. Section 23 0505 "HVAC Demolition for Remodeling" for removal of HVAC components as part of HVAC remodeling work.
  - 4. Section 26 0505 "Electrical Demolition for Remodeling" for removal of electrical components as part of electrical remodeling work.

#### **1.2 DEFINITIONS**

- A. Remove: Detach items from existing construction and, unless indicated to be salvaged or reinstalled, legal disposal off-site.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item, using methods and equipment to prevent damage to the item, including disposing of items not indicated to be salvaged or reinstalled.

#### **1.3 MATERIALS OWNERSHIP**

- A. Unless otherwise made manifest, demolition waste becomes property of Contractor.

#### **1.4 SUBMITTALS**

- A. 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, ensuring that Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate start and stop dates.
  - 3. Use of stairs.
  - 4. Dates of demolition work affecting Owner's continuing occupancy.
  - 5. Dates planned for Owner's partial occupancy of completed Work.

- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### **1.5 QUALITY ASSURANCE**

- A. Refrigerant Recovery Technician Qualifications: 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 such that Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed as part of this contract.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by the abatement contractor as part of this contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

#### **1.7 SPECIAL CONDITIONS**

- A. Recycling of Existing Ceiling Tile: Bidders are reminded to take advantage of recycling programs, such as offered by Armstrong, for disposing of existing ceiling tiles removed from the building.

#### **1.8 COORDINATION**

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

### **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 ASSE A10.6 and NFPA 241.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

### **3.2 PREPARATION**

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

### **3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC 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. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

### **3.4 PROTECTION**

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

### **3.5 SELECTIVE DEMOLITION, GENERAL**

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level, except as scheduled otherwise for phased Work.
    - a. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain fire watch during and for at least 5 hours after flame-cutting operations.
  6. Maintain adequate ventilation when using cutting torches.
  7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  10. Dispose of demolished items and materials promptly.



- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for extended reuse. Completely refurbish where scheduled.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### **3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS**

- A. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- B. Other Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

### **3.7 DISPOSAL OF DEMOLISHED MATERIALS**

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

### **3.8 CLEANING**

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

**END OF SECTION**

## SECTION 03 2000 - CONCRETE REINFORCING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

#### 1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete.

#### 1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International.
- C. ASTM A 82/A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- D. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- E. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society.
- G. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.
- H. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

#### 1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), and ACI 301.
- B. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

### PART 2 PRODUCTS

#### 2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
  - 1. Deformed billet-steel bars.
  - 2. Unfinished.
- B. Stirrup Steel: ASTM A 82/A 82M steel wire, unfinished.
- C. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.
  - 1. Flat Sheets.
  - 2. Mesh Size and Wire Gage: As indicated on drawings.
- D. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gage.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

#### 2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of Architect. Perform welding in accordance with AWS D1.4.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

**PART 3 EXECUTION**

**3.01 PLACEMENT**

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Reinforcement may be field adjusted within specified tolerances to avoid interference with other reinforcement, conduits or embedded items. Do not heat, bend or cut bars in the field.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Maintain concrete cover around reinforcing as follows:
  - 1. Walls (exposed to weather or backfill): 2 inch.
  - 2. Footings and Concrete Formed Against Earth: 3 inch.
  - 3. Slabs on Fill: 3 inch.
- F. Conform to applicable code for concrete cover over reinforcement.
- G. Bond and ground all reinforcement to requirements of Division 16.

**END OF SECTION**

## SECTION 03 3000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Features:
  - 1. Concrete formwork.
  - 2. Reinforcement.
  - 3. Mixture design.
  - 4. Under-slab vapor barrier.
  - 5. Placement procedures.
  - 6. Concrete finishing.
  - 7. Testing.
  
- B. Related Requirements:
  - 1. Section 31 2000 "Earth Moving" for drainage fill under slabs-on-grade.
  - 2. Section 32 1313 "Concrete Paving" for concrete pavement and walks.

#### 1.02 SUBMITTALS

- A. Product Data: For each type of product.
  
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
  
- C. Steel Reinforcement Shop Drawings: Submit drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
  
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - 1. Location of construction joints is subject to approval of the Architect.
  
- E. Qualification Data: For Contractor's testing agency.
  
- F. Welding certificates.
  
- G. Field quality-control reports.

#### 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who will employ for Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

## CAST-IN-PLACE CONCRETE

- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

**1.04 FIELD CONDITIONS**

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. 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.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. 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 as follows:
  - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

**PART 2 - PRODUCTS****2.01 CONCRETE, GENERAL**

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301.
  - 2. ACI 117.

**2.02 FORM-FACING MATERIALS**

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

- a. High-density overlay, Class 1 or better.
  - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
  - c. Structural 1, B-B or better; mill oiled and edge sealed.
  - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- C. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
- D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

### **2.03 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- D. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- E. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- F. Zinc Repair Material: ASTM A 780/A 780M.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
  2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

## CAST-IN-PLACE CONCRETE

- H. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.
  - 1. Height: To suit slab thickness

**2.04 CONCRETE MATERIALS**

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
  - 1. Portland Cement: ASTM C 150/C 150M, Type I or Type I/II, gray.
  - 2. Fly Ash: ASTM C 618, Class F or C.
  - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
  - 4. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S or Class 3M coarse aggregate or better, graded. Provide aggregates with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
- F. Water: ASTM C 94/C 94M.

**2.05 VAPOR BARRIER**

- A. Sheet Vapor Retarder: Multi-layer, fabric-, cord- or grid-reinforced polyethylene at least 15-mil thick and complying with ASTM E 1745, Class A, except with maximum water-vapor permeance of 0.01 perm.
  - 1. "Stego Wrap Vapor Barrier" by Stego Industries LLC, [www.stegoindustries.com](http://www.stegoindustries.com).
  - 2. "Viper VaporCheck II" by Insulation Solutions, Inc; [www.insulationsolutions.com](http://www.insulationsolutions.com).
  - 3. "PERMINATOR" by W.R. Meadows, Inc.; [www.wrmeadows.com](http://www.wrmeadows.com).
- B. Vapor Retarder Accessories: To be used as recommended by manufacturer.
  - 1. Seam Tape: Permeance less than 0.3 perms per ASTM F 1249 or ASTM E 96, "Stego Tape" by Stego Industries LLC.
  - 2. Vapor Proofing Mastic: Permeance less than 0.3 perms per ASTM F 1249 or ASTM E 96, "Stego Mastic" by Stego Industries LLC.
  - 3. Pipe Boots: Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instruction.

**2.06 CURING MATERIALS**

- A. Curing Compound: As meets approval of Installers for floor finishes.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

**2.07 RELATED MATERIALS**

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

**2.08 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, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use 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.

**2.09 FABRICATING REINFORCEMENT**

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

**2.10 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Allowed only for accessory work such as post holes.



## CAST-IN-PLACE CONCRETE

1. Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  2. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  3. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
- C. 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****3.01 FORMWORK INSTALLATION**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
  2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

## CAST-IN-PLACE CONCRETE

- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

**3.02 EMBEDDED ITEM INSTALLATION**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

**3.03 REMOVING AND REUSING FORMS**

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

**3.04 VAPOR-RETARDER INSTALLATION**

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

**3.05 STEEL REINFORCEMENT INSTALLATION**

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

## CAST-IN-PLACE CONCRETE

- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

**3.06 JOINTS**

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 3. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: 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.
  - 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 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: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

**3.07 CONCRETE PLACEMENT**

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. 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. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. 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.
- E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

### **3.08 FINISHING FORMED SURFACES**

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material shall have tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Application: Concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, shall have tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
- C. Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces.

### **3.09 FINISHING FLOORS AND SLABS**

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

## CAST-IN-PLACE CONCRETE

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
  - 1. Apply scratch finish to surfaces [indicated] [and] [to receive concrete floor toppings] [to receive mortar setting beds for bonded cementitious floor finishes] <Insert locations>.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces indicated to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply trowel finish to all floor surfaces.
  - 2. Finish and measure surface, so gap at any point between concrete surface and an unlevleed, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

**3.10 MISCELLANEOUS CONCRETE ITEMS**

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Equipment Bases and Foundations:
  - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
  - 2. Minimum Compressive Strength: 3000 psi at 28 days.
  - 3. When indicated on MEP Drawings, install dowel rods to connect concrete base to concrete floor at 18-inch centers around the full perimeter of concrete base, unless otherwise indicated.
  - 4. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

**3.11 CONCRETE PROTECTING AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

## CAST-IN-PLACE CONCRETE

- C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. 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.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

**3.12 JOINT FILLING**

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least one month(s). 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.

## CAST-IN-PLACE CONCRETE

- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

**3.13 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. 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 Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include 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.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  - 5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  - 6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

**3.14 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Steel reinforcement welding.
  - 3. Verification of use of required design mixture.
  - 4. Concrete placement, including conveying and depositing.
  - 5. Curing procedures and maintenance of curing temperature.

## CAST-IN-PLACE CONCRETE

- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: 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.
  2. Testing Frequency: At least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  3. Slump: Test per ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  4. Air Content: Test per ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  5. Concrete Temperature: Test per ASTM C 1064/C 1064M; 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. Compression Test Specimens: Test per ASTM C 31/C 31M.
    - a. Cast and laboratory-cure 2 sets of 2 standard cylinder specimens for each composite sample.
  7. Compressive-Strength Tests: Test per ASTM C 39/C 39M; one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of 2 field-cured specimens at 7 days and one set of 2 specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  8. Strength of each concrete mixture will be satisfactory if every average of any 3 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.
  9. Test results shall be reported in writing to Architect, concrete supplier, and Contractor within 48 hours of testing.
  10. Reports of compressive-strength tests shall contain:
    - a. Project identification name and number.
    - b. Date of concrete placement.
    - c. Name of concrete testing and inspecting agency.
    - d. Location of concrete batch in Work.
    - e. Design compressive strength at 28 days.
    - f. Concrete mixture proportions and materials.
    - g. Compressive breaking strength.
    - h. Type of break, for both 7- and 28-day tests.
  11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but shall not be used as sole basis for approval or rejection of concrete.



## CAST-IN-PLACE CONCRETE

12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct such tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
  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.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

**END OF SECTION**

## SECTION 040120.64 - BRICK MASONRY REPOINTING

### 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. Repointing joints with mortar.
  2. Repointing joints with sealant.

#### 1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

#### 1.4 SEQUENCING AND SCHEDULING

- A. Order sand and gray portland cement for pointing mortar immediately after approval of Samples. Take delivery of and store at Project site enough quantity to complete Project.
- B. Work Sequence: Perform brick masonry repointing work in the following sequence, which includes work specified in this and other Sections:
  1. Remove plant growth.
  2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
  3. Remove paint.
  4. Clean masonry.
  5. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
  6. Repair masonry, including replacing existing masonry with new masonry materials.
  7. Rake out mortar from joints to be repointed.
  8. Point mortar and sealant joints.
  9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
  10. Where water repellents are to be used on or near masonry work, delay application of these chemicals until after pointing and cleaning.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include recommendations for product application and use.
  - 3. Include test data substantiating that products comply with requirements.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and locations of repointing work on the structure.
  - 2. Show provisions for expansion joints or other sealant joints.
- C. Samples for Initial Selection: For the following:
  - 1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches (150 mm) long by 1/4 inch (6 mm) wide, set in aluminum or plastic channels.
    - a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching existing, cleaned mortar when cured and dry.
    - b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.
  - 2. Sand Type Used for Pointing Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.
  - 3. Sealant materials.
  - 4. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following:
  - 1. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches (150 mm) long by 1/4 inch (6 mm) wide, set in aluminum or plastic channels.
    - a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
  - 2. Sealant materials.
  - 3. Accessories: Each type of accessory and miscellaneous support.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For brick masonry repointing specialist including field supervisors and workers.
- B. Quality-control program.

## 1.7 QUALITY ASSURANCE

- A. Brick Masonry Repointing Specialist Qualifications: Engage an experienced brick masonry repointing firm 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 masonry is insufficient experience for masonry repointing work.
  - 1. Field Supervision: Brick masonry repointing specialist firms shall maintain experienced full-time supervisors on Project site during times that brick masonry repointing work is in progress.
- B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

## 1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Temperature Limits: Repoint mortar joints only when air temperature is between **40 and 90 deg F (4 and 32 deg C)** and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:
  - 1. When air temperature is below **40 deg F (4 deg C)**, heat mortar ingredients and existing masonry walls to produce temperatures between **40 and 120 deg F (4 and 49 deg C)**.
  - 2. When mean daily air temperature is below **40 deg F (4 deg C)**, provide enclosure and heat to maintain temperatures above **32 deg F (0 deg C)** within the enclosure for seven days after pointing.

- D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above unless otherwise indicated.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Source Limitations: Obtain each type of material for repointing brick masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

### 2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.
  - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Masonry Cement: ASTM C91/C91M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Lafarge North America Inc.
- D. Mortar Cement: ASTM C1329/C1329M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Lafarge North America Inc.
- E. Mortar Sand: ASTM C144.
  - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- F. Water: Potable.

## 2.3 ACCESSORY MATERIALS

### A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants."
  - a. Type: Single-component, nonsag urethane sealant.
2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.

### B. Joint-Sealant Backing:

1. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing 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.

### C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

### D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could leave residue on surfaces.

## 2.4 MORTAR MIXES

### A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again, adding only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
  - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.
- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mixes: Mix mortar materials in the following proportions:
  - 1. Pointing Mortar by Type: ASTM C270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime masonry cement or mortar cement.
  - 2. Pointing Mortar by Property: ASTM C270, Property Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime masonry cement or mortar cement.

## PART 3 - EXECUTION

### 3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
  - 1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
  - 2. Keep wall area wet below pointing work to discourage mortar from adhering.
  - 3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.
- B. Remove gutters and downspouts and associated hardware adjacent to masonry and store during masonry repointing. Reinstall when repointing is complete.
  - 1. Provide temporary rain drainage during work to direct water away from building.

### 3.2 MASONRY REPOINTING, GENERAL

- A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect.

### 3.3 REPOINTING attached drawings in the Appendix

- A. Rake out and repoint joints to the following extent:
  - 1. All joints in areas indicated.
  - 2. Joints indicated as sealant-filled joints.
  - 3. Joints at locations of the following defects:
    - a. Holes and missing mortar.

- b. Cracks that can be penetrated **1/4 inch (6 mm)** or more by a knife blade **0.027 inch (0.7 mm)** thick.
  - c. Cracks **1/16 inch (1.6 mm)** or more in width and of any depth.
  - d. Hollow-sounding joints when tapped by metal object.
  - e. Eroded surfaces **1/4 inch (6 mm)** or more deep.
  - f. Deterioration to point that mortar can be easily removed by hand, without tools.
  - g. Joints filled with substances other than mortar.
- B. Do not rake out and repoint joints where not required.
- C. Rake out joints as follows, according to procedures demonstrated in approved mockup:
- 1. Remove mortar from joints to depth of not less than **3/4 inch (20 mm)** and not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than **2 inches (50 mm)** deep; consult Architect for direction.
  - 2. Remove mortar from brick and other masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
  - 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
- D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- E. Pointing with Mortar:
- 1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
  - 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than **3/8 inch (9 mm)** until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
  - 3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in layers not greater than **3/8 inch (9 mm)**. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
  - 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
  - 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
  - 6. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
- F. Pointing with Sealant: Comply with Section 079200 "Joint Sealants." and as follows:
- 1. After raking out, keep joints dry and free of mortar and debris.



2. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
3. Fill sealant joints with specified joint sealant.
  - a. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
  - b. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
  - c. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
    - 1) Fill joints to a depth equal to joint width, but not more than **1/2 inch (13 mm)** deep or less than **1/4 inch (6 mm)** deep.
  - d. Tool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant from surfaces adjacent to joint.
  - e. Sanded Joints: Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
  - f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.
- G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

### 3.4 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.
  1. Do not use metal scrapers or brushes.
  2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.

### 3.5 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

END OF SECTION 040120.64

## **SECTION 04 0123 - BRICK MASONRY REPAIR**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section Features:
  - 1. Repairing brick masonry including removal and replacement of bricks and mortar.
  - 2. Cleaning existing brick.
- B. Related Requirements:
  - 1. Section 04 2000 "Unit Masonry" for new masonry construction and remodeling of interior masonry.
  - 2. Section 09 9100 "Field Painting" for interior finish on masonry infill.

#### **1.2 SUBMITTALS**

- A. See Section 01 3300 "Submittals Procedures" for additional requirements.
- B. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, compliance with specified standards, dimensions of individual components and profiles, and finishes.
  - 2. Include suction rate of replacement brick.
- C. Samples: Submit strap of 3 bricks representative of brick to be furnished for new work.
- D. Qualification Data: For masonry foreman.

#### **1.3 QUALITY ASSURANCE**

- A. Brick Masonry Repair Specialist's Qualifications: Engage an experienced brick masonry repair firm 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.
  - 1. Experience only in installing masonry is insufficient experience for masonry repair work.
  - 2. Field Supervision: Brick masonry repair specialist firm shall maintain experienced full-time supervisors on Project site during times that brick masonry repair work is in progress.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

## **1.5 FIELD CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit brick masonry repair work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Temperature Limits: Repair masonry units only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven days after completion of the Work.
- C. Limits for Wind: Do work only when wind will not create excessive evaporation for at least 72 hours after installation.

## **PART 2 - PRODUCTS**

### **2.1 BRICK MATERIALS**

- A. Replacement Brick: Any sound used brick approximating color and texture of existing brick, and sized to match existing.
  - 1. Obtain replacement brick from source of sufficient quantity that some of the source brick may be destroyed in order to prove brick's soundness.
  - 2. For purposes of payment, such tested brick shall be considered the same as brick furnished for actual repairs.

### **2.2 MORTAR MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or Type II, gray.
  - 1. Provide cement containing not more than 0.60 percent total alkali when tested per ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Masonry Cement: Not allowed.
- D. Mortar Cement: Not allowed.
- E. Mortar Sand: ASTM C 144.
- F. Water: Potable.

### **2.3 MORTAR MIXES**

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
- B. Do not use admixtures in mortar unless approved by Architect.
- C. Mixes: Mix mortar materials per ASTM C 270, Proportion Specification, Type N with cementitious material limited to portland cement and lime.
  - 1. Adjust quantities as required to produce dried mortar matching appearance of existing.

## **PART 3 - EXECUTION**

### **3.1 PROTECTION**

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
  - 1. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
  - 2. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

### **3.2 BRICK REPLACEMENT**

- A. Where bricks are discovered to be spalled or deteriorated beyond their surface, carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining brick masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- D. Install replacement brick after wetting of existing surfaces, matching bonding and coursing pattern of existing brick.
- E. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet replacement bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
- F. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
  - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

### **3.3 MORTAR PATCHING**

- A. Patch existing exterior mortar between bricks at building faces so that mortar between existing brick is free of voids and weak mortar. Replace all voids, cracks and weak mortar with new mortar, as follows.
- B. Rake out and repoint joints at:
  - 1. Holes and missing mortar.
  - 2. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
  - 3. Hollow-sounding joints when tapped by metal object.
  - 4. Eroded surfaces 1/4 inch or more deep.
  - 5. Mortar that is unable to withstand 50% of the force that can be applied with tools to sound mortar.
- C. Rake out joints as follows:
  - 1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep. Do not spall edges of masonry units or widen joints.
  - 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

3. Cut out holes sufficient to receive a mortar patch plug at least 7/16 inch thick in any dimension.
4. Remove loose/weak mortar and adjacent brick materials. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched.

D. Pointing with Mortar:

1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer, and allow it to become thumbprint hard before applying next layer.
3. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces
4. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
5. Hairline cracking within mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and replace.
6. Allow mortar to extrude itself outside of brick faces, to match existing brick construction.

- E. Tooling: When mortar is thumbprint hard, tool all joints to provide water-resistant barrier, matching appearance of mortar in existing brick masonry.

### **3.4 FINAL CLEANING**

- A. After mortar has fully hardened, clean existing exterior masonry surfaces of excess mortar.
1. Do not use metal scrapers or brushes.
  2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent non-masonry surfaces of spare mortar. Use detergent and soft brushes.

### **3.5 MASONRY WASTE DISPOSAL**

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.
- B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

**END OF SECTION**

**SECTION 04 2000 - UNIT MASONRY****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section Features Work for New Construction, Including:
  - 1. Clay face brick.
  - 2. Mortar and grout.
  - 3. Ties and anchors.
  - 4. Embedded flashings.
- B. Related Requirements:
  - 1. Section 04 0120 "Unit Masonry Restoration" for repairs to existing brick masonry.

**1.2 SUBMITTALS**

- A. See Section 01 3300 "Submittal Procedures."
- B. Product Data: For each type of product.
  - 1. Include for each type of masonry its manufacturer's recommended cleaning procedures.
- C. Samples for Initial Selection:
  - 1. Clay face brick, in the form of straps of three or more bricks.
  - 2. Colored mortar.
- D. Mix Designs: For mortar. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

**1.3 QUALITY ASSURANCE**

- A. Coordination: Coordinate with hollow metal door frame installers for required grouting.
- B. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in Contract Documents.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.5 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls, and anchor cover securely in place.
  - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, securely cover a minimum of 24 inches down the face next to unconstructed wythe, and fix cover in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining exposed face of masonry. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 UNIT MASONRY, GENERAL

- A. Source Limitations for Masonry Units: Obtain exposed masonry units from single source and manufacturer for each product type.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.



**2.2 BRICK**

- A. Clay Face Brick: Facing brick complying with ASTM C 216.
  - 1. Grade: SW.
  - 2. Type: To match existing.
  - 3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C 67.
  - 4. Efflorescence: Tested per ASTM C 67 and rated "not effloresced."
  - 5. Size: Modular Utility, matching existing
  - 6. Color and Texture: Match existing and as selected by Owner.

**2.3 MORTAR AND GROUT MATERIALS**

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color.
  - 1. Alkali content shall not be more than 0.1 percent when tested per ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: NOT allowed.
- E. Mortar Cement: NOT allowed.
- F. Aggregate for Mortar: Washed natural sand or crushed stone meeting ASTM C 144.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- H. Water: Potable.

**2.4 TIES AND ANCHORS**

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Adjustable Masonry-Veneer Anchors:
  - 1. Type: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
  - 2. Material: Steel, galvanized with 2.00 oz per sq ft zinc coatings per ASTM A 153, class B2.
  - 3. Screws at Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
  - 4. Screws at Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless-steel shank.

**2.5 EMBEDDED FLASHING MATERIALS**

- A. Flexible Flashing: Use the following unless otherwise indicated:
1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
    - a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
  2. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal drip edge.
- B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- C. Termination Bars for Flexible Flashing: Aluminum bars 1/8 inch by 1 inch or stainless-steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

**2.6 MISCELLANEOUS MASONRY ACCESSORIES**

- A. Weeps: Use one of the following:
1. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
  2. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
  3. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
  4. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
  5. Aluminum Weep Hole/Vent: Units made from sheet aluminum, designed to fit into a head joint and consisting of a vertical channel, with louvers stamped in web and with a top flap to keep mortar out of the head joint; factory primed and painted before installation to comply with Section 099113 "Exterior Painting" in color selected by Architect.
  6. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.
- B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Configuration: Provide one of the following:
    - a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
    - b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

**2.7 MASONRY CLEANERS**

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without

discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to PROSOCO, Inc.

## 2.8 MORTAR MIXES

- A. General: Do not use frozen admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  1. Do not use frozen materials.
  2. Do not use calcium chloride in mortar or grout.
  3. Use portland cement-lime mortar.
  4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, Type N.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  1. Verify that foundations are within tolerances specified.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Use full-size units without cutting if possible. If cutting is required:
  1. Cut units with motor-driven saws.
  2. Provide clean, sharp, unchipped edges.
  3. Allow units to dry before laying unless wetting of units is specified.
  4. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Matching Existing Masonry: Match coursing, pattern and joint widths of existing masonry.
- E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

### 3.3 TOLERANCES

#### A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

#### B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

#### C. Joints:

1. For bed joints, do not vary thickness match existing by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Match existing; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay CMUs with face shells bedded in mortar and make head joints of depth equal to bed joints.
- B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  - 2. Allow cleaned surfaces to dry before setting.
  - 3. Wet joint surfaces thoroughly before applying mortar.
  - 4. Rake out mortar joints for pointing with sealant.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

### 3.6 CAVITY WALLS

- A. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- B. Cavity Wall Insulation: Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
  - 1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation.
- C. Anchor masonry veneers to wall stud framing with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  - 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
  - 4. Space anchors as indicated, but not more than 18 inches o.c. vertically and horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 24 inches, around perimeter.

### 3.7 FLASHINGS AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on

sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. Extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches. Fasten upper edge of flexible flashing to sheathing.
  3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
  4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
- C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
  2. Space weep holes 24 inches o.c. unless otherwise indicated.

### **3.8 POINTING, AND CLEANING**

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance.
- C. Final Cleaning: After mortar for new masonry is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Clean masonry with specified cleaner applied according to manufacturer's written instructions.
  3. Protect adjacent surfaces from contact with cleaner by covering with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
  6. Clean stone trim in compliance with stone supplier's written instructions.

**END OF SECTION**

## SECTION 06 1000 - ROUGH CARPENTRY

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Structural wall and roof framing.
- B. Built-up structural beams and columns.
- C. Roof Sheathing.
- D. Preservative treated wood materials.
- E. Miscellaneous framing and sheathing.
- F. Concealed wood blocking, nailers, and supports.
- G. Miscellaneous wood nailers, furring, and grounds.

#### 1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

#### 1.03 REFERENCE STANDARDS

- A. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association.
- B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- D. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

#### 1.05 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
  - 1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
- B. Exposed-to-View Rough Carpentry: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- C. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

### PART 2 PRODUCTS

#### 2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

## **2.02 DIMENSION LUMBER**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: 15% max..
- C. Stud Framing:
  1. Species: Hem-Fir.
  2. Grade: No. 2. Exterior and Interior Load bearing walls.
- D. Structural Framing and Timbers:
  1. Species: Hem-Fir.
  2. Grade: No. 2.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  1. Lumber: S4S, No. 2 or Standard Grade.
  2. Boards: Standard or No. 3.
- F. Miscellaneous Blocking, Furring, and Nailers:
  1. Lumber: S4S, No. 2 or Standard Grade.
  2. Boards: Standard or No. 3.

## **2.03 LAMINATED HEADERS**

- A. Laminated headers shall meet or exceed the following requirements:
  1. Extreme Fiber Bending:Fb= 2,800 psi
  2. Compression Normal to Grain:Fc= 2,700 psi
  3. Horizontal Shear:Fv= 285 psi
  4. Modulus of Elasticity:E = 2,000,000
  5. Allowance Axial Tension Stress:Ft= 1,850 psi
- B. Composition:
  1. The term "Structural Glue Laminate Timber" refers to an engineered, stress rated product of a timber laminating plant, comprising of assemblies of specially selected and prepared wood laminations securely bonded together with adhesives.
  2. The grain of all laminations is approximately parallel longitudinally.
  3. Lumber used for laminating is structurally graded in accordance with the standard grading provision for the species and supplementary specifications, surfaced to laminating tolerances and dried according to the required moisture content at the time of gluing.
  4. Adhesives of structural glue laminated timber must comply with the specifications contained in ANSI/AITC A190.1.

## **2.04 TIMBERS**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: Kiln-dry (15 percent maximum).
- C. Beams and Posts 5 inches and over in thickness:
  1. Grade: Select Structural.

## **2.05 CONSTRUCTION PANELS**

- A. Roof Sheathing: APA Structural I Rated OSB Sheathing, Exposure 1, and as follows:
  1. Span Rating: 48/24.
  2. Thickness: 5/8 inch, nominal.

## **2.06 ACCESSORIES**



- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
  - 3. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
- B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions. Provide connectors manufactured by Simpson Strong Tie.
  - 1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing per ASTM A 653/A 653M.
- C. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions. Provide hangers manufactured by Simpson Strong Tie Co..
- D. Sill Gasket on Top of Foundation Wall: 1/2 inch thick, plate width, closed cell plastic foam from continuous rolls.
- E. Subfloor Glue: Waterproof, water base, air cure type, cartridge dispensed.

## **2.07 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
  - 1. Kiln dry lumber after treatment to maximum moisture content of 15 percent.
- C. Preservative Pressure Treatment of Lumber in Contact with Soil: AWWA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft retention.
- D. Treat wood exposed to deterioration by moisture such as items in contact with roof, flashing, waterproofing, masonry, concrete, or the ground including posts, plates, or as shown on drawings.
- E. Treat wood subject to insect attack.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including, shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

- C. Install structural members full length without splices.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

#### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

#### **3.05 INSTALLATION OF CONSTRUCTION PANELS**

- A. Roof Sheathing: Secure panels to framing members, with ends staggered and sheet ends over firm bearing.
  - 1. Screw panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with ends over firm bearing and staggered, using nails, or screw.
  - 1. Place air infiltration barrier over wall sheathing, weather lapping edges and ends.

#### **3.06 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

#### **3.07 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

**END OF SECTION**

## SECTION 06 1600 - SHEATHING

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Wall sheathing.
  - 2. Subflooring.
- B. Related Requirements:
  - 1. Section 06 1000 "Rough Carpentry" for plywood backing panels.
  - 2. Section 07 2500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.
  - 3. Section 09 2900 "Gypsum Board" for cementitious backer panels.

#### 1.02 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
  - 1. Certification that fire-retardant treated plywood complies with requirements. Include physical properties of treated plywood both before and after exposure to elevated temperatures, per ASTM D 5516.
  - 2. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Fire-retardant-treated plywood.

#### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation.
- B. Protect sheathing from weather by covering with waterproof sheeting, securely anchored.
- C. Provide for air circulation around stacks and under coverings.

### PART 2 - PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119 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. Emissions: Products shall meet 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."

## **2.02 FIRE-RETARDANT-TREATED SHEATHING**

- A. Treatment by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, 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.
- B. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

## **2.03 FASTENERS**

- A. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M
  - 1. For fire-retardant-treated roof sheathing use Type 304 stainless steel nails or coated nails having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.

# **PART 3 - EXECUTION**

## **3.01 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 obstructions, fitting tightly against abutting construction.
- C. Comply with the following:
  - 1. Table 2304.9.1, "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.

## **3.02 WOOD PANEL INSTALLATION**

- 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:
  - 1. Subflooring:

- a. Nail to wood framing.
  - b. Space panels 1/8 inch apart at edges and ends.
2. Wall and Roof Sheathing:
- a. Nail to wood framing.
  - b. Space panels 1/8 inch apart at edges and ends.

**END OF SECTION**

## SECTION 06 2000 - FINISH CARPENTRY

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Finish carpentry items.
- C. Wood casings and moldings.
- D. Hardware and attachment accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 9000 - Painting and Coating: Painting and finishing of finish carpentry items.
- C. Section 12 3530 - Residential Casework: Shop fabricated cabinet work.

#### 1.03 REFERENCE STANDARDS

- A. ANSI A135.4 - American National Standard for Basic Hardboard.
- B. ANSI A208.1 - American National Standard for Particleboard.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.
- E. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- C. Samples: Submit two samples of wood trim 6 inches long.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, grades as indicated.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
- C. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of experience.

#### 1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire retardant requirements.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

#### 1.08 PROJECT CONDITIONS

- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- B. Coordinate the work with installation of associated and adjacent components.

### PART 2 PRODUCTS

#### 2.01 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

#### 2.02 LUMBER MATERIALS

- A. Hardwood Lumber: Red oak species, quarter sawn, maximum moisture content of 8 percent with closed grain , of quality suitable for transparent finish, exposure and loading.
- B. Prefinished Wood for moldings, bases, casing, and miscellaneous trim.
  - 1. Finish to match wood door.

### **2.03 SHEET MATERIALS**

- A. Hardwood Plywood: Veneer core, type of glue recommended for application; Oak face species or species selected by the architect.
- B. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of 45 pound density, made with waterproof resin binders; of grade to suit application; sanded faces.
- C. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth one side (S1S).

### **2.04 PLASTIC LAMINATE MATERIALS**

- A. Plastic Laminate: NEMA LD 3, 0.050 inches thick ; color as selected ; satin finish.
- B. Laminate Backing: Minimum 45 pound density particle board on 5/8" plywood.

### **2.05 ADHESIVE**

### **2.06 FASTENINGS**

- A. Fasteners: Of size and type to suit application; mill finish in concealed locations and polished finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

### **2.07 ACCESSORIES**

- A. Lumber for Shimming and Blocking : Softwood lumber of pine species.
- B. Glass: Type as indicated on drawings and as specified in Section 08 8000.
- C. Primer: Alkyd primer sealer.
- D. Wood Filler: Solvent base, tinted to match surface finish color.
- E. Hardware: See Section 08710-Finish Hardware.

### **2.08 WOOD TREATMENT**

- A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of as required by code or local Authorities, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84. Vehicle for preservation compatible with finish.
- B. Wood Preservative by Pressure Treatment (PT Type): AWWA Treatment C2 using water borne preservative with 0.25 percent retainage. Vehicle for preservation compatible with finish.
- C. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
- D. Provide identification on fire retardant treated material.
- E. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- F. Kiln dry wood after pressure treatment to maximum 15 percent moisture content.

### **2.09 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. Shop prepare and identify components for book match grain matching during site erection.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

## **2.10 SHOP FINISHING**

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Stain, seal, and varnish exposed to view surfaces. Brush apply only.
- E. Seal internal surfaces and semi-concealed surfaces. Brush apply only.
- F. Prime paint surfaces in contact with cementitious materials.
- G. Back prime woodwork items to be field finished, prior to installation.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- C. See Section 06100-Rough Carpentry for installation of recessed wood blocking.

### **3.02 INSTALLATION**

- A. Set and secure materials and components in place, plumb and level.
- B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- C. Install trim with nails at 6 inch on center.
- D. Install hardware supplied by Section 08710 in accordance with manufacturer's instructions.

### **3.03 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**



## SECTION 06 4023 - INTERIOR ARCHITECTURAL WOODWORK

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

##### A. Section Includes:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Shop priming of interior architectural woodwork.

##### B. Related Requirements:

1. Section 06 1000 "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.

#### 1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

#### 1.4 ACTION SUBMITTALS

##### 1.

##### B. Shop Drawings:

1. Include the following:
  - a. Dimensioned plans, elevations, and sections.
  - b. Attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.

## 1.5 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.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: 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: 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 (16 and 32 deg C) 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.

## 1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

## PART 2 - PRODUCTS

### 2.1 ARCHITECTURAL 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.

### 2.2 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Economy.
  - 1. Wood Species: Any closed-grain hardwood.
  - 2. Wood Moisture Content: 5 to 10 percent.

### 2.3 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Economy.
- B. Wood Species: Any closed-grain hardwood.
  - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (76 mm) wide.
  - 2. Wood Moisture Content: 5 to 10 percent.

### 2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood 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 in contact with concrete or masonry.
    - 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 by the American Lumber Standards Committee's (ALSC) Board of Review.
- 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. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

## 2.5 FABRICATION

- A. 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 (1.5 mm) unless otherwise indicated.
    - b. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

## 2.6 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 09 9900 "Interior, Exterior, And Industrial Painting And Coatings."
  - 1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

### 3.2 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 (3 mm in 2400 mm).
- 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 according to AWPA M4.
- F. 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 **96 inches (2400 mm)** 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 smooth; and finish same as wood base if finished.
  - 5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

### 3.3 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 shall prepare and submit report of inspection.

### 3.4 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual.
- B. Where not possible to repair, replace defective woodwork.

- C. Field Finish: See Section 09 9000 "Interior, Exterior, And Industrial Painting And Coatings for final finishing of installed interior architectural woodwork not indicated to be shop finished.

### 3.5 CLEANING

- A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 064023

## SECTION 066100 – Solid Surface Tub Surrounds

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Tub/Shower Systems

#### **1.02 SECTION INCLUDES**

- A. Wall Panels
- B. Accessories

#### **1.03 REFERENCES**

- A. American National Standards Institute (ANSI)

#### **1.04 SYSTEM DESCRIPTION**

- A. Performance Requirements: Provide shower receptors and shower systems that conform to the following requirements of regulatory agencies and the quality control of Inpro® Corporation.
  - 1. Provide shower receptors and shower systems that conform to ANSI Z124.1.2-2005 when tested for workmanship and finish, structural integrity and material characteristics.

#### **1.05 SUBMITTALS**

- A. Product Data: Manufacturer's printed product data for each type of shower receptor and shower system specified.
- B. Samples: Verification samples minimum of 3" x 3" samples indicating color and pattern.
- C. Manufacturer's Installation Instruction: Printed installation instructions for shower receptors and shower systems.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in unopened factory packaging to the jobsite
- B. Inspect materials at delivery to assure that specified products have been received.
- C. Store in original packaging in an interior climate controlled location away from direct sunlight.

#### **1.07 PROJECT CONDITIONS**

- A. Environmental Requirements: Products must be installed in an interior climate controlled environment.

#### **1.08 WARRANTY**

- A. Standard BioPrism® Solid Surface Limited 10 Year Warranty against material and manufacturing defects.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURER**

- A. Acceptable Manufacturer:
  - Inpro® Corporation,
  - PO Box 406 Muskego, WI 53150 USA;
  - Telephone: 800.222.5556, Fax: 888.715.8407,
  - www.inprocorp.com
- B. Provide all shower receptors and shower systems from a single source.

#### **2.02 MANUFACTURED UNITS**

- A. Tub/Shower systems
  - 1. Wall Panels Only
    - A. Specify size; custom made to order
      - 1. Edge Options: Radius.
    - B. Panel options: Provide BioPrism® Solid Surface Panels with the following decorative options (4" Square).

1. Groove width, Groove style, cutting depth
  - a. 1/8", V-groove, .060" deep

### **2.03 ACCESSORIES**

- A. Trim
  1. Inside Corner Wedge Molding, 15/16"
- B. Solid Surface Bonding Adhesive
- C. Adhesive Cartridge Dispenser
- D. Adhesive Mixing Tips
- E. Silicone Adhesive/Sealant

### **2.04 MATERIALS**

- A. BioPrism® Solid Surface: Shower wall panels shall be manufactured from polyester/acrylic blended resins with natural filler material.

### **2.05 FINISHES**

- A. Select color from the Inpro® Corporation BioPrism® Solid Surface color palette.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas and conditions in which shower receptors and shower systems will be installed.

### **3.02 PREPARATION**

- A. General: Prior to installation, clean area to remove dust, debris and loose particles.

### **3.03 INSTALLATION**

- A. General: Install components plumb and level, scribe adjacent finishes, in accordance with approved shop drawings and recommended installation instructions.

### **3.04 CLEANING**

- A. At completion of the installation, clean surfaces in accordance with the manufacturer's clean-up and maintenance instructions.

**END OF SECTION**



## SECTION 06 61 13 – SIMULATED STONE FABRICATIONS

### Part 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Cambria Quartz Surfacing.

##### B. Related Sections:

1. Administrative, procedural and temporary work requirements.
  - i. Section 12 3530 - Residential Casework.

#### 1.2 REFERENCES

##### A. ASTM International (ASTM):

1. ASTM C97; Moisture Absorption.
2. ASTM C99; Modulus of Rupture.
3. ASTM C170; Compressive Strength.
4. ASTM C501; Abrasion Resistance.
5. ASTM C482; Bond Strength.
6. ASTM C484; Thermal Shock.
7. ASTM C531; Coefficient of Thermal Expansion.
8. ASTM C648; Breaking Strength of Tile.
9. ASTM C1026; Resistance to Freeze-Thaw Cycling.
10. ASTM E84; Surface Burning Characteristics.
11. ASTM E662; Smoke Density.
12. ASTM 650-04; Chemical Resistance.

##### B. American National Standards Institute (ANSI):

1. ANSI Z124.6; Stain Resistance.
2. ANSI A137.1; Wet/Dry Dynamic Coefficient of Friction.

##### C. Cambria installation procedures.

#### 1.3 SUBMITTALS

##### A. Product Data:

1. Cambria Product Specification Sheet.
2. Cambria Care and Maintenance Information.
3. Cambria Full Lifetime Warranty.

##### B. Samples:

1. Submit minimum of 3"x3" Cambria samples.

- C. Test and Evaluation Reports: Showing compliance with the specified performance characteristics and physical properties.
- D. Adhesive:
  - 1. Submit two samples of adhesive joint for each Cambria Design™ selected.
- E. Shop Drawings: Double Treeline Edge (A+R) edge, and show the following:
  - 1. Drawings to include countertop layout, dimensions, required locations of support and blocking member, edge profiles, cutouts, and attachments.
- F. Fabricator/Installer Qualifications:
  - 1. Work of this section shall be performed by a fabricator/installer approved by Cambria.
  - 2. Use of digital templating equipment and slab layout technology prior to fabrication and installation of all products.
    - i. Slabsmith™.
  - 3. Minimum of five (5) years of documented experience with commercial fabrication/installation of quartz surfaces.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturers' Qualifications:
  - 1. All products must be produced in US production facility.
  - 2. Quartz producer must have 15 years of documented experience in quartz design, production, and innovation in the US.
- B. Fabricator/Installer Qualifications:
  - 1. Work of this section shall be performed by a fabricator/installer approved by Cambria.
  - 2. Use of digital templating equipment and slab layout technology prior to fabrication and installation of all products.
    - i. Slabsmith™.
  - 3. Minimum of five (5) years of documented experience with commercial fabrication/installation of quartz surfaces.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging, Shipping, Handling, and Unloading: Observe Cambria's recommendations and handle in a manner to prevent breakage. Brace parts if necessary. Transport in the near vertical position with finished face toward

finished face. Do not allow finished surfaces to rub during shipping and handling.

B. Storage and Protection:

1. Store in racks in near vertical position.
2. Store inside away from direct exposure to sunlight.

C. Damaged materials shall be removed from the jobsite.

1.6 JOBSITE REQUIREMENTS

A. PPE must be used as required and directed by OSHA standards governing your industry.

B. General Contractor shall provide access to electrical power.

1.7 WARRANTY

A. Cambria Full Lifetime Warranty.

1. Fully transferable, non-prorated warranty.

Part 2 - Products

2.1. MANUFACTURERS

A. Acceptable Manufacturer:

1. Cambria.

B. No substitutions.

2.2. MATERIALS

A. Material:

1. Cambria Quartz surfacing.

B. Construction:

1. Quartz, binder, and pigment.

C. Identification:

1. Material shall be labeled with Cambria's identification/logo.

D. Thickness:

1. 2 cm.

E. Design: Cambria Classic Collection

F. Finish: Polish Finish.

G. Exposed Edges and Corners:

## 1. Countertop profile Double Treeline Edge (A+R)

### H. Performance:

1. ASTM C97; Moisture Absorption: typical results negligible.
2. ASTM C99; Modulus of Rupture: typical results 6,800 psi.
3. ASTM C170; Compressive Strength: typical results 24,750 psi.
4. ASTM C501; Abrasion Resistance: typical results 223.
5. ASTM C482; Bond Strength: typical results 205 psi.
6. ASTM 484; Thermal Shock: Passes 5 cycles.
7. ASTM C531; Coefficient of Thermal Expansion: typical results  $1.2 \times 10^{-5}$  inch/°F.
8. ASTM C648; Breaking Strength of Tile: typical results 3,661 lbf.
9. ASTM C1026; Resistance to Freeze-Thaw Cycling: Unaffected 15 cycles.
10. ANSI A137.1; Wet Dynamic Coefficient of Friction [0.34 polish] / [0.47 matte].
11. ANSI A137.1; Dry Dynamic Coefficient of Friction [0.72 polish] / [0.80 matte].
12. ASTM E84; Surface Burning Characteristics: typical results 17 (Class A/1 Rating).
13. ASTM E662; Smoke Density: Flaming 196, Non-flaming 69.
14. ANSI Z124.6; Stain Resistance: Unaffected.
15. ASTM 650-04; Chemical Resistance: Unaffected.

## 2.3. ACCESSORIES

### A. Mounting Adhesive:

1. 50-year 100% silicone or epoxy adhesive.
2. Acceptable silicone manufacturers:
  - i. Tremco
3. Acceptable epoxy manufacturers:
  - i. Cambria Adhesive.

### B. Quartz Surface Adhesive:

1. Provide epoxy or acrylic adhesive of a type recommended by manufacturer for application and conditions of use.
2. Acceptable manufacturers:
  - i. Cambria Adhesive.
3. Adhesive which will be visible in finished work shall be tinted to match quartz surface.

### C. Joint Sealant:

1. Clear sealant of type recommended by manufacturer for application and use.

2. Acceptable manufacturers:

- i. Dow Corning.
- ii. GE Sealants.

D. Solvent: Denatured alcohol for cleaning to assure adhesion of adhesives and sealants.

E. Cleaning Agents: Mild soap and water.

## 2.4. FABRICATION

### A. Layout:

1. Layout surface to minimize joints. Joint width should not be larger than 1/32".
2. Work with an approved Cambria fabricator who utilizes digital images for seam coordination, product flow, and bookmatch material (i.e., Slabsmith™).

### B. Inspection of Materials:

1. Inspect materials for imperfections prior to fabrication.
  - i. Variations in distribution of aggregate and color that occur in Cambria product are within manufacturer's tolerance and do not constitute defective product.
2. Removal of the protective plastic film is required.

C. Tools: Cut and polish with water-fed powered tools.

### D. Cutouts:

1. Cutouts shall have a minimum of 1/4" (6.35mm) radius.
2. Where edges of cutouts will be exposed in finished work; polish edges.

E. Mitered Edge: Miter Cambria Quartz surfacing material as required following procedures recommended by the manufacturer.

## PART 3 - EXECUTION

### 3.1. PRE-INSTALLATION EXAMINATION.

#### A. Site Verification:

1. Verify dimensions by field measurements prior to installation.
2. Verify that substrates supporting Cambria Quartz surfaces are plumb, level, and flat to within 1/8 inch in 10 feet and that all necessary supports and blocking are in place.

3. Support structure shall be secured to adjoining units, back wall, and/or flooring.

B. Inspection of Cambria Quartz surfacing:

1. Inspect materials for imperfections prior to installation.

### 3.2. PREPARATION

A. Prepare Surface:

1. Clean Cambria Quartz surfacing prior to installation.

B. Protection of Cambria Quartz surfacing:

1. Protect finished surfaces from damage. Apply protection where necessary. Take necessary precautions to prevent dirt, grit, dust, and debris from other trades from contacting the surface by covering the top and exposed edge profiles after installation is completed.

### 3.3. INSTALLATION

A. Install materials in accordance with Cambria's procedures and approved shop drawings.

B. Preliminary Installation:

1. Position materials to verify the correct size and orientation (bookmatch material).
2. If size adjustments, or additional fabrication is necessary, use water-fed tools. Protect jobsite and surface from dust and water. Perform work away from installation site if possible.
3. Allow gaps for expansion of not less than 1/8" (1.5mm) per 10 feet when installed between walls or other fixed structures.

C. Permanent Installation:

1. After verification of fit and finish, clean substrate; remove loose and foreign matter which may interfere with adhesion. Clean Cambria Quartz surfacing backside and joints with denatured alcohol.
2. Horizontal surface: Apply continuous bead of 100% silicone at the intersection point of the Cambria Quartz surfacing and the substrate or cabinet. This bead will be continuous throughout the entire perimeter.
3. Vertical surface: Apply continuous bead of mounting adhesive around the perimeter of the vertical piece(s). In addition, apply 1/4" mounting adhesive bead every 8" on vertical center.
4. Install Cambria Quartz surfacing plumb, level, square, and all on the same plane.
5. Align adjacent pieces in same plane.

D. Joints:

1. Joints Between Adjacent Pieces of Cambria Quartz surfacing:
  - i. Joints shall be flush, tight fitting, level, and clean.
  - ii. Securely join adjacent pieces with Cambria Adhesive.
  - iii. Fill joints level to polished surface.
  - iv. Secure adjacent Cambria Quartz surfacing with pneumatic vacuum clamps until adhesive hardens.
2. Joints between Cambria Quartz surfacing and wall;
  - i. Seal joints with 50-year 100% silicone sealant.

3.4. REPAIR

- A. Perform any finish work necessary and replace any damaged material.

3.5. CLEANING

- A. Remove all masking, all excessive adhesive, and all excess sealants.
- B. Thoroughly clean all exposed surfaces with denatured alcohol to remove all debris.

3.6. PROTECTION

- A. Protect installed fabrications with non-staining sheet coverings.

End of section

SECTION 06 73 00  
COMPOSITE DECKING AND RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Composite Decking Trex Transcend
- B. Composite Railing Trex Transcend

1.2 RELATED SECTIONS

- A. Section 05 73 05 - Decorative Stainless Steel Railings. (Trex)
- B. Section 06 11 16 - Mechanically Graded Lumber.
- C. Section 05 40 00 - Cold-Formed Metal Framing.

1.3 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM D1037: Water Absorption of Plastics.
  - 2. ASTM D1761: Mechanical Fasteners in Wood.
  - 3. ASTM D1413: Test method for Wood Preservatives by Laboratory Soil-block Cultures.
  - 4. ASTM D7031: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International.
  - 5. ASTM D7032: Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails).
  - 6. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.
- B. Code Reports:
  - 1. Nationally Recognized Testing Facilities:
    - a. Intertek:
      - 1) CCRR-0301 Trex Enhance Basic and Naturals Decking.
      - 2) CCRR-0132 Transcend, Enhance, and Select Railing.
    - b. ICC Evaluation Services:
      - 1) ESR-3168 Trex Transcend and Select Decking.
      - 2) ESR-3947 Trex Transcend and Select Railing.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- 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. Shop Drawings:
  - 1. Provide plans and details which include layout, spacing, and sizes of decking and railings.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.



- E. Verification Samples: For each finish product specified, two samples, representing actual product color, size, and finish.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.
- B. Installer Qualifications: Minimum 2 year experience installing 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 is approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

#### 1.6 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Store products on a flat and level surface. Adjust support blocks accordingly.
- C. Support bundles on supplied dunnage.
- D. When stacking bundles, supports should start approximately 8 inches from each end and be spaced approximately 2 feet on center. Supports shall line up vertically/perpendicular to the decking product.
- E. Do not stack Transcend decking more than 14 bundles. Do not stack Select or Enhance decking more than 12 bundles.
- F. Keep material covered using the provided bundle cover until time of installation.
- G. Handle materials to avoid damage.

#### 1.8 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 recommended limits.

#### 1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

#### 1.10 WARRANTY

- A. Provide manufactures warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 25 years for a residential installation and 10 years for a commercial installation. In addition provide the Trex Fade and Stain Warranty against food staining and fading beyond 5 Delta E (CIE units) for a period of 25 years for a residential installation and 10 years for a commercial installation.

### PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Trex Railing and Decking; 160 Exeter Dr., Winchester, VA 22603-8605. Tel: (540) 542-6300. Fax: (540) 542-6890. Email: marketing@trex.com Web: <http://www.trex.com>.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

## 2.2 Design/Performance Requirements:

- A. Structural Performance:
  - 1. Deck: Uniform Load - 100lbf/sq.ft.
  - 2. Tread of Stairs: Concentrated Load: 750 lbf on area of 4 sq. in., and 1/8 inch maximum deflection at a concentrated load of 300 lbf.
  - 3. Railing: Trex Railing Systems meet various IRC and IBC requirements. Consult the label and published code evaluation reports for the performance levels of each system.
- B. Fire-Surface Burning Characteristics per ASTM E-84.

## 2.3 COMPOSITE DECKING

- A. Wood-Plastic Composite Lumber:
  - 1. Product: Trex Transcend Decking Boards as manufactured by Trex Railing and Decking.
  - 2. Material Description: Composite Decking consisting of recycled Linear Low Density Polyethylene (LLDPE) and recycled wood. The product is extruded into shapes and sizes as follows:
    - a. Width: 1 inch x 5.5 inches (25 mm x 140 mm).
    - b. Lengths - 12 feet (3658 mm) 16 feet (4877 mm), and 20 feet (6096 mm).
    - c. Color - To be specified by owner from Trex' standard list of colors.
  - 3. Physical and Mechanical Properties as follows:
    - a. Flame Spread, ASTM E 84: 70.
    - b. Thermal Expansion, ASTM D 1037: 0.000019 inch/inch/degree F.
    - c. Moisture Absorption, ASTM D 1037: Less than 1percent.
    - d. Screw Withdrawal, ASTM D1761: 588 lbs/in.
    - e. Fungus Resistance, ASTM D1413: Rating - no decay.
    - f. Termite Resistance, AWPAE1-72: Rating: 9.6.
    - g. Compression Parallel, ASTM D198: 1588 psi ultimate, 540 psi design.
    - h. Compression Perpendicular, ASTM D143: 1437 psi ultimate, 540 psi design.
    - i. Bending Strength, ASTM D198: 3280 psi ultimate, 500 psi design.
    - j. Shear Strength, ASTM D143: 1761 psi ultimate, 360 psi design.
    - k. Modulus of Elasticity, ASTM D4761: 412,000 psi ultimate, 200,000 psi design.
    - l. Modulus of Rupture, ASTM D4761: 3280 psi ultimate, 500 psi design.
    - m. Ultimate strength values are not meant for design analysis. Design values are for temperatures up to 125 degree F (52 degree C).
- B. Fascia Boards
  - 1. Product: Trex Fascia.
- C. Stairs:
  - 1. Product: Spiral Stairs(tm) system as manufactured by Trex Railing and Decking.
- D. Composite Decking Color:
  - 1. Color: As selected by the architect

- E. Accessory Hardware:
  - 1. Fasteners:
    - a. Trex Universal Hideaway Hidden Fasteners.
    - b. Composite Decking Screws:
      - 1) Refer to Trex.com for recommended composite screws.

## 2.4 DECK RAILING

- A. Composite Railing:
  - 1. Product:
    - a. Transcend Railing as manufactured by Trex Railing and Decking.
- B. Railing Post Components:
  - 1. Product: Post sleeves, post sleeve caps, post sleeve skirts.

## 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, approved submittals, and in proper relationship with adjacent construction.
- B. Cut, drill, and rout using carbide tipped blades.
- C. Do not use composite wood material for structural applications.

### 3.4 Cleaning

- A. Cleaning as required by manufacturer for warranty compliance.

### 3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

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## SECTION 07 2100 - THERMAL INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall.
- B. Batt insulation and vapor retarder in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.
- B. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation.

#### 1.03 REFERENCE STANDARDS

- A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

#### 1.06 SEQUENCING

- A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

### PART 2 PRODUCTS

#### 2.01 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: ASTM C 578, Type IV; Extruded polystyrene board with either natural skin or cut cell surfaces; with the following characteristics:
  - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E 84.
  - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
  - 3. Board Size: 24 x 96 inch.
  - 4. Board Edges: Square.
  - 5. Compressive Resistance: 20 psi.
  - 6. Water Absorption, maximum: 0.3 percent, volume.
  - 7. R-value at 75 degrees F per 1" of thickness: 5.0 min.
  - 8. Manufacturers:
    - a. Dow Chemical Co: [www.dow.com](http://www.dow.com).
    - b. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
    - c. U.C. Industries.
  - 9. Substitutions: See Section 01 6000 - Product Requirements.
- B. Expanded Polystyrene is not acceptable.

#### 2.02 BATT INSULATION MATERIALS

- A. Batt Insulation: ASTM C 665; preformed mineral fiber blanket; friction fit, conforming to the following:

1. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 450 or less, when tested in accordance with ASTM E 84.
2. Formaldehyde Content: Zero.
3. Thermal Resistance: As indicated on drawings.
4. Thickness: As required to provide indicated R-Value.
5. Facing: Unfaced.
6. Manufacturers:
  - a. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - b. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - c. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
7. Substitutions: See Section 01 6000 - Product Requirements.

### **2.03 ACCESSORIES**

- A. Sheet Vapor Retarder: Clear polyethylene film for above grade application, 15 mil thick.
- B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- C. Nails or Staples: steel wire; electroplated, or galvanized; type and size to suit application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Install boards horizontally on foundation perimeter.
  1. Place boards to maximize adhesive contact.
  2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.

### **3.03 BATT INSTALLATION**

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Retain insulation batts in place with spindle fasteners at 12 inches on center.
- F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- G. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.
- H. Tape seal tears or cuts in vapor retarder.
- I. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

### **3.04 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

## SECTION 07 2126 - BLOWN INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Attic: Loose insulation pneumatically placed and poured into joist spaces.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 2100 - Thermal Insulation.

#### 1.03 REFERENCE STANDARDS

- A. ASTM C 739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.
- B. ASTM C 1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation.

#### 1.04 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements, in conjunction with Section 07 2100.

#### 1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, limitations.
- C. Manufacturer's Installation Instructions: Indicate procedure for preparation and installation.
- D. Certificates: Certify that products of this section meet or exceed specified requirements.

#### 1.06 PROJECT CONDITIONS

- A. Coordinate the work with Section 07 2100 for placement of insulation materials.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Blown Insulation:
  - 1. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 3. Substitutions: See Section 01 6000 - Product Requirements.

#### 2.02 MATERIALS

- A. Loose Fill Insulation: ASTM C 764, glass fiber type, nodulated for pour and bulk for pneumatic placement.
  - 1. Thermal Conductivity: 0.27 BTU in/(hr sq ft deg F).
  - 2. Installed Thickness: As indicated on drawings.
- B. Ventilation Baffles: Formed plastic.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.
- B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.
- C. Verify spaces are unobstructed to allow placement of insulation.

#### 3.02 INSTALLATION

- A. Install insulation and ventilation baffle in accordance with ASTM C 1015 and manufacturer's instructions.
- B. Place insulation against baffles. Do not impede natural attic ventilation to soffit.
- C. Place against and behind mechanical and electrical services within the plane of insulation.
- D. Completely fill intended spaces. Leave no gaps or voids.

**3.03 CLEANING**

- A. Remove loose insulation residue.

**3.04 SCHEDULES**

- A. Attic Spaces: Pour insulation between ceiling joists to achieve an R value of 38.

**END OF SECTION**

## SECTION 07 2129 - SPRAYED INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Cellulose insulation placed in walls type 18.

#### 1.02 REFERENCE STANDARDS

- A. ASTM C 739 - Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. ASTM E 119- Standard Test Methods for Fire Tests of Building Construction and Materials.
- D. CPSC Standard 16 CFR Parts 1209 and 1404
- E. UL 723- Standards for test Surface Burning Characteristics of Building Materials.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on materials, describing insulation properties, and include installation instructions.
- C. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application
- D. Warranty Documentation: submit manufacture's standard warranty.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.
- C. Installer: Certified by cellulose insulation manufacturer
- D. Installer's Equipment: Approved by cellulose insulation manufacturer.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Cellulose Fiber:
  - 1. Nu-Wool Company, Inc., 2472 Port Sheldon Street, Jenison Michigan 49428  
[www.nuwool.com](http://www.nuwool.com)

#### 2.02 MATERIALS

- A. Cellulose Fiber Insulation: ASTM C 739; treated cellulose fiber pneumatically sprayed damp into open wall cavities: Nu-Wool WALLSEAL insulation, conforming to the following test requirements:
  - 1. Settled Density: 1.6 lb/cu ft, maximum density after long term settling of dry installation
  - 2. Moisture Absorption: Maximum 15 percent by weight.
  - 3. Average thermal resistance per inch: 3.8
  - 4. Flame Spread and Smoke Developed Index: 15/5, when tested in accordance with ASTM E 84.
  - 5. Combustibility: Passing ASTM E 119.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.
- B. Verify other work on and within spaces to be insulated is complete prior to application.

#### 3.02 PREPARATION

- A. Mask and protect adjacent surfaces from overspray or damage.



- B. Install insulation stops between rafters at wall/sloped roof construction to prevent insulation from covering soffit vents or from limiting air circulation from soffit to attic space.

**3.03 INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install insulation to a uniform monolithic density without voids.
- C. Use quantity of water in installation to ensure proper adhesion into wall cavities and proper density
- D. Install gypsum board to 2x6 wall as specified in Section 09 2116 a minimum of 24 hours after installation of pneumatically sprayed damp cellulose insulation

**3.04 PROTECTION**

- A. Do not permit subsequent construction work to disturb applied insulation.

**END OF SECTION**

DIVISION 7– THERMAL AND MOISTURE PROTECTION  
**Section 07 25 00 – Weather Barriers**

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. Commercial weather barrier assemblies.
  2. Flexible flashing.
  3. Weather barrier flashing.
  4. Fluid-applied flashing.
  5. Weather barrier accessories.
  6. Drainage material.

- B. Related Requirements:
1. Section 04 2000 Unit Masonry

1.3 DEFINITIONS

- A. Weather Barrier: A combination of materials and accessories that do the following:
1. Prevents the accumulation of water as a water-resistive barrier.
  2. Minimizes the air leakage into or out of the building envelope as a continuous air barrier.
  3. Provides sufficient water vapor transmission to enable drying as a vapor-permeable membrane.
- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly per International Building Code Section 1403.2.
- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 section 5.4.3.1.
- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E 96 per definition in International Building Code. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.
- B. Sustainable Design Submittals:
  - 1. Test Reports: Envelope testing and verification of the following:
    - a. Water-Spray Test.
    - b. Air Infiltration Test.
    - c. Water Penetration Test.
- C. Shop Drawings: Show details of weather barrier at terminations, openings, and penetrations. Show details of flexible flashing applications.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For weather barrier from ICC-ES.
- B. Manufacturer's Instructions: For installation of each product specified.
- C. Qualification Data: For Installer and laboratory mockup testing agency.
- D. Sample Warranty: For manufacturer's warranty.
- E. Reports: Field test and inspection reports.
- F. Installer's weather barrier manufacturer-training certificate.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.
- B. Laboratory Mockup Testing Agency Qualifications: Qualified in accordance with ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement in compliance with ISO/IEC 17025.
- C. Manufacturer's Field Service: Register project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project registration and observation process.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store near heat source or open flame.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

#### 1.8 WARRANTY

- A. Manufacturer's Product Warranty: To repair or replace weather barrier product that fails in materials within specified warranty period.
  - 1. Warranty Period: 10 years from date of purchase.
- B. Manufacturer's Product and Labor Warranty: Manufacturer agrees to repair or replace weather barrier that fails in materials within specified warranty period, including removal and replacement of affected construction up to manufacturer's limits.
  - 1. Warranty Period: 10 years from date of purchase.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain weather barrier assembly components, including weather barrier flashing from same manufacturer as weather barrier.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.
- B. High-Performance Installations:
  - 1. For installation with one of the following building envelope performance or structural characteristics:
    - a. Exceeding 65 mph (100 km/h) equivalent structural load.
    - b. Exceeding 15 mph (24 km/h) equivalent wind-driven rainwater infiltration.
    - c. Buildings with 60 feet (18 m) or more total height above grade plane, as defined in the International Building Code.
    - d. Construction with gypsum or cement-based exterior sheathing.
    - e. Non-wood based primary structure such as: steel, light gage steel, masonry or concrete.

#### 2.3 WEATHER BARRIER

- A. Commercial Building Wrap: ASTM E 2357 passed, ABAA (Air Barrier Association of America) evaluated air barrier assembly, and assembly water resistance per ASTM E 331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E 84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® CommercialWrap® and Tyvek® CommercialWrap® D.
2. System Description, Single-Layer Weather Barrier: Single-layer weather barrier, including flashing and sealing of penetrations and seams.
3. Drainability: 98 percent or greater when tested in accordance with ASTM E 2273.
4. Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 PA) when tested in accordance with ASTM E 2357 and evaluated by ABAA.
5. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E 2357 to water resistance in accordance with ASTM E 331 to 2.86 lbf/sq. ft. (137 Pa) 6.24 lbf/sq. ft. (300 Pa).
6. Water-Vapor Permeance: Not less than 23 perms (1300 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A) or not less than 28 perms (1600 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Water Method (Procedure B).
7. Allowable UV Exposure Time: Not less than nine months when tested in accordance with ASTM G 155 (Accelerated Weathering).
8. Flame Propagation Test: Materials and construction shall be as tested in accordance with NFPA 285.
9. Heat and Visible Smoke Release Rates: Maximum rates in accordance with NFPA 285.
  - a. Peak Heat Release: 13,217 Btu/sq. ft. (150 kW/sq. m).
  - b. Total Heat Release: 1762 Btu/sq. ft. (20 MJ/sq. m)
  - c. Effective Heat of Combustion: 7744 Btu/lb (18 MJ/kg)
10. Weather barrier system to have a VOC content of 30 g/L or less.

#### 2.4 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; FlexWrap™.
  2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
  3. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
  4. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (minus 4 deg C) as Class A (without primer use).
  5. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 deg F (80 deg C) for 7 days.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; StraightFlash™.
2. Water Penetration: No leakage at 15 psf (720 Pa) per ASTM E 331.
3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 deg F (minus 4 deg C) as Class A without primer use.
4. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

#### 2.5 FLUID-APPLIED FLASHING

- A. Fluid-Applied Flashing: Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied Flashing & Joint Compound+.
  2. VOC Content: ASTM C 1250, less than 2 percent by weight and between 25 to 30 g/L.
  3. Water Vapor Transmission: ASTM E 96, Method B, greater than 20 perms (1100 ng/Pa x s x sq. m) at 25 mils (0.635 mm) thick.
  4. Minimum Tensile Strength: ASTM D 412, 165 lb/sq. ft. (1140 kPa)
  5. Minimum Elongation at Break: ASTM D 412; 360 percent.

#### 2.6 WEATHER BARRIER ACCESSORIES

- A. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap.
  1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Tape.
- B. Fasteners with Self-Gasketing Washers: Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with 1-inch- (25-mm-) diameter, high-density polyethylene cap washers with UV inhibitors.
  1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company; Tyvek® Wrap Caps.
- C. Primer for Flashings: Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.
  1. Basis-of-Design Product: DuPont Safety & Construction: E. I. du Pont de Nemours and Company, DuPont™ Adhesive Primer.
  2. Peel Adhesion Test: Passes in accordance with ASTM D 3330, Test Method F, for the following.
    - a. Peel Angles: 0, 25, 72, and 180 degrees.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

- b. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
- 3. Chemical Compatibility: Pass; AAMA 713.
- 4. Flame Spread Index: 5; ASTM E 84.
- 5. Smoke Development Index: 0; ASTM E 84.

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.
  - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

##### 3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall.
  - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

##### 3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written instructions and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed.
  - 1. Maintain continuity of air and water barrier assemblies.
  - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
  - 3. Install weather barrier horizontally starting at lower portion of wall surface.
  - 4. Provide minimum 6 inches (150 mm) overlap at horizontal- and vertical-wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

- C. Seams: Seal seams with building wrap tape per manufacturer's recommended installation instructions.
  - 1. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners: Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer's installation guidelines.
  - 1. Do not use temporary fasteners to permanently attach weather barrier.
  - 2. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
  - 3. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings: Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines.
  - 1. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
  - 2. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
  - 3. Install flashing according to weather barrier manufacturer's installation guidelines.

#### 3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation: Remove wrinkles and bubbles, reposition weather barrier as necessary to produce a uniform, smooth surface.
  - 1. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
  - 2. Wipe surfaces to remove moisture, dirt, grease and other debris that could interfere with adhesion.
  - 3. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
  - 4. Lap weather barrier flashing a minimum of 2 inches (50 mm) onto weather barrier.
  - 5. Apply pressure over entire surface using roller or firm hand pressure
- B. Rough Openings: Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions.
  - 1. Apply 6-inch- (150-mm-) wide conformable weather barrier flashing at door and window sills.
  - 2. Ensure that sill flashing does not slope to the interior.
  - 3. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
  - 4. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
  - 5. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.



## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

6. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations: Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels.
  1. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.
- D. Terminations: Provide minimum 2 inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane.
  1. Secure weather barrier with fasteners and weather-barrier flashing.

### 3.5 FLUID-APPLIED FLASHING INSTALLATION

- A. General: Before installing fluid-applied flashing, do the following:
  1. Ensure drainage path is not blocked or disrupted. Do not install on walls that do not feature a continuous path for moisture drainage. Blocked or disrupted paths for drainage can result in excess moisture buildup in wall cavity. Do not install below grade.
  2. Remove surface dust, dirt, and loose mortar.
  3. Verify that surface is free of grease and other contaminants and that surface is smooth.
  4. Fill joints in concrete masonry units, and voids in cast-in-place concrete with trowel-applied fluid-applied flashing to ensure surface is flush and smooth.
  5. Allow masonry mortar and cast-in-place concrete a minimum of 24 hours to cure before installing fluid-applied flashing.
- B. Fluid-Applied Flashing Installation: Using a trowel or brush, apply fluid-applied flashing around perimeter of window and door openings to a minimum thickness of **25 mils (0.635 mm)**.
  1. Extend flashing a minimum of **2 inches (50 mm)** onto exterior face of adjacent surface.
  2. Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.
  3. Joint Applications: Using a trowel or a brush, fill cracks and voids up to 1/4 inch (6 mm) in width.
    - a. For joints and cracks between 1/4 and 1/2 inch (6 and 12 mm) wide, cover first with mesh tape.
    - b. For joints and cracks between 1/2 and 1 inch (12 and 24 mm) wide, cover first with butyl-based strip flashing.
    - c. Apply a bead, then trowel smooth.
    - d. Seam coverage should be a minimum of 2 inches (50 mm) wide and 15 to 20 mils (0.38 to 0.51 mm) thick.
    - e. Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.

## DIVISION 7– THERMAL AND MOISTURE PROTECTION

### **Section 07 25 00 – Weather Barriers**

#### 3.6 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material with grooves or channels running vertically in compliance with manufacturer's written instructions.

#### 3.7 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to train installers and observe subject test-wall areas and installations.
- B. Field Quality Control Testing: Perform the following test on representative areas of structural-sealant-glazed curtain walls.
  - 1. Air Infiltration Whole Building: ASTM E 779 at not more than 0.40 cfm/sf (2.00 L/s per sq. m).
  - 2. Water Penetration: ASTM E 1105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" article, but not less than 2.86 lbf/sq. ft. (137 Pa). No water penetration shall occur as defined in ASTM E 1105.
    - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Prepare test and inspection reports.

#### 3.8 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material in accordance with requirements of Section 017300 "Execution."

#### 3.9 PROTECTION

- A. Protect installed weather barrier from the following:
  - 1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
  - 2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
  - 3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
  - 4. UV exposure in excess of products' stated limits.

END OF SECTION 072500

## **SECTION 07 3113 - ASPHALT SHINGLE ROOFING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Features:
  - 1. Asphalt shingles.
  - 2. Underlayment.
  - 3. Related metal flashing and trim.

#### **1.02 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples: Upon Architect's request, for each exposed product and for each color and texture specified.
  - 1. Asphalt Shingles: Full size.
  - 2. Ridge and Hip Cap Shingles: Full size.

#### **1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Sample Warranty: For manufacturer's warranty.

#### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.
- B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

## 1.06 FIELD CONDITIONS

- A. Do no installation until surfaces are dry and ambient temperature exceeds 45 deg F.

## 1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Manufacturing defects.
  - 2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years nonprorated.
  - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 70 mph for 15 years from date of Substantial Completion.
  - 4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
  - 1. [Basis of Design](#): Owen Corning's "Oakridge."
  - 2. Algae Resistance: Granules resist algae discoloration.
  - 3. Impact Resistance: UL 2218, Class 4.
  - 4. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

### 2.02 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, asphalt-saturated organic felts, nonperforated.
  - 1. Type: Type I.
- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970/D 1970M, minimum of 40-mil-thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release backing; cold applied.

### 2.03 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a minimum 3/8-inch-

diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.

1. Shank: Smooth.
2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

#### **2.04 METAL FLASHING AND TRIM**

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
- B. Drip Edges: Fabricate from prefinished 26 gage aluminum sheet (minimum 0.017 inch thick) formed with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
  1. Finish: Baked on modified polyester paint or better.
  2. Color: As selected by Architect from manufacturer's standard colors.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 UNDERLAYMENT INSTALLATION**

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches.
  1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction that sheds water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.

2. Install fasteners at no more than 36 inches o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
  1. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.
  2. Rakes: Extend from edges of rake 24 inches beyond interior face of exterior wall.
  3. Valleys: Extend from lowest to highest point 18 inches on each side.
  4. Sidewalls: Extend beyond sidewall 12 inches, and return vertically against sidewall not less than 8 inches.
- D. Concealed Valley Lining: For woven valleys. Comply with NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems." Install underlayment centered in valley and fastened to roof deck.
  1. Lap roof-deck underlayment over valley underlayment at least 6 inches.

### **3.03 METAL FLASHING INSTALLATION**

- A. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Rake Drip Edges: Install rake drip-edge flashings over underlayment and fasten to roof deck.
- C. Eave Drip Edges: Install eave drip-edge flashings below underlayment and fasten to roof sheathing.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

### **3.04 ASPHALT-SHINGLE INSTALLATION**

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.
  1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
  2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform recommended exposure.
- D. Woven Valleys: Extend succeeding asphalt-shingle courses from both sides of valley 12 inches beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.
  1. Do not nail asphalt shingles within 6 inches of valley center.

- E. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

**END OF SECTION**

## SECTION 07 7100 - ROOF SPECIALTIES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including vents.

#### 1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers.
- B. Section 07 3113 – Asphalt Shingle Roofing

#### 1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual details.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Ridge Vents:
  - 1. Air Vents Inc.; Shingle Vent II-9: Model SHFV9CC
  - 2. Substitutions: See Section 01 6000 - Product Requirements.

#### 2.02 COMPONENTS

- A. Ridge Vents: 16 sq in per liner foot minimum free area of ventilation.

#### 2.03 FINISHES

- A. As per manufacturer standard colors.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

#### 3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Coordinate installation of components of this section with installation of roofing and flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- D. Install units plumb and level; isolate dissimilar materials to prevent corrosion.
- E. Touch up damaged coatings.

**END OF SECTION**



## SECTION 07 9200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Features:
  - 1. Silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Mildew-resistant joint sealants.
  - 4. Butyl joint sealants.
  - 5. Latex joint sealants.
  
- B. Related Requirements:
  - 1. Section 07 8443 "Joint Firestopping" for sealants in fire-rated joints.
  - 2. Section 09 2900 "Gypsum Board" for acoustic sealant work.

#### 1.02 SUBMITTALS

- A. Product Data: For each joint-sealant product.
  
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

#### 1.03 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.04 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
  
- B. Correct defective work within a five-year period after Date of Substantial Completion.
  
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Silicone Sealants:
1. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. BASF Construction Chemicals-Building Systems: [www.chemrex.com](http://www.chemrex.com).
  4. Tremco, Inc: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Polyurethane Sealants:
1. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. BASF Construction Chemicals-Building Systems: [www.chemrex.com](http://www.chemrex.com).
  4. Tremco, Inc: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 01 6000 - Product Requirements.
- C. Butyl Sealants:
1. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. Tremco, Inc: [www.tremcosealants.com](http://www.tremcosealants.com).
  4. Substitutions: See Section 01 6000 - Product Requirements.
- D. Acrylic Emulsion Latex Sealants:
1. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  2. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  3. BASF Construction Chemicals-Building Systems: [www.chemrex.com](http://www.chemrex.com).
  4. Tremco, Inc: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. Substitutions: See Section 01 6000 - Product Requirements.

### 2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single component.
1. Color: Standard colors matching finished surfaces.
  2. Product: Dymonic manufactured by Tremco.
  3. Product: Dynatrol manufactured by Pecora.
  4. Product: Sonolastic NP manufactured by BASF.
  5. Applications: Use for:
    - a. Control, expansion, and soft joints in masonry.
    - b. Joints between concrete and other materials.
    - c. Joints between metal frames and other materials.
    - d. Other exterior joints for which no other sealant is indicated.

- C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
  - 1. Product: JS-773 manufactured by Tremco.
  - 2. Applications: Use for:
    - a. Concealed sealant bead in sheet metal work.
    - b. Concealed sealant bead in siding overlaps.
  
- D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
  - 1. Product: Tremflex 834 manufactured by Tremco.
  - 2. Product: AC-220 manufactured by Pecora.
  - 3. Product: Sonolastic NP manufactured by Sonneborne.
  - 4. Applications: Use for:
    - a. Interior wall and ceiling control joints.
    - b. Joints between door and window frames and wall surfaces.
    - c. Other interior joints for which no other type of sealant is indicated.
  
- E. Wet Area Sealant: White silicone; ASTM C920, Uses M and A; single component, mildew resistant.
  - 1. Product: Tremsil 200 manufactured by Tremco.
  - 2. Applications: Use for:
    - a. Joints between plumbing fixtures and floor and wall surfaces.
    - b. Joints between kitchen and bath countertops and wall surfaces.

### **2.03 JOINT-SEALANT BACKING**

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
  
- C. 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. Provide self-adhesive tape where applicable.

### **2.04 MISCELLANEOUS MATERIALS**

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
  
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Verify that substrate surfaces are ready to receive work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
  - 2. Protect elements surrounding the work of this section from damage or disfigurement.
  - 3. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant
  - 4. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of such to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
  - 5. Remove laitance and form-release agents from concrete.
  - 6. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.03 INSTALLATION

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer rods to provide proper cross-section of sealant.
  - 1. Provide profile of:
    - a. Width/depth ratio of 2:1.
    - b. Neck dimension no greater than 1/3 of the joint width.
    - c. Surface bond area on each side not less than 75 percent of joint width
  - 2. Do not leave gaps between ends of sealant backings.
  - 3. Do not stretch, twist, puncture, or tear sealant backings.
  - 4. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where backer rods are not used between sealants and backs of joints.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
  - 4. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tooling: Immediately after application of a non-sag sealant and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Use tooling agents that do not discolor sealants or adjacent surfaces.
  - 2. Provide concave joint profile per Figure 8A in ASTM C 1193.

### 3.04 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and materials approved in writing by manufacturers of joint sealants and of products adjacent to sealants.

### 3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

**END OF SECTION**

SECTION 08 11 00  
STEEL DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel entrance doors.
- B. Prehung hardwood door systems.
- C. Glazing.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 09 21 16.33 - Gypsum Board Area Separation Wall Assemblies.

1.3 REFERENCES

- A. American Architectural Manufacturer Association (AAMA):
  - 1. AAMA 1304 - Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems.
  - 2. AAMA 506; Voluntary Specifications for Hurricane and Impact and Cycle Testing of Fenestration Products.
- B. ASTM International (ASTM):
  - 1. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimen.
  - 2. ASTM E330 - Standard Test Method for Structural Performance of Exterior Doors by Uniform Static Pressure Difference.
  - 3. ASTM E331 - Standard Test Method for Water Penetration of Exterior Doors by Uniform Static Air Pressure Difference.
  - 4. ASTM E547; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
  - 5. ASTM E1886 - Standard Test Method for Performance of Exterior Doors by Missile(s) and Exposed to Cyclic Pressure Differentials.
  - 6. ASTM E1996 - Standard Specification for Performance of Exterior Doors by Windborne Debris in Hurricanes.
- C. Florida Building Code (FBC):
  - 1. FBC 1626 - High-Velocity Hurricane Zones - Wind Loads.
  - 2. TAS 201-94 - Impact Test Procedures.
  - 3. TAS 202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure.
  - 4. TAS 203-94 - Criteria for Testing Products Subject to Cycle Wind Pressure Loading.
- D. National Fenestration Rating Council (NFRC):
  - 1. NFRC 100 - Procedure for Determining Fenestration Thermal Properties.
  - 2. NFRC 200 - Solar Heat Gain Coefficient and Visible Transmittance.
- E. National Fire Protection Association (NFPA):
  - 1. NFPA 252 - Standard Methods of Fire Tests of Doors Assemblies.

- F. Underwriters Laboratories, Inc. (UL)
  - 1. UL 10B - Standard for Fire Test of Door Assemblies.
  - 2. UL 10C - Standard for positive Pressure Fire Tests of Doors Assemblies.
- G. Uniform Building Code Standard 7-2 (UBC):
  - 1. UBC 7-2 - Fire Tests of Door Assemblies. (Note: Neutral pressure testing standard).
  - 2. UBC 7-2 - Fire Test of Door Assemblies. (Note: Positive pressure testing standard).
- H. Underwriters' Laboratories of Canada (ULC):
  - 1. CAN/ULC S104 - Standard Method for Fire Tests of Door Assemblies.
- I. Window & Door Manufacturers Association (WDMA):
  - 1. WDMA I.S.4 - Water Repellent Preservative Non-Pressure Treatment for Millwork.
  - 2. Sponsored Hallmark Certification Program.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- 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. Shop Drawings: Submit shop drawings indicating details of construction, flashings and relationship with adjacent construction.
- D. Verification Samples: For each factory-finished product specified, two samples, minimum size 6 in (150 mm) square, representing actual finishes.
- E. Quality Assurance Submittals:
  - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
  - 2. Manufacturer Instructions: Provide manufacturer's written installation instructions.
- F. Closeout Submittals: Refer to Section 01 70 00 - Execution and Closeout Requirements.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 2 years installing similar assemblies.
- B. Certifications: NAMI certification label indicating assemblies meet the design requirements.
- C. Mock-Up: Provide a mock-up for evaluation of installation techniques and workmanship.
  - 1. Mock-ups shall incorporate surrounding construction, including wall assembly fasteners, flashing, and other related accessories installed in accordance with manufacturer's approved installation methods.
  - 2. Do not proceed with remaining work until workmanship is approved by Architect.
  - 3. Rework mock-up as required to produce acceptable work.
  - 4. At Substantial Completion, approved mockups may become part of completed Work.
  - 5. Demolish mockups and remove from site.
- D. Pre-installation Meeting: Conduct pre-installation meeting on site two weeks prior to commencement of installation.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's



instructions and recommendations and industry standards.

- B. Deliver and store assembly materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect from damage and exposure to direct sunlight during storage.
  - 2. Store in a dry, well-ventilated area off the floor.
  - 3. During storage, do not remove paper or cardboard placed between products for shipment.
  - 4. Store in a humidity and temperature controlled facility. Recommended conditions: 30 to 50 percent relative humidity and 50 to 90 degrees F (10 to 32 degrees C).
- C. Handling: Handle with clean hands and equipment. Lift and carry the products when moving them. Do not drag across one another.

## 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions; temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Install only in vertical walls and when conditions are dry. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.8 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: 10 Years.
  - 2. Door System: 10 Years.
  - 3. Steel Frame: See manufacturers separate warranty.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Acceptable Manufacturer: JELD-WEN, Inc., which is located at: 2645 Silver Crescent Dr. Suite 400; Charlotte, NC 28273 ; Toll Free Tel: 800-535-3936; Tel: 541-850-2606; Fax: 541-851-4333; Email:[request info \(Architectural Inquiries@jeld-wen.com\)](mailto:request info (Architectural Inquiries@jeld-wen.com)); Web:[www.jeld-wen.com](http://www.jeld-wen.com)
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### 2.2 STEEL ENTRANCE DOORS

- A. Basis of Design: Contours Steel Doors as manufactured by JELD-WEN Incorporated.
  - 1. Panel Doors:
    - a. Contours; Six Panel;
- B. Performance Requirements:
  - 1. Structural Design Pressure: Provide doors capable of complying with requirements indicated:
    - a. As required by code.
- C. Materials:
  - 1. Wood Frames: Western Pine.
    - a. Preservative treated with AuraLast in accordance with WDMA I.S.4.
  - 2. Steel Skins: Galvanized steel. 0.0195 in (0.495 mm) plus or minus 2 percent.
  - 3. Stiles and Rails:
    - a. Steel Edge Construction: Galvanized Steel; 0.028 in (0.7 mm) continuous roll-

- formed steel.
- 4. Core: Custom-fitted Polystyrene.
- 5. Thickness: 1-3/4 in (44 mm).
- 6. Edge Construction:
  - a. Steel.

- D. Door Design:
  - 1. Door Style: Contours Ovolo
  - 2. Bottom Rail: ADA, 10-1/8 in (257 mm).
  - 3. Panel Profile: Six Panel.
  - 4. Finish: Two-coats, low-sheen, baked-on enamel primer.
  - 5. Hardware: None. Prep door for owner supplied hinge and lockset.
    - a. Hardware Finish: Satin Nickel.

## 2.3 PREHUNG HARDWOOD DOOR SYSTEMS

- A. Profile:
  - 1. System 01, Single Door.
- B. Jamb:
  - 1. Material: Primed Pine.
  - 2. Profile: Rabbeted.
  - 3. Width: 6-9/16 in (167 mm).
- C. Casing:
  - 1. As selected by Architect.
- D. Hinges: Solid brass concealed-bearing.
  - 1. Finish: Satin Nickel.
- E. Sills:
  - 1. Aluminum with Polished Aluminum Finish.

## 2.4 CONSTRUCTION ACCESSORIES

- A. Flashing: Refer to Section 07 60 00 - Flashing and Sheet Metal.
- B. Sealants: Manufacturer recommended sealants to maintain watertight conditions.

## 2.5 FABRICATION

- A. Construction: One-piece of polystyrene is custom fitted in standard wood stile and rail frame. Back of steel skin is coated with epoxy primer before attachment to core and frame.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Inspect doors prior to installation. Verify doors are suitable for installation
- B. Inspect rough opening for compliance with door manufacturer recommendations. Verify rough opening conditions are within recommended tolerances.

### 3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's installation guidelines and recommendations.

- B. Install Jamb Assembly:
  - 1. Caulk sill along outside edge and 1/2 in (13 mm) in from edge of subfloor.
  - 2. Set door unit into center of opening and tack in place.
  - 3. Shim hinge then latch side jambs straight. Inspect jamb for square, level and plumb.
  - 4. Fasten hinge side jamb to studs.
  - 5. Verify door opens freely and weatherstrip meets door evenly.
  - 6. Verify door sweep contacts threshold evenly.
  - 7. Fasten latch side jamb to studs.
  
- C. Caulk outside perimeter of door unit between brickmold and wall face, along front side of threshold, and between jamb sides and threshold.

### 3.3 PROTECTION

- A. Protect installed doors from damage.

END OF SECTION

SECTION 08 16 00  
COMPOSITE INTERIOR DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Composite wood doors with simulated panels.
- B. Pre-fitted and pre-machined, simulated stile and rail wood doors.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 09 21 16 - Gypsum Board Shaft Wall Assemblies.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
  - 1. A115-W - WOOD DOOR HARDWARE STANDARDS Hardware Preparations.
  - 2. A117.1 - Accessible and Usable Buildings and Facilities.
- B. ASTM International (ASTM):
  - 1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- C. National Fire Protection Association (NFPA):
  - 1. NFPA-80 - Standard for Fire Doors and Windows.
  - 2. NFPA-252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories (UL):
  - 1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
- E. Uniform Building Code (UBC):
  - 1. UBC 7-2 - Fire Test of Door Assemblies.
- F. Window and Door Manufacturers Association (WDMA):
  - 1. IS 1 - Industry Standard for Architectural Wood Doors.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
  - 1. Product Data: Manufacturer's data sheets on products to be used, including:
    - a. Preparation instructions and recommendations.
    - b. Storage and handling requirements and recommendations.
    - c. Operations and Maintenance data
    - d. Installation methods.
- B. Shop Drawings: Submit shop drawings indicating details of construction, and relationship with adjacent construction.
- C. Quality Assurance Submittals:
  - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
  - 2. Certification that doors and frames comply with UBC 7-2.

- 3. Manufacturer Instructions: Provide manufacturer's written installation instructions.
- D. Closeout Submittals: Refer to Section 01 70 00 - Execution and Closeout Requirements.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 3 years installing similar assemblies.
- B. Fire-Rated Simulated Stile and Rail Wood Doors: Meet fire-protection ratings indicated when tested in accordance with the following: NFPA 252, labeled and listed for ratings indicated by testing and inspection agency acceptable to authorities having jurisdiction.
  - 1. Test doors in compliance with ASTM E119.
  - 2. Comply with UBC 7-2 where required.
  - 3. Comply with UL-10C Category A and Category B.
  - 4. Temperature Rise Rating: At Stairwell Enclosures: 250 degrees F maximum in 30 minutes of fire exposure.
- C. Certifications:
  - 1. WDMA Hallmark certification label indicating assemblies meet the design requirements.
  - 2. Warnock Hersey, Inc (WH)
  - 3. Underwriters Laboratories, Inc. (UL)

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
- B. Deliver and store assembly materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect from damage and exposure to direct sunlight during storage.
  - 2. Store in a dry, well-ventilated area off of the floor.
  - 3. During storage, do not remove paper or cardboard placed between products for shipment.
  - 4. Store in a humidity and temperature controlled facility. Recommended conditions: 30 to 50 percent relative humidity and 50 to 90 degrees F (10 to 32 degrees C)
- C. Handling: Handle with clean hands and equipment. Lift and carry the products when moving them. Do not drag across one another.

## 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 recommended limits.

## 1.8 WARRANTY

- A. Manufacturer's Standard Warranty: Door assemblies will be free from defects in materials and workmanship from the date of manufacture for a time period of 10 years.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: JELD-WEN, Inc., which is located at: 2645 Silver Crescent Dr. Suite 400; Charlotte, NC 28273 ; Toll Free Tel: 800-535-3936; Tel: 541-850-2606; Fax: 541-851-4333; Email:[request info \(Architectural Inquiries@jeld-wen.com\)](mailto:request info (Architectural Inquiries@jeld-wen.com)); Web:[www.jeld-wen.com](http://www.jeld-wen.com)

[wen.com](http://www.wen.com)

- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

## 2.2 COMPOSITE INTERIOR DOORS

- A. Basis of Design: Colonist Composite Interior Doors by JELD-WEN, Inc.
- B. Colonist Smooth All Panel Doors:
  - 1. 1-3/8 inch (35 mm) All Panel Doors:
    - a. Skins: 1/8 inch Unprimed medium density fiberboard.
    - b. Core: 1 -3/8 inch (35.1 mm) Solid Core.
    - c. Stiles: 1 inch (25 mm) fir on each vertical edge precision routed into and sandwiched between the MDF skins.
    - d. Adhesive: Moisture resistant Type 1 glue for internal door construction.
    - e. Panel and Profile Design: Design C2020 2.

## 2.3 FABRICATION

- A. Fabricate in accordance with requirements of WDMA I.S. 1 Quality Standards.
- B. Hardware blocking: Per hardware manufacturers requirements for hardware to be installed without thru-bolts. Comply with ANSI A115-W and ANSI-A117.1.
- C. Factory prime doors for field finish.
- D. Bevel lock and hinge edges of single acting doors 3 degrees or 1/8 inch (3 mm) in 2 inches (51 mm).
- E. Prepare doors to receive hardware. Refer to Section 08 71 00 - Door Hardware, NFPA 80, and UL-10C for hardware requirements.
  - 1. Pre-fit and bevel to net opening size less 1/4 inch (6 mm) in width for single swing doors.
  - 2. Pre-fit and bevel to net opening size less 3/16 inch (5 mm) in width for paired doors.
  - 3. Provide 1/4 inch (6 mm) clearance above finished floor, unless otherwise indicated on drawings.
  - 4. Provide 1/8 inch (3 mm) clearance at top of door.
  - 5. Slightly ease vertical edges.

## PART 3 EXECUTION

### 3.1 EXAMINATION AND PREPARATION

- A. Inspect and prepare openings and substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions.
  - 1. Inspect door and components prior to installation.
  - 2. Verify rough opening conditions are within recommended tolerances.
  - 3. Prepare assembly components for installation in accordance with manufacturer's recommendations.
- B. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
- C. Do not proceed with installation until openings and substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

- D. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's installation guidelines and recommendations and approved submittals.

3.3 FIELD QUALITY CONTROL

- A. Manufacturers' Field Services: Field inspections.

3.4 CLEANING AND PROTECTION

- A. Protect installed doors from damage.

END OF SECTION

**SECTION 08 3100**  
ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Roof framing and opening support.

1.2 SUBMITTALS

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- B. Shop Drawings: Indicate exact position of all access door units.
- C. Submit under provisions of Section 01300.
- D. Manufacturer's data sheets, including:
  - 1. Brochures.
  - 2. Installation Instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store attic access door hatch in manufacturer's unopened packaging until ready for installation.
- B. Store attic access door hatch until installation inside under cover in dry area out of direct sunlight.

1.4 WARRANTY

- A. Limited Warranty: One year against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:

Battic Door Energy Conservation Products.  
Box 15, Mansfield, MA 02048-0015 U.S.A.  
Phone: (508) 320-9082; Fax: (508) 339-4571  
e: [info@batticdoor.com](mailto:info@batticdoor.com); i: [www.batticdoor.com](http://www.batticdoor.com)

2.2 FABRICATION

- A. Manufacture each access panel assembly as an integral unit ready for installation.

2.3 OVERVIEW OF PRODUCT

- A. Model 22 x 30 Attic Access Door System is an R-50 insulated and triple-gasketed door that installs in minutes and provides an air sealed, insulated access opening to residential attic space. Door is provided with wood trim attached to the wood frame. The door face and trim are pre-finished satin white and the unit is shipped ready to install. Exceeds 2009, 2012 and 2015 IBC and IECC requirements.



## 2.4 MATERIALS

- A. Wood frame and door. Unit installs into a 22-1/2" x 30-1/2" framed opening. Fits within the standard space between trusses spaced 24' o.c. or joists 16" o.c. to simplify installation. Pre-painted satin white door face and trim. R-50 insulated door core is 10" thick Extruded Polystyrene (EPS). Door face is mineral board facer and is painted satin white. Wood trim is attached to door frame and is painted satin white. Triple rubber gaskets provided for air tight seal. Solid wood frame and trim.

## 2.5 ACCESS DOOR AND FRAME FOR ATTIC ACCESS IN RESIDENTIAL APPLICATIONS

- A. Non-rated attic access doors and frames.
  - 1. Door: White mineral board face, extruded polystyrene (EPS) R-50 core, and fire rated rubber sealing gasket over top of EPS core. Door is pre-finished and painted satin white to match trim.
  - 2. Frame: Plywood frame is installed into a wood framed 22-1/2" x 30-1/2" rough opening. Frame is 12" tall and provides insulation dam. Wood trim is pre-secured to frame. Rubber gasket is installed on trim on each side of frame.
  - 3. Trim: Tapered wood trim 2" wide is pre-secured to frame and painted satin white to match door.
  - 4. Finish: Pre-finished satin white painted wood door and trim.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

### 3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

## SECTION 08 7100 - DOOR HARDWARE

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Hardware for wood and hollow steel doors.
- B. Hardware for fire-rated doors.
- C. Electrically operated and controlled hardware.
- D. Power supplies for electric hardware.
- E. Low energy door operators plus sensors and actuators.
- F. Cylinders for doors fabricated with locking hardware.
- G. Thresholds.
- H. Weather-stripping, seals and door gaskets.
- I. Key cabinet.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 – Wood Doors
- C. Section 08 1600 – Composite Doors

#### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Convey Owner's keying requirements to manufacturers.
- D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

#### **1.04 SUBMITTALS**

- A. Submit six copies of schedule per Division 1. Organize vertically formatted schedule into "Hardware Sets" following guidelines established in Door & Hardware Institute Handbook (DHI) Sequence and Format for the Hardware Schedule with index of doors and headings, indicating complete designations of every item required for each door or opening. Horizontal schedule format will be returned "Not Approved". Include following information:
  - 1. Type, style, function, size, quantity and finish of hardware items.  
Use BHMA Finish codes per ANSI A156.18.
  - 2. Name, part number and manufacturer of each item.
  - 3. Fastenings and other pertinent information.
  - 4. Location of hardware set coordinated with floor plans and door schedule.
  - 5. Explanation of abbreviations, symbols, and codes contained in schedule.
  - 6. Mounting locations for hardware.
  - 7. Door and frame sizes, materials and degrees of swing.
  - 8. List of manufacturers used and their nearest representative with address and phone number.
  - 9. Catalog cuts.
  - 10. Manufacturer's technical data and installation instructions for electronic hardware.
  - 11. Date of jobsite visit.

- C. Make substitution requests in accordance with Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
  - 1. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.
  - 2. For products specified by naming several Products or Manufacturers select any one of the products or manufacturers named, which complies with the specifications. No substitute product will be considered.
- D. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

### 1.05 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Hardware supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years. Who is or who employs an experienced Architectural Hardware Consultant (AHC) who is available, at reasonable times during the course of the Work, for consultation about project's hardware requirements to Owner, Architect and Contractor.
  - 2. Electrified hardware supplier: An experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design and extent to that indicated for this project, who has a record of successful in-service performance and is acceptable to manufacturer of materials. Shall prepare data for electrified door hardware based on testing and engineering analysis of manufacturer's assemblies similar to those in this project.
    - a. Responsible for detailing, scheduling and ordering of finish hardware.
  - 3. Installer: Must demonstrate suitable competence and experience installing finish hardware on like projects.
- B. Hardware: New, free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Fire-Rated Openings: In compliance with NFPA 80. Provide proper latching hardware, non-flaming door closers and approved-bearing hinges. Furnish openings complete.
- E. Pre-Installation Meetings: Prior to start of hardware installation, contractor shall schedule and conduct pre-installation meeting with hardware supplier, lock, exit device, and door closer manufacturers' representative(s), installer and related trades, to coordinate materials and techniques, and sequence complex hardware items and systems installation. Proper and correct installation and adjustment of hardware is to be reviewed, and criteria for punch list review will be established. Convene at least one week prior to commencement of related work. Written documentation of date and attendees/participants is to be provided to architect and owner for record.
- F. Discontinued and Obsolete Items: Bid and submit manufacturer's updated/improved item if scheduled item is discontinued. Where scheduled item is now obsolete, bid and furnish manufacturers updated item at no additional cost to the project.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Package hardware items individually; label and identify each package with door opening code to match Hardware Schedule.
- B. Delivery: coordinate delivery to appropriate locations (shop or field).
  - 1. Key cabinet, permanent keys and cores: secured delivery direct to Owner's representative.
- C. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers. Shipments direct from manufacturer to Site are not acceptable.
- D. Storage: Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.

### **1.07 PROJECT CONDITIONS**

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical as the same operation and quality as type specified, subject to Architect's approval.

### **1.08 WARRANTY**

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' warranties:
  - 1. Mortise Locksets: Three years.
  - 2. Bored Locksets: Seven years.
  - 3. Closers: Ten years mechanical, two years electrical.
  - 4. Exit Devices: Three years.
  - 5. Hinges: Life of Building.
  - 6. Other Hardware: One year.

### **1.10 COMMISSIONING**

- A. Test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
- B. Test electrical hardware systems for satisfactory operation.
- C. Test hardware interfaced with fire/life-safety system for proper operation and release.

### **1.11 MAINTENANCE**

- A. Furnish operating and maintenance data of manufacturers for door hardware items. Include instructions for operation, adjustments and maintenance and parts list.
- B. Instruct personnel of Owner in proper adjustments and maintenance of door hardware and hardware finishes during final adjustment phase of hardware installation.
- C. Key biting list shall be delivered from lock manufacturer directly to representative of Owner with return receipt. Furnish copy of transmittal letter to Architect.
- D. Furnish a complete set of specialized tools as needed for continued adjustment, maintenance, removal and replacement of door hardware by Owner.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Listed acceptable alternate manufacturers: submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	McKinney, Stanley
Continuous Hinges	(IVE) Ives	Pemko, Zero
Key System	(FAL) Falcon	(SCH) Schlage
Locks	(FAL) Falcon	(SCH) Schlage
Exit Devices	(VON) Von Duprin	(FAL) Falcon
Closers	(FAL) Falcon	(LCN) LCN
Flush Bolts	(IVE) Ives	Hiawatha, Trimco
Coordinators	(IVE) Ives	Hiawatha, Trimco
Push & Pull Plates	(IVE) Ives	Hiawatha, Trimco
Kickplates	(IVE) Ives	Hiawatha, Trimco
Stops & Holders	(IVE) Ives	Hiawatha, Trimco
Overhead Stops	(GLY) Glynn-Johnson	No Substitution
Thresholds	(ZER) Zero	Pemko, Reese
Seals & Bottoms	(ZER) Zero	Pemko, Reese
Key Cabinets	(TEL) TelKey	Lund

## 2.02 HANGING MEANS

- A. Conventional Hinges: Hinge open widths minimum, but, of sufficient throw to permit maximum door swing. Steel or stainless steel pins and concealed bearings.
1. Three hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height, or any fraction thereof.
  2. Extra heavy weight hinges on doors over 3 foot, 5 inches in width.
  3. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins.
  4. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
  5. Provide shims and shimming instructions for proper door adjustment.
  6. Scheduled Hinges are Ives 5BB1
  7. Finish of hinges is to be as scheduled
  8. Accepted substitutions: McKinney TB2714, Stanley FBB179

## 2.03 LOCKSETS, LATCHSETS, DEADBOLTS

- A. Standard Duty Cylindrical Locks and Latches:
1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.
  2. Locking Spindle: stainless steel, interlocking design.
  3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel or stainless steel.
  4. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to face of door.
  5. Lock Series and Design: Schlage AL series, "Neptune" design  
Schlage F series, "Jazz" design
  6. Certifications:
    - a. ANSI A156.2, 1994, Series 4000, Grade 2
    - b. UL listed for A label and lesser class single doors up to 4ft x 8ft.
- B. Interconnected Locks:
1. Interconnected linkage housing connects deadbolt and latch operation.
  2. Enlarged turnpiece for ease of operation.
  3. Inside lever provides simultaneous retraction of deadbolt and latch.
  4. 1" throw deadbolt with hardened steel roller.
  5. Lock Series and Design: Schlage S200 series, "Neptune" design
  6. Certifications:
    - a. ANSI A156.12, 1992, Grade 2
    - b. UL listed for A label and lesser class single doors up to 4ft.

## 2.04 KEYING REQUIREMENTS:

- A. Key System: Schlage Everest keyway, non-interchangeable core typically with interchangeable core type operating cylinders for panic hardware. Key blanks available from factory-direct sources and from after-market key blank manufacturers. For estimate use factory GMK charge.
  - 1. New factory registered master key system.
  - 2. Furnish 6 master keys per master key group.
  - 3. Furnish 3 control keys.
  - 4. Re-combinate entire project at no extra expense to owner if missing any keys.
- B. Key Cylinders/Cores: utility patented, 6-pin solid brass construction.
- C. Locksets and cylinders/cores: keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- D. Permanent keys, cores and bitting list: Secured shipment direct from point of origination to Owner.
- E. Bitting list: secured shipment direct from point of origination to Owner.
- D. Supply three (3) cut keys per cylinder or lock.
- F. Supply four (4) control keys.
- G. All keys to be stamped with "key set" and "Do Not Duplicate".
- H. Stamp all keys with the appropriate key set.

## 2.05 EXIT DEVICES/ PANIC HARDWARE

- A. General features:
  - 1. Independent lab-tested 2,000,000 cycles.
  - 2. Push-through touch pad design. No exposed touch bar fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
  - 3.  $\frac{3}{4}$ " throw deadlocking latchbolts.
  - 4. No exposed screws to show through glass doors.
  - 5. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
  - 6. Releasable with 32 lb. maximum pressure under 250 lb. load to the door.
  - 7. Heavy cast metal flush mounted end caps finished to match exit device.
- B. Specific features:
  - 1. Non-Fire rated devices to have cylinder dogging.
  - 2. Lever Trim: Breakaway type (996L), forged brass or bronze escutcheon min .130" thickness, match lockset lever design.
  - 3. Exterior doors to have Ives "Vandal-Resistant" pulls.
    - 1. Rod and latch guards with surface vertical rod devices.
    - 2. Furnish one 98/99MK parts maintenance kit per project.
    - 3. Scheduled Exit Device: Von Duprin 99 series
- C. Power Supplies: Power supplies are to provide filtered, regulated power to operate electrical products including electrified exit devices. Output power is to be field-selectable for either 24VDC @ 2 ampere or 12VDC @ 4 ampere. Standard input is to be 120VAC @ 1.0 ampere or 240VAC @ 0.5 ampere. Steel enclosure shall incorporate key lock and have minimum quantity of five knockout holes for conduit connection. Terminal block to accept up to 14 gauge wire.
  - 1. Scheduled Power Supplies: Von Duprin
- D. Electrical Power Transfer Devices: Fully concealed when door is closed, power transfer device is to have two 18 gauge or ten 24 gauge wires as indicated by model scheduled.
  - 1. Scheduled Power Transfer Devices: Von Duprin EPT

## 2.06 CLOSERS

### A. Surface Closers:

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast aluminum body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
3. Units stamped with date-of-manufacture code.
4. Thru-bolts at wood doors unless doors are provided with closer blocking. Non-sized, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to -30 degrees F, furnish data on request.
9. Non-flaming fluid will not fuel door or floor covering fires.
10. Scheduled Closers: Dor-O-Matic SC61, 71, 81 series

### B. Low-Energy Door Operators:

1. Where "Low Energy Power Operated Door" as defined by ANSI Standard A156.19 is indicated for doors required to be accessible to the disabled, provide pneumatically powered operators complying with the ADA requirements.
2. Full closing force shall be provided when the power or assist cycle ends.
3. Modular design, adjustments easily accessible from the front, UL listed for use on labeled doors.
4. Shall have "Second Chance" function to accommodate momentary resistance, "Breakaway" function in the electronically controlled clutch, "Soft Start" motor control function and "Maintain Hold-Open Switch" to hold the door open at 90 degrees.
5. Shall have built in 12V and 24V power supply for actuators, card readers, electric strikes and magnetic door locks, inputs for both swing and stop side sensors and available to accept either 120VAC or 220VAC input power. All wiring connections between operator modules made by easy-to-handle electrical connectors. Shall comply with both UL and NEC requirements for Class 1 and Class 2 wiring by providing separate conduits for each.
6. Shall have seven independent electronic adjustments to tailor the operator for specific site conditions. Opening speed, holding force at 90 degrees, sequential trigger and time delay, hold-open time at 90 degrees, opening force, clutch "breakaway" force setting, electric strike trigger and time delay.
7. Shall have separate and independent adjustments for back check, main speed and latch speed.
8. Furnish actuators and other controls as specified in Hardware Sets.
9. Scheduled Operators: LCN 4640 series

## 2.07 OVERHEAD STOP AND HOLDERS

- ### A. Surface mounted and concealed overhead stops and holders shall be heavy duty 300 series stainless steel, brass/bronze and steel materials, as required for specified finish, with finished metal end caps. Holders shall incorporate selective, adjustable hold-open mechanism. Templating of both surface and concealed overhead stops and holders allows for 85 to 115 degree stop/hold open position.

1. Scheduled surface mounted overhead stops and holders are Glynn-Johnson 90.

## 2.08 OTHER HARDWARE

- A. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
1. Scheduled kick plates are: Ives 8400
  2. Accepted substitutions: Hiawatha J102, Trimco K0050
- B. Door Stops: Provide stops to protect walls, casework or other hardware.
1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide overhead type.
  2. Scheduled door stops are: Ives WS406CVX and 060
  3. Accepted substitutions: Hiawatha, Trimco
- C. Sweeps: Specially formulated to withstand greater temperature extremes while providing maximum protection against air infiltration. Neoprene or nylon brush type as scheduled.
1. Scheduled sweeps: National Guard Products 200NA and 600A
  2. Accepted substitutions: Pemko, Reese
- D. Electric Strikes: Provide remote release of a locked door. They shall be designed for use with the type of locks shown at each opening where required. Strikes will be UL listed for Burglary-Resistant Electric Door Strike, and where required, shall be UL listed as electric strikes for Fire Doors or Frames. Faceplates shall be stainless steel with finish as specified for each opening. The locking components shall be stainless steel to resist damage and abuse. Solenoids shall be of the continuous duty type for the voltage specified. Plug connectors will be furnished. Strikes shall have an adjustable backbox to compensate for misalignment of door and frame.
1. Scheduled electric strikes: Von Duprin 6211
  2. Finish of electric strikes is to be 626
- E. Thresholds: As scheduled and per details. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
1. Exteriors: Set in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous ¼ inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
  2. Fire-rated openings, 90min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.
  3. Sound control openings: Set in bed of mastic sealant.
  4. Scheduled thresholds: National Guard Products 513, 896S
  5. Finish of thresholds is to be mill finish aluminum.
- F. Viewers: Provide Owner requested "Door Scope" available at [www.doorscopes.com](http://www.doorscopes.com) viewers as scheduled. Viewers to be aluminum units in silver color. Secondary viewer in handicapped units to be Ives U700 model.
- G. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- H. Seals: Specially formulated to withstand greater temperature extremes while providing maximum protection against air infiltration. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability. Proposed substitutions: submit for approval.
1. Meets UL10B and ASTM E283 classification.
  2. Sound control openings: Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leaves have the necessary sealed-in-place STC ratings.
  3. Scheduled seals: National Guard Products 160S, 5050CL



4. Finish of seals is to be Aluminum or Clear as indicated
- I. Silencers: Interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.
- J. Key Cabinet: As part of this contract, the finish hardware supplier shall provide one TelKey surface mounted key cabinet, Aristocrat "AWC" model. Cabinet shall be fully set-up and indexed with all keys attached to hook clips, indexed and recorded. Capacity of key cabinet shall be same as number of locks and cylinders on project, plus an additional 50% for future expansion. Components of key cabinet shall include, in quantities to accommodate "job plus 50%" requirements listed above, the following:
  1. Numbered Label Sheets
  2. Key Gathering Envelopes
  3. Key Tags
  4. Permanent Key Tags for File Keys
  5. Duplicate Key Tags
  6. System Index Sheets:
    - a. Alphabetical Index
    - b. Hook Number Index
    - c. Key Numerical Index
    - d. Master Index
    - e. Cross Index
  7. Signature Cards
  8. Permanent Loan Register

Completely set up and indexed key cabinet shall be delivered with a signed receipt to District Construction Manager.

## **2.09 FINISHES**

- A. Generally BHMA 626 Satin Chromium.
  1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.
- C. Door Closers: Factory powder coated to match other hardware, unless otherwise noted.
- D. Aluminum Items: Match predominant adjacent material.
  1. Seals to coordinate with frame color.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that doors and door frames are ready to receive work.
- B. Do not install hardware for permanent use until finish painting immediately adjacent to hardware is complete.
- C. Verify that electric power furnished for electric hardware is of correct characteristics.

### **3.02 PREPARATION**

- A. Ensure that walls and frames are square and plumb before hardware installation.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
  1. Notify Architect of any code conflicts before ordering material.
  2. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

- C. Existing frames and doors scheduled to receive new hardware: Carefully remove existing hardware, tag and bag, and turn over to Owner. Match new locksets strike plates to existing frame preps.
  - 1. Patch and fill wood frames and doors with solid wood stock or dowel material before cutting for new hardware. Do not reuse existing screw holes - - fill and re-pilot.
  - 2. Metal doors/frames: Weld or fasten with screws: filler pieces in existing hardware cut-outs and mortises not scheduled for re-use by new hardware. Leave surfaces smooth by using non-metallic filler material.
  - 3. Patch all holes, sand smooth and paint existing doors and frames scheduled to receive new hardware.

### **3.03 INSTALLATION**

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation.
  - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
  - 2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
- B. Drill pilot holes for fasteners in wood doors and/or frames.
- C. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

### **3.04 ADJUSTING**

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
- B. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction at no additional cost to Owner.
- C. Inspection: Prior to owner's occupancy, the general contractor shall schedule and conduct a post-installation meeting with the hardware supplier and the manufacturer representative who supplied the commercial locks, the exit devices, the door controls/closers, etc.. The purpose is to eliminate any or all institutional door hardware "punch list" items. This will enable the general contractor and the owner to gain approval for their building occupancy permit much quicker.
- D. Follow-up Inspection: Per letter of agreement with Owner, approximately 6 months after substantial completion, installer shall visit Project with representatives of the manufacturers of the locking devices and door closers to accomplish following:
  - 1. Re-adjust hardware.
  - 2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
  - 3. Identify items that have deteriorated or failed.
  - 4. Submit written report identifying problems and likely future problems.

### **3.05 DEMONSTRATION**

- A. Demonstrate electrical hardware systems, including adjustment and maintenance procedures.

### **3.06 PROTECTION/CLEANING**

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

**PART 4 SCHEDULES**

**4.01 HARDWARE SETS**

- A. Provide hardware items required to complete the work in accordance with these specifications and manufacturers' instructions.
- B. Include items inadvertently omitted from this specification. Note these items in submittal for review.
- C. There will not be any extra's allowed for items that should have been picked up during bidding.

HW SET: 1  
Single Door– Unit Entry Door

1	EA	DEAD BOLT	B60N CEN	626	SCH
3	EA	HINGE	BY DOOR MANUFACTURER	626	
1	EA	PASSAGE SET	F40ELA CEN	626	SCH
1	EA	DOOR STOP	060	626	IVE
1	EA	DOOR SCOPE	DS/2000 MOUNT AT 60" AFF	AL.S	DSC
1	SET	SEALS	BY DOOR MANUFACTURER		
1	EA	Threshold	BY DOOR MANUFACTURER		

HW SET: 2  
Single Door – Closet

1	EA	PASSAGE SET	F10ELA CEN	626	SCH
1	EA	DOOR STOP	060	626	IVE

HINGES BY THE PRE-HUNG MANUFACTURER

HW SET: 3  
Single Door – Bathroom  
Single Door– Bedroom

1	EA	PRIVACY SET	F40ELA CEN	626	SCH
1	EA	DOOR STOP	060	626	IVE

HINGES BY THE PRE-HUNG MANUFACTURER

**4.02 KEY SCHEDULE**

- A. Verify the following proposed schedule with Owner.
- B. Provide factory grand master key that opens all doors 1AA thru ?AA

DOOR

LOCATION  
Apartment Entry

KEYSET  
1AA – ?AA

**END OF SECTION**

## SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Gypsum wallboard.
- B. Joint treatment and accessories.

#### 1.02 RELATED REQUIREMENTS

#### 1.03 REFERENCE STANDARDS

- A. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- B. ASTM C 557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- C. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members.
- D. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- E. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- F. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board.
- G. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- H. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board.
- I. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- J. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association.
- K. GA-600 - Fire Resistance Design Manual; Gypsum Association.
- L. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc..

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
- C. Test Reports: For all stud framing products that do not comply with ASTM C 645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

#### 1.05 QUALITY ASSURANCE

- A. Perform in accordance with GA-214 and GA-216. Comply with requirements of GA-600 for fire-rated assemblies.

#### 1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

### PART 2 PRODUCTS

#### 2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C 840 and GA-216.

#### 2.02 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
  - 1. National Gypsum Company; Product Hi-Impact XP Wallboard with fiberglass mesh: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - 2. Substitutions: See Section 01 6000 - Product Requirements.

- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  - 2. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
- C. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
  - 1. Thickness: 5/8 inch, as indicated.
  - 2. Edges: Tapered.
- D. Fire Resistant Type: Complying with Type X requirements; UL or WH rated.
  - 1. Special Fire Resistant Type: "Type C"; meeting and exceeding requirements of Type X; UL or WH rated.
    - a. Thickness: 5/8 inch, as indicated.
- E. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M; ends square cut.
  - 1. Core Type: Regular and Type X, as indicated.
  - 2. Thickness: 5/8 inch, as indicated.

### **2.03 ACCESSORIES**

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced.
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
  - 1. Types: As detailed or required for finished appearance.
  - 2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
- E. Screws: ASTM C 1002; self-piercing tapping type; cadmium-plated for exterior locations.
- F. Adhesive for Attachment to Wood: ASTM C 557.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 FRAMING INSTALLATION**

- A. Suspended Ceilings and Soffits: Space framing and furring members as permitted by standard.
  - 1. Level ceiling system to a tolerance of 1/1200.
  - 2. Laterally brace entire suspension system.
  - 3. Install bracing as required at exterior locations to resist wind uplift.
- B. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- C. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
  - 1. Orientation: Horizontal.
  - 2. Spacing: As indicated.
- D. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- E. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

- F. Blocking: Install blocking for support of plumbing fixtures, wall cabinets, wood frame openings, and toilet accessories. Comply with Section 06 1054 for wood blocking.

### **3.03 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Place one bead continuously on substrate before installation of perimeter framing members.
  - 2. Place continuous bead at perimeter of each layer of gypsum board.
  - 3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

### **3.04 BOARD AND GLASS MAT FACED BOARD INSTALLATION**

- A. Comply with GA-216 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
  - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
  - 1. Single-Layer Applications: Adhesive application.
- E. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

### **3.05 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
  - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.06 JOINT TREATMENT**

- A. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:
  - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- B. Finish all gypsum board in accordance with ASTM C 840 Level 4.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.

### **3.07 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**

SECTION 09 90 00  
INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior paint and coatings systems including surface preparation.
- B. Interior high-performance paint and coatings systems including surface preparation.
- C. Exterior paint and coatings systems including surface preparation.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 06 20 00 - Finish Carpentry.
- C. Section 09 21 16.23 - Gypsum Board Shaft Wall Assemblies.

1.3 REFERENCES

- A. Steel Structures Painting Council (SSPC):
  - 1. SSPC-SP 1 - Solvent Cleaning.
  - 2. SSPC-SP 2 - Hand Tool Cleaning.
  - 3. SSPC-SP 3 - Power Tool Cleaning.
  - 4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
  - 5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
  - 6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
  - 7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
  - 8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
  - 9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
  - 10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.
- B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.
- C. South Coast Air Quality Management District (SCAQMD): Rule 1113 - Architectural Coatings.
- D. Green Seal, Inc.:
  - 1. GS-11 Standard for Paints and Coatings (1st Edition, May 20, 1993).
  - 2. GC-03 - Environmental Criteria for Anti-Corrosive Paints.
- E. United States Green Building Council (USGBC): LEED-09 NC/CI/CS.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: For each paint system indicated, including.
  - 1. Product characteristics.
  - 2. Surface preparation instructions and recommendations.
  - 3. Primer requirements and finish specification.

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

4. Storage and handling requirements and recommendations.
  5. Application methods.
  6. Cautions for storage, handling and installation.
- C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors and sheens available.
- D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.
- E. Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish surfaces for verification of products, colors and sheens.
  2. Finish area designated by Architect.
  3. Provide samples that designate primer and finish coats.
  4. Do not proceed with remaining work until the Architect approves the mock-up.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
1. Product name, and type (description).
  2. Application and use instructions.
  3. Surface preparation.
  4. VOC content.
  5. Environmental handling.
  6. Batch date.
  7. Color number.
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

## 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits



## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.8 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Sherwin-Williams, which is located at: 101 Prospect Ave.; Cleveland, OH 44115; Toll Free Tel: 800-524-5979; Tel: 216-566-2000; Fax: 440-826-1989; Email: request info [specifications@sherwin.com](mailto:specifications@sherwin.com); Web: [www.swspecs.com](http://www.swspecs.com).
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

### 2.2 APPLICATIONS/SCOPE

- A. Interior Paints and Coatings:(LEED-09 NC/CI/CS COMPLIANT)
  - 1. Concrete: Floors (Non-Vehicular).
  - 2. Wood: Walls, ceilings, doors, trim and similar items.
  - 3. Drywall: Drywall board, Gypsum board.
- B. Exterior Paints and Coatings:
  - 1. Metal: galvanized steel.
  - 2. Metal: Miscellaneous iron, ornamental iron, ferrous metal.
  - 3. Architectural PVC, plastic, fiberglass.

### 2.3 PAINT MATERIALS - GENERAL

- A. Paints and Coatings:
  - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
  - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

### 2.4 INTERIOR PAINT SYSTEMS

- A. METAL: Aluminum, Galvanized.

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

1. Latex Systems:
  - a. Semi-Gloss Finish:
    - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
    - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series.
    - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4.0 mils wet, 1.6 mils dry per coat).
  
- B. METAL: Galvanized; Ceilings, Duct work.
  1. Multi-Surface Acrylic Coating System:
  2. Dryfall Waterborne Topcoats:
    - a. Eg-Shel Finish:
      - 1) 1st Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series.
      - 2) 2nd Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-80 Series (6.0 mils wet, 1.9 mils dry per coat).
  
- C. METAL - (Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous and Ornamental Iron, Structural Iron, Ferrous Metal)
  1. Latex Systems:
    - a. Eg-Shel / Satin Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4.0 mils wet, 1.7 mils dry per coat).
  
- D. WOOD - (Walls, Ceilings, Doors, Trim):
  1. Latex Systems:
    - a. Semi - Gloss Finish:
      - 1) 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).
      - 2) 2nd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series.
      - 3) 3rd Coat: S-W ProClassic Waterborne Acrylic Semi-Gloss, B31 Series (4 mils wet, 1.3 mils dry per coat).
  
- E. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
  1. Latex Systems:
    - a. Eg-Shel / Satin Finish:
      - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
      - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.
      - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).
    - b. Eg-Shel / Satin Finish:
      - 1)
  
- F. Concrete - (Floors, non-vehicular):
  1. Latex Systems:
    - a. Semi Gloss Finish:
      - 1) 1st Coat: S-W Tread-Plex Primer Acrylic Floor Coating, B90W110.
      - 2) 2nd Coat: S-W Tread-Plex Acrylic Floor Coating, B90 Series.
      - 3) 3rd Coat: S-W Tread-Plex Acrylic Floor Coating, B90 Series (3.5 mils wet, 1.5 mils dry, per coat).

## 2.5 EXTERIOR PAINT SYSTEMS

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

- A. CONCRETE (Cementitious Siding, Flexboard, Transite Board, Shingles (Non-Roof), Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement).
1. Latex Systems:
    - a. Satin Finish- Early Moisture Resistant:
      - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (5.3-8.0 mils wet, 2.1-3.2 mils dry).
      - 2) 2nd Coat: S-W Resilience Exterior Latex Satin, K43 Series.
      - 3) 3rd Coat: S-W Resilience Exterior Latex Satin, K43 Series (4.0 mils wet, 1.6 mils dry per coat).
- B. METAL: Aluminum, Galvanized.
- a. Satin Finish - Early Moisture Resistant Finish:
    - 1) 1st Coat: S-W Resilience Exterior Latex Satin, K43 Series.
    - 2) 2nd Coat: S-W Resilience Exterior Latex Satin, K43 Series (4.0 mils wet, 1.6 mils dry per coat).
- C. METAL: Misc. Iron, Ornamental Iron, Structural Iron and Steel, Ferrous Metal.
1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0-10.0 mils wet, 1.8-3.6 mils dry).
      - 2) 2nd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series.
      - 3) 3rd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series (4.0-11.0 mils wet, 1.5-4.0 mils dry per coat).
- D. WOOD: Decks, Exterior including pressure treated lumber, Floors (non-Vehicular), Platforms.
1. Stain Systems:
    - a. Solid Color Acrylic Latex:
      - 1) 1st Coat: S-W SuperDeck Exterior Waterborne Solid Color Deck Stain, SD7-Series.
      - 2) 2nd Coat: S-W SuperDeck Exterior Waterborne Solid Color Deck Stain, SD7-Series (200-400 sq ft/gal).
- E. WOOD: Siding, Trim, Shutters, Sashes, Hardboard-Bare/Primed.
1. Latex Systems:
    - a. Satin Finish - Early Moisture Resistant Finish:
      - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W8041 (4.0 mils wet, 1.4 mils dry).
      - 2) 2nd Coat: S-W Resilience Exterior Latex Satin, K43 Series.
      - 3) 3rd Coat: S-W Resilience Exterior Latex Satin, K43 Series (4.0 mils wet, 1.6 mils dry per coat).
- F. ARCHITECTURAL PVC, PLASTIC, FIBERGLASS
1. Latex Systems:
    - a. Gloss Finish:
      - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
      - 2) 2nd Coat: S-W A-100 Exterior Latex Gloss, A8 Series.
      - 3) 3rd Coat: S-W A-100 Exterior Latex Gloss, A8 Series (4.0 mils wet, 1.3 mils dry per coat).
    - b. Gloss Finish - Early Moisture Resistant Finish:
      - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
      - 2) 2nd Coat: S-W Resilience Exterior Latex Gloss, K44 Series.
      - 3) 3rd Coat: S-W Resilience Exterior Latex Gloss, K44 Series (4.0 mils wet, 1.6 mils dry per coat).

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

- 1.6 mils dry per coat).
- c. Semi-Gloss Finish:
    - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
    - 2) 2nd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series.
    - 3) 3rd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series (4.0-11.0 mils wet, 1.5-4.0 mils dry per coat).
  - d. Satin Finish:
    - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
    - 2) 2nd Coat: S-W A-100 Exterior Latex Satin, A82 Series.
    - 3) 3rd Coat: S-W A-100 Exterior Latex Satin, A82 Series (4.0 mils wet, 1.5 mils dry per coat).
  - e. Satin Finish - Early Moisture Resistant Finish:
    - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
    - 2) 2nd Coat: S-W Resilience Exterior Latex Satin, K43 Series.
    - 3) 3rd Coat: S-W Resilience Exterior Latex Satin, K43 Series (4.0 mils wet, 1.6 mils dry per coat).
  - f. Flat Finish:
    - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
    - 2) 2nd Coat: S-W A-100 Exterior Latex Flat, A6 Series.
    - 3) 3rd Coat: S-W A-100 Exterior Latex Flat, A6 Series (4.0 mils wet, 1.2 mils dry per coat).
  - g. Flat Finish - Early Moisture Resistant Finish:
    - 1) 1st Coat: S-W Extreme Bond Bonding Primer, B51W00150 (3.1 mils wet, .9 mils dry).
    - 2) 2nd Coat: S-W Resilience Exterior Latex Flat, K42 Series.
    - 3) 3rd Coat: S-W Resilience Exterior Latex Flat, K42 Series (4.0 mils wet, 1.6 mils dry per coat).
- G. DRYWALL: Gypsum Board, Exterior Drywall.
- 1. Latex Systems:
    - a. Semi-Gloss Finish:
      - 1) 1st Coat: S-W Exterior Latex Wood Primer, B42W08041 (4.0 mils wet, 1.4 mils dry).
      - 2) 2nd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series.
      - 3) 3rd Coat: S-W Metalatex Acrylic Semi-Gloss, B42 Series (4.0-11.0 mils wet, 1.5-4.0 mils dry per coat).

## PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

## 3.2 SURFACE PREPARATION

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

- A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
  2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
  3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
  4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.
- B. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.
- C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
- D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
- E. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.
- F. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.
- G. Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

- H. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.
- I. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.
- J. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.
- K. Plaster: Must be allowed to dry thoroughly for at least 30 days before painting, unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.
- L. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
  2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
  4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust,

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.

7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
  8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
  9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
  10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
- M. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

### 3.3 INSTALLATION

- A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.
- H. Contractor Note: Owner has the option to chose different colors for the walls, ceiling, doors,

## INTERIOR, EXTERIOR AND INDUSTRIAL PAINTS AND COATINGS

frames, and trim work of each room at no extra charge to the contract sum except unit, mechanical and storage room ceilings and walls, shall be sprayed the same color and finish.

## 3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION



## SECTION 10 2800 – TOILET ACCESSORIES

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Features:
  - 1. Private-use bathroom accessories.
  
- B. Related Requirements:
  - 1. Section 06 1000 "Rough Carpentry" for concealed solid wood blocking in walls.
  - 2. Division 22 "Plumbing" for grab bars and shower curtain rods built into shower stalls and bathtub surrounds.

#### 1.02 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 anchoring and mounting requirements.
- B. Sample Warranty: For manufacturer's special warranty.

#### 1.03 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: 15 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Toilet Accessories: One of the following except as approved otherwise by Architect:
  - 1. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 2. Basco Inc.: [ww.bascoinc.com](http://ww.bascoinc.com).
- B. Substitutions: See Section 01 6000 "Product Requirements."

#### 2.02 PRIVATE-USE BATHROOM ACCESSORIES

- A. Source Limitations: Obtain private-use bathroom accessories from single manufacturer.
- B. Toilet Tissue (Roll) Dispenser: Single roll, surface mounted bracket type, chrome-plated zinc alloy brackets.
  - 1. Product: 505 manufactured by Bradley Corp.
- C. Mirror Unit: Stainless steel framed, 6 mm thick float glass mirror.
  - 1. Frame: Stainless-steel angle, 0.05 inch thick, #4 finish.
    - a. Corners: Welded and ground smooth.
  - 2. Hangers: Tamper- and theft-resistant installation.
  - 3. Size: As indicated on Drawings.
  - 4. Product: 780-2436 by Bradley Corp.
- D. Medicine Cabinet: Recessed-mounted one-piece construction of heavy-gauge steel with factory-applied, gloss white, baked enamel finish, frameless mirror.
  - 1. Size: 30 by 30 inches.
  - 2. Shelves: Three, adjustable, tempered glass.
  - 3. Product: BV3030FR-W manufactured by Basco Inc.

- E. Medicine Cabinet: Recessed-mounted one-piece construction of sturdy polystyrene, Stainless steel channel frame mirror.
  - 1. Size: 16 by 22 inches.
  - 2. Shelves: Two, adjustable, polystyrene.
  - 3. Model: 9661 Bradley Corporation
- F. Product: BV3030FR-W manufactured by Basco Inc.
- G. Towel Hook Insert drawing designation: Stainless Steel, concealed attachment, bright polished finish.
  - 1. Product: 9315 manufactured by Bradley Corp.
- H. Towel Ring Insert drawing designation: Die Cast, 6-3/4" Diameter; rectangular brackets, concealed attachment, bright polished finish.
  - 1. Product: 7406C manufactured by Basco Inc
- I. Shower Curtain Rod: 1" Outside Diameter, Curved with swivel brackets 60"
  - 1. Product: Bradford's of Tampa.
- J. Towel Bar: Die Cast, 3/4 inch square tubular bar; rectangular brackets, concealed attachment, bright polished finish.
  - 1. Length: 24 inches.
  - 2. Product: 7918 manufactured by Basco Inc

### **2.03 MATERIALS**

- A. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- B. Fasteners:
  - 1. Attachment to Blocking: Steel wood screws at least #8 size.
  - 2. Attachment to Gypsum board: Toggle bolts except as approved otherwise by Architect.
  - 3. Plastic sleeved expansion screws NOT allowed.
- C. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Where Drawings require solid blocking and installation does not encounter solid blocking, report condition to Architect and do not proceed until condition is remedied.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

### **3.02 ADJUSTING AND CLEANING**

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions including types of cleaners.

### **3.03 SCHEDULE**

- A. In each Unit bathroom to have toilet accessory items shown on Drawings or not shown on the Drawings as follows:
  - 1. 1 – 24" Towel Bars
  - 2. 1 – Toilet Paper Holder
  - 3. 1 – Towel Ring
  - 4. 1 – Medicine Cabinet
  - 5. 2 – Towel Hooks
  - 6. 1 – Shower Curtain Rod

7. 1 - Mirror

**END OF SECTION**

**SECTION 10 5623 - WIRE STORAGE SHELVING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Features:
  - 1. Wall mounted wire closet shelving.
  - 2. Mounting standards and brackets.
- B. Related Requirements:
  - 1. Section 06 1000 "Rough Carpentry" for blocking in walls for attachment of shelving.
  - 2. Section 12 3530 "Residential Casework" for wire storage accessories associated with kitchen cabinets.

**1.02 SUBMITTALS**

- A. See Section 01 3000 "Administrative Requirements" for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, with installation instructions.
- C. Shop Drawings: Provide drawings prepared specifically for this project; show dimensions of shelving and attachment to substrates.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.
- C. Store flat to prevent warpage and bending.

**PART 2 PRODUCTS**

**1.04 MANUFACTURERS**

- A. Wire Storage Shelving: Use one of the following:
  - 1. ClosetMaid Corporation : [www.closetmaid.com](http://www.closetmaid.com).
  - 2. RubberMaid Closet and Organization Products : [www.rubbermaidcloset.com](http://www.rubbermaidcloset.com).
- B. Substitutions: See Section 01 6000 "Product Requirements."

**1.05 MATERIALS**

- A. Wire Shelving: Factory-assembled coated wire mesh shelf assemblies for wall-mounting, with all components and connections required to produce a rigid structure that is free of buckling and warping.
  - 1. Construction: Cold-drawn steel wire having average tensile strength of 100,000 psi resistance welded into uniform mesh units, square, rigid, flat, and free of dents or other distortions, with wires trimmed smooth.
  - 2. Coating: PVC or epoxy, applied after fabrication, covering all surfaces.
    - a. PVC Coating: 9 to 11 mils thick.
    - b. Epoxy Coating: Non-toxic epoxy-polyester powder coating baked-on finish, 3 to 5 mils thick.
  - 3. Free-Sliding Hanging Rod: Hanger rod integrated into the shelf construction, permitting uninterrupted sliding of clothes hangers the full width of the shelf.

- B. Wall-Mounted Standards: Vertically slotted channel standards with double-tab cantilever brackets to suit shelving; factory finished to match shelving. Attached standards to hang track
- C. Mounting Hardware: Manufacturer's standard mounting hardware; include support braces, wall brackets, and other accessories required for complete and secure installation; factory finished to match shelving.
- D. Fasteners: As recommended by manufacturer for mounting to substrates provided.

### **PART 3 EXECUTION**

#### **1.06 EXAMINATION**

- A. Inspect areas to receive shelving, to verify that spaces are properly prepared to receive shelf units, and are of dimensions indicated on shop drawings.
- B. Verify appropriate fastening hardware.
- C. Do not begin installation until substrates have been properly prepared.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **1.07 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.

#### **1.08 INSTALLATION**

- A. Install in accordance with manufacturer's instructions, with shelf surfaces level.
- B. Cap the exposed ends of cut wires.
- C. Secure hang track to wall studs in accordance with manufacturer's instructions.
- D. Space standards as required and secure plumb to wall with recommended fasteners.

#### **1.09 CLEANING**

- A. Clean soiled surfaces after installation.
- B. Remove and clean any debris from installation
- C. Notify contractor or any gouges or marks requiring repair

#### **1.10 PROTECTION**

- A. Protect installed work from damage.
- B. Touch-up, repair, or replace damaged products before Substantial Completion in a manner that eliminates evidence of replacement.

#### **1.11 SCHEDULE OF SHELVING**

- A. Linen Closets: Five close-mesh shelves 24 inches deep, supported by wall clips at each end.
- B. Bedroom Closets: Wall-to-wall shelf with free sliding hanger rod.
- C. Coat Closets: Wall-to-wall shelf with free sliding hanger rod.
- D. Laundry Closet: Wall-to-wall close-mesh shelf.

**END OF SECTION**

## SECTION 11 3100 - RESIDENTIAL APPLIANCES

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Features:
  - 1. Kitchen appliances.
  - 2. Kitchen exhaust ventilation.

#### 1.02 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and accessories included.
- B. Sample Warranties: For manufacturers' special warranties.
- C. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

### PART 2 - PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Gas-Fueled Appliances: Certified by a qualified testing agency for each type of gas-fueled appliance according to ANSI Z21 Series standards.
- C. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the ADA standards of the agency having jurisdiction and ICC A117.1.

#### 2.02 RANGES

- A. Gas Range for Standard and ADA Dwelling Units: Freestanding range with oven.
  - 1. Model: GE #JGB660DEJBB.
    - a. Substitutions: See Section 01 6000 "Product Requirements."
  - 2. Anti-Tip Device: Manufacturer's standard.
  - 3. Electric Power Supply: 120 V, 60 Hz, 15 AA
  - 4. Finish: Porcelain-enameled steel, black.
  - 5. Accessories: Wall Shield, 30" W x 24" H Black, by range hood manufacturer. Such as Broan SP300108.

**2.03 KITCHEN EXHAUST VENTILATION**

- A. Exhaust Hood for ADA and Standard Dwelling Units:
  - 1. Model: GE #JVX3300DJBB.
    - a. Substitutions: See Section 01 6000 "Product Requirements."
  - 2. Type: Over range with light.
  - 3. Appliance Finish: Enamel, black.
  - 4. Energy Star

**2.04 REFRIGERATORS**

- A. Refrigerator for Standard Dwelling Units:
  - 1. Model: GE #GTE22JTNRBB.
    - a. Substitutions: See Section 01 6000 "Product Requirements."
  - 2. Type: Freestanding two-door refrigerator/freezer with freezer on top.
  - 3. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
  - 4. Appliance Color/Finish: Black enamel.

**2.05 DISHWASHERS**

- A. Dishwasher for Standard Dwelling Units:
  - 1. Model: GE #GDF510PGRBB.
    - a. Substitutions: See Section 01 6000 "Product Requirements."
  - 2. Type: Built-in undercounter.
  - 3. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
  - 4. Appliance Color/Finish: Black enamel.

**2.06 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.

**PART 3 - EXECUTION****3.01 EXAMINATION**

- A. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 INSTALLATION**

- A. Install appliances according to manufacturer's written instructions.



## RESIDENTIAL APPLIANCES

- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

**END OF SECTION**

## SECTION 12 2113 - HORIZONTAL LOUVER BLINDS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

#### 1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples: Submit two samples, 3 inch long illustrating slat materials and finish, color, wand type and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

#### 1.05 PROJECT CONDITIONS

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds.
- B. Take field measurements to determine sizes required.

#### 1.06 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Provide ten additional slats.
- C. Provide two additional complete blind assemblies of each size.
- D. Provide 2 extra control wands.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Horizontal Louver Blinds:
  - 1. Hunter Douglas: [www.hunterdouglas.com](http://www.hunterdouglas.com).
  - 2. Levolor Contract; Product 0.: [www.levolorcontract.com](http://www.levolorcontract.com).
  - 3. Caco, Inc.: [www.caoinc.com](http://www.caoinc.com)
  - 4. Substitutions: See Section 01 6000 - Product Requirements.

#### 2.02 BLINDS AND BLIND COMPONENTS

- A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand; complying with WCMA A100.1.
- B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
  - 1. Width: 1 inch.
  - 2. Thickness: 0.006 inch.
  - 3. Color: As selected.
- C. Slat Support: Woven polypropylene cord, ladder configuration.

- D. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats
  - 1. Color: Same as slats .
- E. Bottom Rail: Pre-finished, formed aluminum; with end caps. Color: Same as headrail.
- F. Lift Cord: Braided nylon; continuous loop.
- G. Control Wand: Extruded hollow plastic; hexagonal shape.
  - 1. Removable type.
  - 2. ADA compliant
  - 3. Length of window opening height less 3 inches.
- H. Headrail Attachment: Wall brackets.
- I. Accessory Hardware: Type recommended by blind manufacturer.
- J. For windows more than 2 sections wide, divide length of blind into separate sections; one per window section.

### **2.03 FABRICATION**

- A. Fabricate blinds to cover window frames completely.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed.

### **3.02 INSTALLATION**

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.
- C. Place intermediate head supports at 18 inch on center.

### **3.03 INSTALLATION TOLERANCES**

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

### **3.04 ADJUSTING**

- A. Adjust blinds for smooth operation.

### **3.05 CLEANING**

- A. Clean blind surfaces just prior to occupancy.

### **3.06 SCHEDULE**

- A. Provide blinds for all exterior windows located in units.
- B. Provide blinds for all windows located in the community room, exterior.
- C. Provide blinds for all windows located in the offices exterior.

**END OF SECTION**

## SECTION 123530 - RESIDENTIAL CASEWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Kitchen and vanity]cabinets.

##### B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 06 6113 Stimulated Stone Fabrications

#### 1.2 DEFINITIONS

- A. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of casework installed directly against and completely concealed by walls or other casework, and tops of wall cabinets and utility cabinets.
- B. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.
- C. Semiexposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors, interiors and sides of drawers, and bottoms of wall cabinets.

#### 1.3 COORDINATION

- A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.

#### 1.4 ACTION SUBMITTALS

##### A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components, and profiles and finishes for casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

##### B. Shop Drawings: For residential casework.

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.

- C. Samples: For casework and hardware finishes.
- D. Samples for Initial Selection: For casework and hardware finishes and door type.
- E. Samples for Verification: For the following:
  - 1. Casework Finishes: 3-by-4-1/2-inch (76-by-114-mm) Samples for each type of casework finish.
  - 2. Door Sample: 10-by-13-inch (254-by-330-mm) Sample for each door type selected.
  - 3. Hardware: One full-size Sample of each type of exposed hardware in each finish required.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For casework.

## 1.6 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 existing 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.
- D. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 CABINETS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Smart Cabinetry; Door and Drawer Face Style as specified below or comparable product by one of the following:
  - 1. Advanta Cabinets.
  - 2. Cardell Cabinetry.
  - 3. Merillat Industries, Inc.

- 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.
- C. Door and Drawer Face Style:
  - 1. Standard Overlay Door Style:
    - a. Flat Panel Door Type:
      - 1) Sheffield: Shaker type, mortise and tenon door, five-piece drawer front, reversed bevel edge profile.
        - a) Material and Finish: Maple, stained.
- D. Cabinet Construction: Smart Cabinetry; Ultimate.
  - 1. Face Frames: Dado to receive cabinet sides and compressed pocket screw fastened, with **3/4-by-1-1/2-inch (18-by-38-mm)** kiln-dried hardwood horizontal and vertical rails.
  - 2. Cabinet End Construction: **1/2-inch (12-mm)** thick plywood.
    - a. Wall-Hung Unit End Joinery: Rabbeted and hot-melt-glued to receive face frames, tops, and bottoms.
    - b. Base-Unit End Joinery: Rabbeted and industrial hot-melt-glued to receive face frames, floors, and full-depth I-beam bracing.
    - c. Exposed Cabinet End Finish: Wood veneer.
  - 3. Cabinet Tops and Bottoms: **1/2-inch (12-mm)** thick plywood.
    - a. Wall-Hung Unit Top and Bottom Joinery: Universally made and glued to receive face frame and cabinet back.
    - b. Base-Unit Bottom Joinery: Dado and industrial hot-melt-glued to face frame and cabinet sides and backs.
  - 4. Back, Top, and Bottom Rails: **3/4-by-2-1/2-inch (18-by-63-mm)** 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.
  - 5. Wall-Hung-Unit Back Panels: **1/2-inch- (13-mm-)** thick plywood fastened to rear edge of end panels and to top and bottom rails.
  - 6. Base-Unit Back Panels: **1/2-inch (13-mm)** thick plywood fastened to rear edge of end panels and to top and bottom rails.
  - 7. Front Frame Drawer Rails: **3/4-by-1-1/4-inch (18-by-32-mm)** solid wood mortised and fastened into face frame.
  - 8. Cabinet Base: **2-by-6-inch (51-by-152-mm)**, nominal, ACQ pressure-treated perimeter solid wood with **1/2 inch (13 mm)** rabbet at top perimeter to receive cabinet sides, then nailed together.
  - 9. Toe Kick: **2-by-6-inch (51-by-152-mm)**, nominal, ACQ pressure-treated perimeter solid wood.
    - a. Toe Kick Joinery: Hot-melt-glued and stapled between cabinet sides.

- E. 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: **5/8-inch (16-mm)** thick solid wood.
  - 3. Bottoms: **1/4-inch (6.4-mm)** thick plywood.
- F. Shelves: **3/4-inch (18-mm)** thick plywood.
- G. 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. Hardwood Plywood: HPVA HP-1.
- D. Hardboard: ANSI A135.4, Class 1 tempered.
- E. Exposed Materials:
  - 1. Exposed Wood Species: Manufacturer's standard for specified door type.
    - 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 selected by Architect from manufacturer's full range.
  - 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 faces and Grade C backs of same species as faces.
    - a. Matching Edge Bands: Edge band exposed edges with veneer edging of same species as face veneer.
- F. Semiexposed Materials: Manufacturer's standard for specified door type and cabinet construction.
- G. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility.

## 2.3 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as indicated by manufacturer's designations.
- B. Hinges: Concealed European-style, self-closing, 108 deg opening, 6-way adjustable hinges, soft-closing with three-settings.

- C. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; full extension , soft-close, designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.
- D. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
  - 1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
  - 2. Drawers: Provide one bumper on back side of drawer front at each corner.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- 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. (3 mm in 2.4 m)**.
- 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 (400 mm)** o.c.
    - a. Fasteners: No. 10 wafer-head sheet metal screws through the metal backing or metal framing behind the wall finish.

### 3.3 ADJUSTING AND CLEANING

- A. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- B. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123530



## SECTION 12 3600 - COUNTERTOPS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Countertops for manufactured casework.

#### 1.02 RELATED REQUIREMENTS

- A. Section 12 3530 - Residential Casework.

#### 1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. NEMA LD 3 - High-Pressure Decorative Laminates.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- 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. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Installation Instructions: Manufacturer's installation instructions and recommendations.
- F. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

#### 1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
- B. Installer Qualifications: Fabricator.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.07 FIELD 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.

### PART 2 PRODUCTS

#### 2.01 COUNTERTOP ASSEMBLIES

- A. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
  - 1. Laminate Sheet: NEMA LD 3 Grade.
    - a. Surface Burning Characteristics: Flame spread 25, maximum; smoke developed 450, maximum; when tested in accordance with ASTM E 84.
    - b. NSF approved for food contact.
    - c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
    - d. Finish: Matte or suede, gloss rating of 5 to 20.
    - e. Surface Color and Pattern: To be selected from manufacturer's full line. Premium colors will not be selected.

- f. Manufacturers:
  - 1) Formica Corporation: [www.formica.com](http://www.formica.com).
  - 2) Panolam Industries International, Inc\Nevamar: [www.nevamar.com](http://www.nevamar.com).
  - 3) Wilsonart International, Inc: [www.wilsonart.com](http://www.wilsonart.com).
- 2. Exposed Edge Treatment: Square edge
- 3. Back and End Splashes: Same material, same construction.

## **2.02 ACCESSORY MATERIALS**

- A. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- C. Joint Sealant: Mildew-resistant silicone sealant, clear.

## **2.03 FABRICATION**

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  - 1. Join lengths of tops using best method recommended by manufacturer.
  - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

## **PART 3 EXECUTION**

### **3.01 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.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### **3.02 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.

### **3.03 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.

### **3.04 CLEANING AND PROTECTION**

- A. Clean countertops surfaces thoroughly.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

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## SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

### 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.
- B. Requirements in this Section apply to all Division 22 Sections.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Scope of Work and Construction Considerations.
  - 2. Coordination Drawings.
  - 3. Quality Assurance.
  - 4. Submittal Requirements.
  - 5. Change Orders.
  - 6. Delivery, Storage, and Handling.
  - 7. Coordination.

#### 1.3 SCOPE OF WORK AND CONSTRUCTION CONSIDERATIONS

- A. This Specification and the associated Drawings govern the furnishing, installation, testing, and placing into satisfactory operation the Plumbing Systems.
- B. Contractor shall provide all new materials indicated on the Drawings and/or in these Specifications, and all items required to make his portion of the Plumbing Work a finished and working system.
- C. Refer to the Construction Manager's scope statements for complete scope of work description.
- D. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours will be required.

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## 1.4 COORDINATION DRAWINGS

### A. Definitions:

1. Coordination Drawings: A compilation of the pertinent layout and system drawings that show the sizes and locations, including elevations, of system components and required access areas to ensure that no two objects will occupy the same space.
  - a. Mechanical trades shall include, but are not limited to, mechanical equipment, ductwork, fire protection systems, plumbing piping, medical gas systems, hydronic piping, steam and steam condensate piping, and any item that may impact coordination with other disciplines.
  - b. Electrical trades shall include, but are not limited to, electrical equipment, conduit 1.5” and larger, conduit racks, cable trays, pull boxes, transformers, raceway, busway, lighting, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
  - c. Technology trades shall include, but are not limited to, technology equipment, racks, conduit 1.5” and larger, conduit racks, cable trays, ladder rack, pull boxes, raceway, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
  - d. Maintenance clearances and code-required dedicated space shall be included.
  - e. The coordination drawings shall include all underground, underfloor, infloor, in chase, and vertical trade items.
2. The contractors shall use the coordination process to identify the proper sequence of installation of all utilities above ceilings and in other congested areas, to ensure an orderly and coordinated end result, and to provide adequate access for service and maintenance.

### B. Participation:

1. The contractors and subcontractors responsible for work defined above shall participate in the coordination drawing process.
2. One contractor shall be designated as the Coordinating Contractor for purposes of preparing a complete set of composite electronic CAD coordination drawings that include all applicable trades, and for coordinating the activities related to this process. The Coordinating Contractor for this project shall be the Mechanical Contractor.
  - a. The Coordinating Contractor shall utilize personnel familiar with requirements of this project and skilled as draftspersons/CAD operators, competent to prepare the required coordination drawings.
3. Electronic CAD drawings shall be submitted to the Coordinating Contractor for addition of work by other trades. TRC will provide electronic file copies of drawings for contractor’s use if the contractor signs and returns an “Electronic File Transfer” waiver provided by TRC. TRC will not consider blatant reproductions of original file copies an acceptable alternative for coordination drawings.

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C. Drawing Requirements:

1. The file format and file naming convention shall be coordinated with and agreed to by all contractors participating in the coordination process and the Owner.
  - a. Scale of drawings:
    - 1) General plans: 1/4 Inch = 1'-0" (minimum).
    - 2) Mechanical, electrical, communication rooms, and including the surrounding areas within 10 feet: 1/2 Inch = 1'-0" (minimum).
    - 3) Shafts and risers: 1/2 Inch = 1'-0" (minimum).
    - 4) Sections of shafts and mechanical and electrical equipment rooms: 1/4 Inch = 1'-0" (minimum).
    - 5) Sections of congested areas: 1/2 Inch = 1'-0" (minimum).
  - b. Ductwork layout drawings shall be the baseline system for other components. Ductwork layout drawings shall be modified to accommodate other components as the coordination process progresses.
  - c. There may be more drawings required for risers, top and bottom levels of mechanical rooms, and shafts.
  - d. The minimum quantity of drawings will be established at the first coordination meeting and sent to the Architect and Engineer for review. Additional drawings may be required if other areas of congestion are discovered during the coordination process.

D. General:

1. Coordination drawing files shall be made available to the Architect, Engineer, and Owner's Representative. The Architect and Engineer will only review identified conflicts and give an opinion, but will not perform as a coordinator.
2. A plotted set of coordination drawings shall be available at the project site.
3. Coordination drawings are not shop drawings and shall not be submitted as such.
4. The contract drawings are schematic in nature and do not show every fitting and appurtenance for each utility. Each contractor is expected to have included in his bid sufficient fittings, material, and labor to allow for adjustments in routing of utilities made necessary by the coordination process and to provide a complete and functional system.
5. The contractors will not be allowed additional costs or time extensions due to participation in the coordination process.
6. The contractors will not be allowed additional costs or time extensions for additional fittings, reroutings or changes of duct size, that are essentially equivalent sizes to those shown on the drawings and determined necessary through the coordination process.
7. The Architect and Engineer reserves the right to determine space priority of equipment in the event of spatial conflicts or interference between equipment, piping, conduit, ducts, and equipment provided by the trades.
8. Changes to the contract documents that are necessary for systems installation and coordination shall be brought to the attention of the Architect and Engineer.

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9. Access panels shall preferably occur only in gypsum board walls or plaster ceilings where indicated on the drawings.
    - a. Access to mechanical, electrical, technology, and other items located above the ceiling shall be through accessible lay-in ceiling tile areas.
    - b. Potential layout changes shall be made to avoid additional access panels.
    - c. Additional access panels shall not be allowed without written approval from the Architect and Engineer at the coordination drawing stage.
    - d. Providing additional access panels shall be considered after other alternatives are reviewed and discarded by the Architect, Engineer, and the Owner's Representative.
    - e. When additional access panels are required, they shall be provided without additional cost to the Owner.
  10. Complete the coordination drawing process and obtain sign off of the drawings by all contractors prior to installing any of the components.
  11. Conflicts that result after the coordination drawings are signed off shall be the responsibility of the contractor or subcontractor who did not properly identify their work requirements, or installed their work without proper coordination.
  12. Updated coordination drawings that reflect as-built conditions may be used as record documents.

## 1.5 QUALITY ASSURANCE

### A. Contractor's Responsibility Prior to Submitting Pricing Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the drawings are of a representative nature only and may include imperfect data, interpreted codes, utility guidelines, three-dimensional conflicts, and required field coordination items. Such details can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Design Team any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Design Team will be done at the Contractor's risk.

### B. Qualifications:

1. Only products of reputable manufacturers are acceptable.
2. All Contractors and subcontractors shall employ only workers skilled in their trades.

### C. Compliance with Codes, Laws, Ordinances:

1. Conform to all State Codes.

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2. Conform to all requirements of the City of Chicago, Laws, Ordinances, and other regulations having jurisdiction.
  3. Conform to all published standards of University of Chicago.
  4. Conform to Federal Act S.3874 requiring the reduction of lead in drinking water.
  5. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment to be used.
  6. If the Contractor notes, at the time of bidding, any parts of the drawings or specifications that do not comply with the codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, he shall submit with his proposal a separate price to make the system comply with the codes and regulations.
  7. All changes to the system made after letting of the contract in order to comply with codes or requirements of Inspectors shall be made by the Contractor without cost to the Owner, Architect, or Engineer.
  8. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
  9. All rotating shafts and/or equipment shall be completely guarded from all contact. Partial guards and/or guards that do not meet all applicable OSHA standards are not acceptable. Contractor is responsible for providing this guarding if it is not provided with the equipment supplied.

D. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
3. Pay all charges for permits or licenses.
4. Pay all fees and taxes imposed by the State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections by an authorized body.
6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
7. Where applicable, all fixtures, equipment and materials shall be listed by Underwriters' Laboratories, Inc. and approved by FM Global.

E. Utility Company Requirements:

1. Secure from the appropriate private or public utility company all applicable requirements.
2. Comply with all utility company requirements.
3. Make application for and pay for utility connections and metering systems.

F. Examination of Drawings:

1. The drawings are diagrammatic in nature, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of pipes and ducts to best fit the layout of the job.
3. Scaling of the drawings is not sufficient or accurate for determining these locations.

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4. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner, Architect, or Engineer.
  5. Because of the scale of the drawings, certain basic items, such as fittings, boxes, valves, unions, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
  6. If an item is either on the drawings, in the specifications, or in the code, it shall be included in this contract.
  7. Determination of quantities of material and equipment required shall be made by the Contractor from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater number shall govern.
  8. Where used in these documents, the word "furnish" shall mean supply for use, the word "install" shall mean connect complete and ready for operation, and the word "provide" shall mean to supply for use and connect complete and ready for operation.
    - a. Any item listed as furnished shall also be installed, unless otherwise noted.
    - b. Any item listed as installed shall also be furnished, unless otherwise noted.

G. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any materials or fabricating any supports, pipes or ducts.

H. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing AutoCAD.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by TRC.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by TRC for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by TRC as to the accuracy or correctness of the information provided. TRC accepts no responsibility or liability for the Contractor's use of these documents.



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## 1.6 SUBMITTAL REQUIREMENTS

- A. General Submittal Requirements: In addition to the requirements of Division 1, the following are required:
1. Transmittal Sheet.
    - a. Date.
    - b. Project title and number.
    - c. Contractors' and subcontractors' name and address.
    - d. Division of work (e.g., fire protection, plumbing, heating, ventilating, etc.).
    - e. Description of items submitted and relevant specification number (only one specification number per submittal).
    - f. Notations of deviations from the contract documents.
    - g. Other pertinent data.
  2. Submittal Cover Sheet: All of the information provided on the Transmittal Sheet, plus:
    - a. Supplier and manufacturer's names and addresses.
    - b. Contractor's review stamp indicating he has thoroughly reviewed and approved all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed. Unstamped submittals will be rejected.
    - c. Space for Architect/Engineer's review stamp
  3. Submittal content shall include the following:
    - a. Fabrication/layout drawings.
    - b. Manufacturer's specification cut sheets with features, options and dimensions.
    - c. Listed codes and standards.
    - d. Wiring and control diagrams.
    - e. Physical characteristics (size, weight, shipping notes, service requirements).
    - f. Every page shall be marked up with project specific annotations and strikeouts to clearly identifying models, options, capacities, etc. being provided in compliance with the contract documents.
    - g. Contractor shall use the same nomenclature as the contract documents.
    - h. Reproduction of the contract documents alone is not acceptable for submittals.
    - i. Incomplete or improperly prepared submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
- B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.
1. Initial review: Allow 10 business days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal must be delayed for coordination.

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2. Concurrent review: Where concurrent review of submittals by Architect/Engineer's Consultants, Owner or other parties is required, allow 15 business days for initial review of each submittal.

C. Submittal Schedule:

1. Contractor shall submit all submittals to the Engineer for initial review within 30 days of award of contract, or within the first 10% of the duration of the project, whichever is less. Submittals which require processing completion prior to 40 business days after award of contract shall be scheduled with the Engineer at least 15 business days in advance of their requested due date.
2. Submittals shall be reviewed by the Architect/Engineer before releasing any equipment for manufacture or shipment.
3. Contractor's responsibility for errors, omissions, code compliance, or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's review.
4. Submittals shall be submitted electronically as PDF files in compliance with the naming, formatting, and organization requirements in Division 1.

D. Operations Manual: Include the following:

1. Final processed submittals of all Division 22 specification sections.
2. Subcontractor contact list including name, phone number and e-mail contact information.
3. Valve tag charts.
4. Field reports, including piping pressure testing.
5. Startup reports for all plumbing systems.
6. Certifications of piping systems, equipment or systems if specified in the individual specification section.
7. Operations and maintenance information for all plumbing equipment.
8. Final, coordinated record drawings.
  - a. Submit one set of Record Drawings for review by Architect/Engineer prior to submission of closeout documents. Record Drawings shall be submitted using the established submittal process.
  - b. Upon satisfactory review of the Record Drawing submittals by Engineer, provide three (3) printed sets of the Record Drawings and three (3) copies in electronic format with closeout documents
  - c. Paper Record Drawings shall be printed full size using the same sheet size as the construction documents issued to the contractor with the contractor's title block.
    - 1) Electronic Record Drawings shall include AutoCAD compatible files and individual PDF files named by sheet and organized in folders by disciplines.

## 1.7 CHANGE ORDERS

- A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders with inadequate breakdown will be rejected.

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- B. Change order work shall not proceed until authorized.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- C. Deliver, store and install materials and equipment (including supports and hangers) such that they are maintaining "as-new" condition (e.g. no rust) upon installation and up through the date of Substantial Completion. Account for environmental conditions of the construction site and schedule work accordingly.
- D. Do not allow any materials nor equipment to be stored in standing water.
- E. Keep all bearings properly lubricated and all belts properly tensioned and aligned.
- F. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Mechanical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.
- G. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate his/her work with other trades.

#### 1.9 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

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- D. Existing Utilities: Do not interrupt utilities serving facilities occupied or partially occupied by the Owner or others unless specifically allowed under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify Owner at least seven days in advance of proposed utility interruptions. Identify extent and duration of utility interruptions.
  2. Indicate method of proposed utility interruptions in detail.
  3. Do not proceed with proposed utility interruptions without Owner's permission.
- E. Coordinate new installations with the existing installations which will remain in place and be reutilized or those that are abandoned in place. Provide transitions and fittings in piping as well as extra lengths of ductwork and piping as required to route around these existing installations. Illustrate all such pipe fittings on the as-built drawings submittal. Existing installations include plumbing, piping, electrical and other building systems components including, but not limited to, roof drain piping, sanitary piping, plumbing piping, fire protection piping and fire protection heads, etc. Coordinate installation of above ceiling components and devices such that maintenance access is achieved at the completion of the project when all ceiling mounted components are installed. Coordinate with all trades. Ultimate responsibility for any rework required to achieve maintenance access is the responsibility of the Contractor responsible for coordination as noted in Division 1 Sections. The required maintenance access is defined here for this contract:
1. A person with a 24" arm length can stand on a folding ladder which rests on the finished floor and which does not extend through the ceiling grid. All lights and diffusers remain in the grid when defining maintenance access. Ceiling tiles with sprinkler heads, smoke detectors, fire alarm devices and other system devices remain in the grid when defining maintenance access. Light fixtures and diffusers/grilles remain in the ceiling grid when defining maintenance access.
  2. While standing on a step of this ladder which is rated for standing upon and while not leaning against the ceiling grid, this person can touch and visually monitor the following items with both hands at the same time:
    - a. Sanitary piping cleanouts.
    - b. Shutoff valves, balance valves and flow control valves.
    - c. Pressure gauges and thermometers.
- F. Locate buried utility and distribution services within the project area.
- G. Provide temporary connections to maintain existing systems in service during the construction. This may include piping, power, controls and water, as well as other connections as required.
- H. Provide the Owner a schedule prior to the start of demolition with phased selected demolition identified by system and by floor. Identify required outages on the schedule and any temporary measures required to maintain existing systems in service.
- I. Coordinate the plumbing demolition with all aspects of demolition and temporary construction (including dust barriers) by other trades.

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## PART 2 - PRODUCTS (NOT APPLICABLE)

## PART 3 - EXECUTION

### 3.1 JOBSITE SAFETY

- A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer, his employees, or sub-consultants at a construction site, shall relieve the Contractor and other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and his or her personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

### 3.2 EXCAVATION, FILL, BACKFILL, COMPACTION

A. General:

1. Prior to the commencement of any excavation or digging, the Contractor shall verify all underground utilities with the regional utility locator. Provide prior notice to the locator before excavations. Contact information for most regional utility locaters can be found by calling 811.
2. The Contractor shall do all excavating, filling, backfilling and compacting associated with his work.

B. Excavation:

1. Make all excavations to accurate, solid, undisturbed earth, and to proper dimensions.
2. Where excavations are made in error below foundations, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer, shall be placed in such excess excavations. Place thoroughly compacted, clean, stable fill in excess excavations under slabs on grade, at the Contractor's expense.
3. Trim bottom and sides of excavations to grades required for foundations.
4. Protect excavations against frost and freezing.
5. Take care in excavating not to damage surrounding structures, equipment or buried pipe. Do not undermine footing or foundation.
6. Perform all trenching in a manner to prevent cave-ins and risk to workmen.
7. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.
8. Where satisfactory bearing soil for foundations is not found at the indicated levels, the Architect/Engineer or their representative shall be notified immediately, and no further

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work shall be done until further instructions are given by the Architect/Engineer or their representative.

C. Dewatering:

1. Contractor shall furnish, install, operate and remove all dewatering pumps and pipes needed to keep trenches and pits free of water.

D. Underground Obstructions:

1. Known underground piping, foundations, and other obstructions in the vicinity of construction are shown on the drawings. Use great care in making installations near underground obstruction.
2. If objects not shown on the drawings are encountered, remove, relocate, or perform extra work as directed by the Architect/Engineer.

E. Fill and Backfilling:

1. No rubbish or waste material is permitted for fill or backfill.
2. Provide all necessary sand for backfilling.
3. Dispose of the excess excavated earth as directed.
4. Backfill materials shall be suitable for required compaction, clean and free of perishable materials and stones greater than 4 inches in diameter. Water shall not be permitted to rise in unbackfilled trenches. No material shall be used for backfilling that contains frozen earth, debris or earth with a high void content.
5. Backfill all trenches and excavations immediately after installing pipes, or removal of forms, unless other protection is provided.
6. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Fill and backfill materials shall be spread in 6 inch uniform horizontal layers with each layer compacted separately to required density.
7. Lay all piping on a compacted bed of sand at least 3 inches deep. Backfill around pipes with sand, 6 inch layers, and compact each layer.
8. Use sand for backfill up to grade for all piping under slabs or paved areas. All other piping shall have sand backfill to 6 inches above the top of the pipe.
9. Place all backfill above the sand in uniform layers not exceeding 6 inches deep. Each layer shall be placed, then carefully and uniformly tamped, to eliminate lateral or vertical displacement.
10. Where the fill and backfill will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content determined by AASHTO T-99 or ASTM D-698 test.

F. Surface Restoration:

1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition. Replace all planting removed or damaged to its original

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condition. A minimum of 6 inches of topsoil shall be applied where disturbed areas are to be seeded or sodded.

2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged shall be replaced with comparable materials and restored to original condition.

### 3.3 ARCHITECT/ENGINEER OBSERVATION OF WORK

- A. The Contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:
  1. Placing fill over underground and underslab utilities.
  2. Covering exterior walls, interior partitions and chases.
  3. Installing hard or suspended ceilings and soffits.
- B. The Architect/Engineer will have the opportunity to review the installation and provide a written report noting deficiencies requiring correction. The Contractor's schedule shall account for these reviews and show them as line items in the approved schedule.
- C. Above-Ceiling Final Observation
  1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:
    - a. Pipe insulation is installed and fully sealed.
    - b. Pipe wall penetrations are sealed.
    - c. Pipe identification and valve tags are installed.
  2. In order to prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.
  3. It is understood that if the Architect/Engineer finds the ceilings have been installed prior to this review and prior to 7 days elapsing, the Architect/Engineer may not recommend further payments to the contractor until such time as full access has been provided.

### 3.4 PROJECT CLOSEOUT

- A. The following paragraphs supplement the requirements of Division 1.
- B. Final Jobsite Observation:
  1. The Contractor is required to review the completion status of the project and certify that the job is ready for the final jobsite observation.
  2. The Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
  3. It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineer's additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

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- C. Before final payment is authorized, this Contractor must submit the following:
1. Operation and maintenance manuals with copies of reviewed shop drawings.
  2. Record documents including reproducible drawings and specifications.
  3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representatives.
  4. Start-up reports on all equipment requiring a factory installation inspection or start-up.
  5. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; receipt by Owner to Architect/Engineer required prior to final payment approval.

### 3.5 OPERATION AND MAINTENANCE MANUALS

A. General:

1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
2. Reviewed O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
  - a. O&M file name: O&M.div22.contractor.YYYYMMDD
  - b. Transmittal file name: O&Mtransmittal.div22.contractor.YYYYMMDD
5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2", etc.
6. Provide the Owner with a reviewed copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.



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8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Paper Copy Submittal Procedures:

1. Once the electronic version of the manuals has been reviewed by the Architect/Engineer, three (3) paper copies of the O&M manual shall be provided to the Owner. The content of the paper copies shall be identical to the corrected electronic copy.
2. Binder Requirements: The Contractor shall submit three sets of O&M manuals in heavy duty, locking three ring binders. Incorporate clear vinyl sheet sleeves on the front cover and spine for slip-in labeling. "Peel and stick" labels are not acceptable. Sheet lifters shall be supplied at the front of each notebook. The three-ring binders shall be 1/2" thicker than initial material to allow for future inserts. If more than one notebook is required, label in consecutive order. For example; 1 of 2, 2 of 2. No other form of binding is acceptable.
3. Binder Labels: Label the front and spine of each binder with "Operation and Maintenance Instructions", title of project, and subject matter.
4. Index Tabs: Divide information by specification section, major equipment, or systems using index tabs. All tab titling shall be clearly printed under reinforced plastic tabs. All equipment shall be labeled to match the identification in the construction documents.

D. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final reviewed shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments and change orders. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copy of final reviewed test and balance reports.
5. Copies of all factory inspections and/or equipment startup reports.
6. Copies of warranties.
7. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
8. Dimensional drawings of equipment.
9. Capacities and utility consumption of equipment.
10. Detailed parts lists with lists of suppliers.
11. Operating procedures for each system.
12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
13. Repair procedures for major components.
14. List of lubricants in all equipment and recommended frequency of lubrication.

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15. Instruction books, cards, and manuals furnished with the equipment.

### 3.6 INSTRUCTING THE OWNER'S REPRESENTATIVES

- A. Adequately instruct the Owner's designated representatives in the maintenance, care, and operation of all systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.
- C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.
- D. The instructions shall include:
  - 1. Explanation of all system flow diagrams.
  - 2. Maintenance of equipment.
  - 3. Start-up procedures for all major equipment.
  - 4. Explanation of seasonal system changes.
- E. The Architect/Engineer shall be notified of the time and place instructions will be given to the Owner's representatives so he or his representative can attend if desired.
- F. Refer to the respective specification sections for minimum hours of instruction for each system.
- G. The Contractor shall prepare a detailed, written training agenda and submit it to the Architect/Engineer a minimum of two weeks prior to the formal training for approval. The written agenda shall include specific training points within the items described above. For example: how to adjust setpoints, troubleshooting, proper start-up, proper shut-down, seasonal changes, draining, venting, changing filters, changing belts, etc. Failure to provide and follow an approved training agenda may result in additional training required at the expense of the Contractor.
- H. Operating Instructions:
  - 1. Contractor is responsible for all instructions to the Owner's representatives for the mechanical and control systems.
  - 2. If the Contractor does not have staff that can adequately provide the required instructions he shall include in his bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

### 3.7 SYSTEM COMMISSIONING

- A. The plumbing systems shall be complete and operating. System start-up, testing, balancing, and satisfactory system performance is the responsibility of the Contractor. This includes calibration and adjustments of all controls, noise level adjustments and final adjustments as required.

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- B. Contractor shall adjust the plumbing systems and controls at season changes during the one year warranty period, as required, to provide satisfactory operation and to prove performance of all systems in all seasons.
  - C. All operating conditions and control sequences shall be tested during the start-up period. Test all interlocks, safety shutdowns, controls, and alarms.
  - D. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

### 3.8 RECORD DOCUMENTS

- A. The following paragraph supplements Division 1 requirements:
  - 1. Contractor shall maintain at the job site a separate and complete set of plumbing coordination drawings and specifications on which he shall clearly and permanently mark in complete detail all changes made to the plumbing systems.
  - 2. Mark drawings to:
    - a. Indicate revisions to piping size and location, both exterior and interior. Note changes specifically due to Change Orders or RFI's by name and number
    - b. Identify devices, requiring periodic maintenance or repair.
    - c. Identify and dimension from column lines actual locations of all equipment, underground piping (including inverts), mains and branches of piping systems, valves, and control system devices.
  - 3. Mark specifications to show formally documented substitutions; Change Orders, and actual equipment and materials used.
  - 4. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.
  - 5. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

### 3.9 PAINTING

- A. This Contractor shall paint the following items:
  - 1. All equipment that is marred or damaged prior to the Owner's acceptance. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier if available.

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2. Equipment in finished areas that will be painted to match the room decor will be painted by others. Should this Contractor install equipment in a finished area after the area has been painted, he shall have the equipment and all its supports, hangers, etc., painted to match the room decor.
  3. Equipment cabinets, casings, covers, metal jackets, etc., in equipment rooms or concealed spaces, shall be furnished in standard or prime finish, free from scratches, abrasions, chips, etc.
  4. Equipment in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chips, etc. If color option is specified or is standard to the unit, this Contractor shall, before ordering, verify with the Architect/Engineer his color preference and furnish this color.
  5. All equipment in unfinished areas such as boiler room, mechanical spaces, storage room, etc., furnished by this Contractor. Equipment furnished with a factory coat of paint and enamel need not be painted, provided the factory applied finish is not marred or spattered. If so, equipment shall be refinished with the same paint as was factory applied.
  6. All outdoor uninsulated steel piping the color selected by Owner or Architect/Engineer.
- B. After surfaces have been thoroughly cleaned and are free of oil, dirt, and other foreign matter; paint all pipes and equipment with the following:
1. Bare metal surfaces: Apply one coat of primer suitable for the metal being painted. Finish with two coats of Alkyd base enamel paint.
  2. Insulated surfaces: Paint insulation jackets with two coats of semi-gloss acrylic latex paint.
  3. Color of paint shall be as selected by the Architect.

### 3.10 ADJUST AND CLEAN

- A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project. Clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from all equipment.
- B. Clean all areas where moisture is present. Immediately report any mold, biological growth, or water damage.
- C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

### 3.11 SPECIAL REQUIREMENTS

- A. Contractor shall coordinate the installation of all equipment, valves, dampers, operators, etc., with other trades to maintain clear access area for servicing.
- B. All equipment shall be installed in such a way to maximize access to parts needing service or maintenance. Review the final field location, placement, and orientation of equipment with the Owner's designated representative prior to setting equipment.
- C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's designated representative will result in removal and reinstallation of the equipment at the Contractor's expense.

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### 3.12 IAQ MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

- A. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building. These measures shall include, but not be limited to:
1. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:
    - a. Minimizing the amount of dust generated.
    - b. Reducing solvent fumes and VOC emissions.
    - c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.
    - d. Protect stored on-site and installed absorptive materials from moisture damage.
  2. Request that the Owner designate an IAQ representative.
  3. Review and receive approval from the Owner's IAQ representative for all IAQ related construction activities and negative pressure containment plans.
  4. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.
  5. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.
  6. Request copies of and follow all of the Owner's IAQ and infection control policies.
  7. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.
  8. To minimize growth of infectious organisms, do not permit damp areas in or near the construction area to remain for over 24 hours.
  9. In addition to the criteria above, provide measures as recommended in the SMACNA "IAQ Guidelines for Occupied Buildings Under Construction".

END OF SECTION 22 05 00

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## SECTION 22 05 17 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

### 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. Sleeves.
  - 2. Stack-sleeve fittings.
  - 3. Sleeve-seal systems.
  - 4. Grout.

#### 1.3 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

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- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
  - F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
  - G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

## 2.2 STACK-SLEEVE FITTINGS

- 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. J. R. Smith.
  - 2. Zurn.
- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
  - 1. Underdeck Clamp: Clamping ring with setscrews.

## 2.3 SLEEVE-SEAL SYSTEMS

- 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. Advance Products & Systems, Inc.
  - 2. CALPICO, Inc.
  - 3. Metraflex Company (The).
  - 4. Pipeline Seal and Insulator, Inc.
  - 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
  - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 2. Pressure Plates: Stainless steel.
  - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

## 2.4 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

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- B. Characteristics: Non-shrink; recommended for interior and exterior applications.
  - C. Design Mix: 5000-psi, 28-day compressive strength.
  - D. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
  - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
  - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
  - 2. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
  - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
  - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
  - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."



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### 3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
  - 1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
  - 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
  - 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
  - 4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 5. Using grout, seal the space around outside of stack-sleeve fittings.
- B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

### 3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

### 3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
  - 1. Exterior Concrete Walls above Grade:
    - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves.
    - b. Piping NPS 6 and Larger: Cast-iron wall sleeves.
  - 2. Exterior Concrete Walls below Grade:
    - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system sleeve-seal fittings.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

- 
- b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.
    - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
  - 3. Concrete Slabs-on-Grade:
    - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
    - b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.
      - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
  - 4. Concrete Slabs above Grade:
    - a. Piping Smaller Than NPS 6: Stack-sleeve fittings.
    - b. Piping NPS 6 and Larger: Stack-sleeve fittings.
  - 5. Interior Partitions:
    - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
    - b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 22 05 17

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## SECTION 22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING

### 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. Escutcheons.
  - 2. Floor plates.

#### 1.3 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

### PART 2 - PRODUCTS

#### 2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

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## 2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
  - 1. Escutcheons for New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
    - c. Insulated Piping: One-piece, stamped-steel type.
    - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
    - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
    - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
    - g. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.
  - 2. Escutcheons for Existing Piping:
    - a. Chrome-Plated Piping: Split-casting brass type with polished, chrome-plated finish.
    - b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge.
    - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
    - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
    - e. Bare Piping in Unfinished Service Spaces: Split-casting brass type with polished, chrome-plated finish.
    - f. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with concealed hinge.
- C. Install floor plates for piping penetrations of equipment-room floors.

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- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
1. New Piping: One-piece, floor-plate type.
  2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

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## SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

### 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. Bronze angle valves.
2. Bronze ball valves.
3. Iron, single-flange butterfly valves.
4. Iron, grooved-end butterfly valves.
5. Bronze swing check valves.
6. Iron swing check valves.
7. Iron swing check valves with closure control.
8. Bronze gate valves.
9. Iron gate valves.
10. Bronze globe valves.
11. Iron globe valves.
12. Chainwheels.

- B. Related Sections:

1. Section 22 05 53 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
2. Section 22 11 13 "Facility Water Distribution Piping" for valves applicable only to this piping.
3. Section 22 11 16 "Domestic Water Piping" for valves applicable only to this piping.
4. Section 22 13 19 "Sanitary Waste Piping Specialties" for valves applicable only to this piping.
5. Section 22 14 23 "Storm Drainage Piping Specialties" for valves applicable only to this piping.
6. Section 22 15 13 "General-Service Compressed-Air Piping" for valves applicable only to this piping.
7. Section 22 61 13 "Compressed-Air Piping for Laboratory and Healthcare Facilities" for valves applicable only to this piping.
8. Section 22 62 13 "Vacuum Piping for Laboratory and Healthcare Facilities" for valves applicable only to this piping.

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9. Section 22 63 13 "Gas Piping for Laboratory and Healthcare Facilities" for valves applicable only to this piping.
  10. Section 33 41 00 "Storm Utility Drainage Piping" for valves applicable only to this piping.
  11. Section 33 46 00 "Sub-drainage" for valves applicable only to this piping.

### 1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. FKM: Fluoroelastomer.
- D. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- E. NRS: Nonrising stem.
- F. OS&Y: Outside screw and yoke.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Polytetrafluoroethylene.

### 1.4 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

### 1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
  1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
  2. ASME B31.1 for power piping valves.
  3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

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## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads, flange faces, grooves, and weld ends.
  - 3. Set angle, gate, and globe valves closed to prevent rattling.
  - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
  - 5. Set butterfly valves closed or slightly open.
  - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection.
  - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
  - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
  - 2. Handwheel: For valves other than quarter-turn types.
  - 3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
  - 4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.
  - 5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
  - 1. Gate Valves: With rising stem.



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2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
  3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

## 2.2 ANGLE VALVES

A. Bronze Angle Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Hammond Valve.
  - b. Milwaukee Valve Company.
2. Description:
  - a. Standard: MSS SP-80, Type 1.
  - b. CWP Rating: 200 psig.
  - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
  - d. Ends: Threaded.
  - e. Stem and Disc: Bronze.
  - f. Packing: Asbestos free.
  - g. Handwheel: Malleable iron, bronze, or aluminum.

## 2.3 BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Valves.
  - b. Crane Valves.
  - c. Hammond Valve.
  - d. Lance Valves.
  - e. Milwaukee Valve Company.

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- f. NIBCO INC.
  - g. Watts.
2. Description:
- a. Standard: MSS SP-110.
  - b. SWP Rating: 150 psig.
  - c. CWP Rating: 600 psig.
  - d. Body Design: Two piece.
  - e. Body Material: Bronze.
  - f. Ends: Threaded.
  - g. Seats: TFE.
  - h. Stem: Stainless steel.
  - i. Ball: Stainless steel, vented.
  - j. Port: Full.

## 2.4 BUTTERFLY VALVES

### A. Single-Flange Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. ABZ Valve and Controls.
  - b. Apollo Valves.
  - c. Cooper Cameron Valves.
  - d. Crane Valve.
  - e. DeZurik Water Controls.
  - f. Flo Fab Inc.
  - g. Hammond Valve.
  - h. Jenkins Valves.
  - i. Kitz Corporation.
  - j. Legend Valve.
  - k. Milwaukee Valve.
  - l. NIBCO INC.
  - m. Norriseal.
  - n. Red-White Valve Corporation.
  - o. Stockham
  - p. Watts.
2. Description:
- a. Standard: MSS SP-67, Type I.
  - b. CWP Rating: 200 psig.
  - c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
  - d. Body Material: ASTM A 536, ductile iron.

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- e. Seat: FKM or TFE.
  - f. Stem: One- or two-piece stainless steel.
  - g. Disc: Stainless Steel.

B. Grooved-End Butterfly Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Grinnell Mechanical Products.
  - b. Kennedy Valve.
  - c. Shurjoint Piping Products.
  - d. Victaulic Company.
- 2. Description:
  - a. Standard: MSS SP-67, Type I.
  - b. CWP Rating: 175 psig.
  - c. Body Material: ASTM A 536, ductile iron.
  - d. Seat: FKM or TFE.
  - e. Stem: One- or two-piece stainless steel.
  - f. Disc: Stainless Steel.

## 2.5 CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Valves.
  - b. Hammond Valve.
  - c. Jenkins Valves.
  - d. Kitz Corporation.
  - e. Legend Valve.
  - f. Milwaukee Valve Company.
  - g. NIBCO INC.
  - h. Powell Valves.
  - i. Red-White Valve Corporation.
  - j. Stockham.
  - k. Sure Flow.
  - l. Watts.
  - m. Zy-Tech Global Industries, Inc.
- 2. Description:
  - a. Standard: MSS SP-139, Type 3.

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- b. CWP Rating: 200 psig.
  - c. Body Design: Horizontal flow.
  - d. Body Material: ASTM B 62, bronze.
  - e. Ends: Threaded.
  - f. Disc: Stainless steel.
  - g. Seat: Renewable

B. Class 125, Iron Swing Check Valves with Metal Seats:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crane Valves.
- b. Hammond Valve.
- c. Jenkins Valves.
- d. Kitz Corporation.
- e. Legend Valve.
- f. Milwaukee Valve Company.
- g. NIBCO INC.
- h. Powell Valves.
- i. Red-White Valve Corporation.
- j. Stockham.
- k. Sure Flow.
- l. Watts.
- m. Zy-Tech Global Industries, Inc.

- 2. Description:

- a. Standard: MSS SP-71, Type I.
- b. CWP Rating: 200 psig.
- c. Body Design: Clear or full waterway.
- d. Body Material: ASTM A 126, gray iron with bolted bonnet.
- e. Ends: Flanged.
- f. Disc: Stainless steel.
- g. Seat: Stainless steel, renewable.
- h. Gasket: Asbestos free.

C. Class 125, Iron Swing Check Valves with Lever- and Weight-Closure Control:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crane Valves.
- b. Hammond Valve.
- c. Jenkins Valves
- d. Milwaukee Valve Company.
- e. NIBCO INC.
- f. Stockham Division.

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- g. Watts.
2. Description:
- a. Standard: MSS SP-71, Type I.
  - b. CWP Rating: 200 psig.
  - c. Body Design: Clear or full waterway.
  - d. Body Material: ASTM A 536, ductile iron.
  - e. Ends: Flanged.
  - f. Disc: Stainless steel.
  - g. Seal: FKM or TFE.
  - h. Gasket: Asbestos free.
  - i. Closure Control: Factory-installed, exterior lever and weight.

## 2.6 GATE VALVES

### A. Class 125, RS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. American Valve, Inc.
  - b. Crane Valves.
  - c. Hammond Valve.
  - d. Jenkins Valves.
  - e. Kitz Corporation.
  - f. Milwaukee Valve Company.
  - g. NIBCO INC.
  - h. Powell Valves.
  - i. Red-White Valve Corporation.
  - j. Stockham Division.
  - k. Watts.
  - l. Zy-Tech Global Industries, Inc.
2. Description:
- a. Standard: MSS SP-80, Type 2.
  - b. CWP Rating: 200 psig.
  - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
  - d. Ends: Threaded.
  - e. Stem: Rising, stainless steel.
  - f. Disc: Solid wedge; bronze.
  - g. Packing: Asbestos free.
  - h. Handwheel: Malleable iron, bronze, or aluminum.

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B. Class 125, OS&Y, Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Valves.
  - b. Flo Fab Inc.
  - c. Hammond Valve.
  - d. Jenkins Valves.
  - e. Kitz Corporation.
  - f. Legend Valve.
  - g. Milwaukee Valve Company.
  - h. NIBCO INC.
  - i. Powell Valves.
  - j. Red-White Valve Corporation.
  - k. Stockham Division.
  - l. Watts.
  - m. Zy-Tech Global Industries, Inc.
2. Description:
  - a. Standard: MSS SP-128, Type I.
  - b. CWP Rating: 200 psig.
  - c. Body Material: ASTM A 536, ductile iron.
  - d. Ends: Flanged.
  - e. Trim: 316 Stainless steel.
  - f. Disc: Solid wedge.
  - g. Packing and Gasket: Asbestos free.

## 2.7 GLOBE VALVES

A. Class 125, Bronze Globe Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Crane Valves.
  - b. Hammond Valve.
  - c. Kitz Corporation.
  - d. Milwaukee Valve Company.
  - e. NIBCO INC.
  - f. Powell Valves.
  - g. Red-White Valve Corporation.
  - h. Stockham Division.
  - i. Watts.
  - j. Zy-Tech Global Industries, Inc.

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2. Description:

- a. Standard: MSS SP-80, Type 1.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded.
- e. Stem and Disc: Stainless steel.
- f. Seals: FKM or TFE
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron, bronze, or aluminum.

B. Class 125, Iron Globe Valves:

1. Manufacturers: Subject to compliance with requirements, Provide products by one of the following:

- a. Crane Valves.
- b. Hammond Valve.
- c. Kitz Corporation.
- d. Milwaukee Valve Company.
- e. NIBCO INC.
- f. Powell Valves.
- g. Red-White Valve Corporation.
- h. Stockham Division.
- i. Watts.
- j. Zy-Tech Global Industries, Inc.

2. Description:

- a. Standard: MSS SP-85, Type I.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM A 126, gray iron with bolted bonnet.
- d. Ends: Flanged.
- e. Trim: Stainless steel.
- f. Packing and Gasket: Asbestos free.

2.8 CHAINWHEELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Babbitt Steam Specialty Co.
- 2. Roto Hammer Industries.
- 3. Trumbull Industries.

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- B. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
  2. Attachment: For connection to ball, butterfly, and plug valve stems.
  3. Sprocket Rim with Chain Guides: Ductile iron, of type and size required for valve. Include zinc coating.
  4. Chain: Stainless steel, of size required to fit sprocket rim.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

### 3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install chainwheels on operators for ball, butterfly, gate, globe, and plug valves NPS 4 and larger and more than 96 inches above floor. Extend chains to 60 inches above finished floor.
- F. Install check valves for proper direction of flow and as follows:
1. Swing Check Valves: In horizontal position with hinge pin level.
  2. Center-Guided Check Valves: In horizontal or vertical position, between flanges.
  3. Lift Check Valves: With stem upright and plumb.



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### 3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

### 3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
  - 1. Shutoff Service:
    - a. NPS 3 and Smaller: Ball valve.
    - b. NPS 4 and Larger: Butterfly valve.
  - 2. Water Service Entrance: Configuration per Utility requirements, materials per this specification, whichever is more stringent. In the absence of specific Utility requirements, use shutoff service valves.
  - 3. Dead-End Service: Butterfly Valve, single-flange (lug) type.
  - 4. Throttling Service: Globe valve.
  - 5. Pump-Discharge Check Valves:
    - a. NPS 2 and Smaller: Bronze swing check valves with stainless steel disc and viton seat.
    - b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight, renewable stainless steel seat and disc.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
  - 1. NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
  - 2. NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
  - 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
  - 4. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved when permitted per the system's pipe fitting specification.

### 3.5 COMPRESSED-AIR VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Ball Valves.
  - 2. Bronze Swing Check Valves.

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- B. Pipe NPS 2-1/2 and Larger:
    - 1. Ductile Iron, Butterfly Valves.
    - 2. Ductile Iron Swing Check Valves.

### 3.6 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Ball Valves.
  - 2. Bronze Globe Valves.
  - 3. Bronze Swing Check Valves.
- B. Pipe NPS 2-1/2 (DN 65) and Larger:
  - 1. Ductile Iron, Butterfly Valves.
  - 2. Ductile Iron Globe Valves.
  - 3. Ductile Iron Swing Check Valves.

### 3.7 SANITARY-WASTE AND STORM-DRAINAGE VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Swing Check Valves.
  - 2. Bronze Gate Valves.
- B. Pipe NPS 2-1/2 and Larger:
  - 1. Ductile Iron Swing Check Valves.
  - 2. Ductile Iron Gate Valves.

END OF SECTION 22 05 23

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## SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.
10. Equipment supports.

- B. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 22 05 16 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
3. Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

#### 1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

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- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
  2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
  3. For components requiring seismic bracing, design seismic-restraint hangers and supports for piping and equipment.

#### 1.5 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

#### 1.6 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

### PART 2 - PRODUCTS

#### 2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Stainless-Steel Pipe Hangers and Supports:
1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.

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2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

## 2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

## 2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Allied Tube & Conduit.
  - b. Cooper B-Line, Inc.
  - c. Flex-Strut Inc.
  - d. GS Metals Corp.
  - e. Thomas & Betts Corporation.
  - f. Unistrut Corporation; Tyco International, Ltd.
  - g. Wesanco, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: None.
9. Plastic Coating: None.
10. Combination Coating: None.

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## 2.4 THERMAL-HANGER SHIELD INSERTS

- 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. Carpenter & Paterson, Inc.
  - 2. Clement Support Services.
  - 3. ERICO International Corporation.
  - 4. National Pipe Hanger Corporation.
  - 5. PHS Industries, Inc.
  - 6. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
  - 7. Piping Technology & Products, Inc.
  - 8. Rilco Manufacturing Co., Inc.
  - 9. Value Engineered Products, Inc.
- B. Insulation-Insert Material: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of insulated pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of insulated pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

## 2.5 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened Portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## 2.6 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

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D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: One or more; plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

## 2.7 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

## 2.8 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

## 2.9 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Non-staining, noncorrosive, and nongaseous.
  2. Design Mix: 5000-psi, 28-day compressive strength.

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## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.
- F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- G. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- H. Pipe Stand Installation:
  - 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
  - 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 07 72 00 "Roof Accessories" for curbs.



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- I. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
  - J. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
  - K. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
  - L. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
  - M. Install lateral bracing with pipe hangers and supports to prevent swaying.
  - N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
  - O. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
  - P. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
  - Q. Insulated Piping:
    - 1. Attach clamps and spacers to piping.
      - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
    - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
    - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
      - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

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4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    - b. NPS 4: 12 inches long and 0.06 inch thick.
    - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
  5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
  6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and 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. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

### 3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

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- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

### 3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings," respectively.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

### 3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers, and metal framing systems and attachments for general service applications.
- F. Use stainless-steel pipe hangers and attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.

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- J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
  2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050° F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
  3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
  4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
  5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
  6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated, stationary pipes NPS 3/4 to NPS 8.
  7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
  8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
  9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
  10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 8.
  11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 3.
  12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
  13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
  14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
  15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
  16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
  17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
  18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
  19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
  20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.

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21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
  2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg. F piping installations.
- M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
  8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
  11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
  12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.

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- b. Medium (MSS Type 32): 1500 lb.
  - c. Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
  2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
  3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
  4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
  5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
  6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
  7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
  8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    - a. Horizontal (MSS Type 54): Mounted horizontally.
    - b. Vertical (MSS Type 55): Mounted vertically.
    - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

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- Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
  - R. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction. Coordinate load bearing capacity of each area of structure with dead weight requirements of full piping in service.
  - S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 22 05 29

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## SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Equipment labels.
  - 2. Warning signs and labels.
  - 3. Pipe labels.
  - 4. Stencils.
  - 5. Valve tags.
  - 6. Warning tags.

#### 1.3 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data shall be included with the O&M Manuals along with the following:
  - 1. Equipment-Label Schedule including equipment name, system, description and location.
  - 2. Valve Schedules including valve number, system, description and location.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

#### 1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.



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## PART 2 - PRODUCTS

### 2.1 EQUIPMENT LABELS

#### A. Metal Labels for Equipment:

1. Material and thickness: Brass, 0.032-inch or Stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum label size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum letter size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

#### B. Plastic Labels for Equipment:

1. Material and thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter color: White.
3. Background color: Black.
4. Maximum temperature: Able to withstand temperatures up to 160° F.
5. Minimum label size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

#### C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

#### D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

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## 2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Black.
- D. Maximum Temperature: Able to withstand temperatures up to 160° F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

## 2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-direction arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering size: At least 1-1/2 inches high.

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## 2.4 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
  - 1. Stencil material: Fiberboard or metal.
  - 2. Stencil paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
  - 3. Identification paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

## 2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
  - 1. Tag material: Brass, 0.032-inch or Stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  - 2. Fasteners: Brass beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
  - 1. Valve-tag schedule shall be included in operation and maintenance data.

## 2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
  - 1. Size: 3 by 5-1/4 inches.
  - 2. Fasteners: Brass grommet and wire.
  - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
  - 4. Color: Yellow background with black lettering.

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## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

### 3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

### 3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09.
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.
  - 1. Identification paint: Use for contrasting background.
  - 2. Stencil paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 12.5 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Pipe Label Color Schedule:
  - 1. Low-pressure, compressed air piping:
    - a. Background color: Green.
    - b. Letter color: White.

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2. Medium-pressure, compressed air piping:
    - a. Background color: White.
    - b. Letter color: Green.
  3. Domestic cold water piping:
    - a. Background color: Green.
    - b. Letter color: White.
  4. Domestic hot water and hot water return piping:
    - a. Background color: Yellow.
    - b. Letter color: Black.
  5. Non-potable water piping:
    - a. Background color: Purple.
    - b. Letter color: White.
  6. Sanitary waste, vent and storm drainage piping:
    - a. Background color: Green.
    - b. Letter color: White.
  7. Natural gas, propane gas and fuel oil piping:
    - a. Background color: Yellow.
    - b. Letter color: Black.
  8. Pure water piping:
    - a. Background color: Blue.
    - b. Letter color: White.
  9. Vacuum piping:
    - a. Background color: Yellow.
    - b. Letter color: Black.

### 3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

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B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-tag size and shape: 1-1/2 inches, round.
2. Valve-Tag color: Natural.
3. Letter color: Black

### 3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

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## SECTION 22 07 19 - PLUMBING PIPING INSULATION

### 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 insulating the following plumbing piping services:

1. Domestic cold water piping.
2. Domestic hot water piping.
3. Domestic recirculating hot water piping.
4. Domestic chilled water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.

- B. Related Sections:

1. Section 22 71 6 "Plumbing Equipment Insulation."

#### 1.3 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data, sealed design documentation, and maintenance requirements shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having

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jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation installed indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation installed outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping mockups:
  - a. One 10 foot section of NPS 2 straight pipe.
  - b. One each of a 90-degree threaded, welded, and flanged elbow.
  - c. One each of a threaded, welded, and flanged tee fitting.
  - d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
  - e. Four support hangers including hanger shield and insert.
  - f. One threaded strainer and one flanged strainer with removable portion of insulation.
  - g. One threaded reducer and one welded reducer.
  - h. One pressure temperature tap.
  - i. One mechanical coupling.
2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and drain protective shielding guards: A117.1.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.



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## 1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

## 1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Aeroflex USA, Inc.; Aerocel.

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- b. Armacell LLC; AP Armaflex.
  - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

G. Mineral-Fiber, Preformed Pipe Insulation:

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Fibrex Insulations Inc.; Coreplus 1200.
  - b. Johns Manville; Micro-Lok.
  - c. Knauf Insulation; 1000-Degree Pipe Insulation.
  - d. Manson Insulation Inc.; Alley-K.
  - e. Owens Corning; Fiberglas Pipe Insulation.
- 2. Type I, 850° F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or ASJ-SSL]. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

## 2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Ramco Insulation, Inc.; Super-Stik.

## 2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Aeroflex USA, Inc.; Aeroseal.
  - b. Armacell LLC; Armaflex 520 Adhesive.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
  - d. K-Flex USA; R-373 Contact Adhesive.
- 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
  - b. Eagle Bridges - Marathon Industries; 225.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
  - d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Dow Corning Corporation; 739, Dow Silicone.
  - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
  - c. P.I.C. Plastics, Inc.; Welding Adhesive.
  - d. Speedline Corporation; Polyco VP Adhesive.
2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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B. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
  - b. Eagle Bridges - Marathon Industries; 501.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
  - d. Mon-Eco Industries, Inc.; 55-10.
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180° F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
  - b. Eagle Bridges - Marathon Industries; 570.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220° F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
  - b. Eagle Bridges - Marathon Industries; 550.
  - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
  - d. Mon-Eco Industries, Inc.; 55-50.
  - e. Vimasco Corporation; WC-1/WC-5.
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180° F.

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4. Solids Content: 60 percent by volume and 66 percent by weight.
  5. Color: White.

## 2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
  1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
    - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
    - c. Vimasco Corporation; 713 and 714.
  3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
  4. Service Temperature Range: 0 to plus 180 deg. F (Minus 18 to plus 82 deg. C).
  5. Color: White.

## 2.6 SEALANTS

- A. Metal Jacket Flashing Sealants:
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    - b. Eagle Bridges - Marathon Industries; 405.
    - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    - d. Mon-Eco Industries, Inc.; 44-05.
  2. Materials shall be compatible with insulation materials, jackets, and substrates.
  3. Fire- and water-resistant, flexible, elastomeric sealant.
  4. Service Temperature Range: Minus 40 to plus 250° F.
  5. Color: Aluminum.
  6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250° F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Johns Manville; Zeston.
    - b. P.I.C. Plastics, Inc.; FG Series.
    - c. Proto Corporation; LoSmoke.
    - d. Speedline Corporation; SmokeSafe.
  2. Adhesive: As recommended by jacket material manufacturer.
  3. Color: White unless otherwise specified by Architect.
  4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

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C. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
  - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
  - c. RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
  - a. Factory cut and rolled to size.
  - b. Finish and thickness are indicated in field-applied jacket schedules.
  - c. Moisture Barrier for Outdoor Applications: 3-mil thick, heat-bonded polyethylene and kraft paper.
  - d. Factory-Fabricated Fitting Covers:
    - 1) Same material, finish, and thickness as jacket.
    - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
    - 3) Tee covers.
    - 4) Flange and union covers.
    - 5) End caps.
    - 6) Beveled collars.
    - 7) Valve covers.
    - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.8 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ABI, Ideal Tape Division; 370 White PVC tape.
  - b. Compac Corporation; 130.
  - c. Venture Tape; 1506 CW NS.
2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

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B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ABI, Ideal Tape Division; 488 AWF.
  - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
  - c. Compac Corporation; 120.
  - d. Venture Tape; 3520 CW.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

## 2.9 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ITW Insulation Systems; Gerrard Strapping and Seals.
  - b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
  2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



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### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
  - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300° F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
  - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300° F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.

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- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
  2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
  2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
  2. Testing agency labels and stamps.
  3. Nameplates and data plates.

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- 4. Cleanouts.

### 3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
  - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
  - 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
  - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
  - 1. Pipe: Install insulation continuously through floor penetrations.
  - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

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### 3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
  3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
  6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
  7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
  8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
  9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

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- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
  2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
  3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
  4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
  5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

### 3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturers' recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
  2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
  3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
  4. Secure insulation to flanges and seal seams with manufacturers' recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
  2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.

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2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  3. Install insulation to flanges as specified for flange insulation application.
  4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

### 3.7 INSTALLATION OF MINERAL-FIBER INSULATION

#### A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

#### B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

#### C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

#### D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.

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3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
  4. Install insulation to flanges as specified for flange insulation application.

### 3.8 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturers' recommended adhesive.
  1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- B. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

### 3.9 FINISHES

- A. Insulation with Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
  1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum jackets.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded

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fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.11 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
  - 1. Drainage piping located in crawl spaces.
  - 2. Underground piping.
  - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

### 3.12 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold, Hot, and Hot Recirculation Water:
  - 1. NPS 1 and Smaller: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1/2 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
  - 2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Domestic Chilled Water (Potable):
  - 1. All Pipe Sizes: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- C. Stormwater and Overflow:
  - 1. All Pipe Sizes (non-acoustically sensitive): Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1/2 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.



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2. All Pipe Sizes (acoustically sensitive areas as noted on the Drawings): Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be one of the following:
  - a. Flexible Elastomeric: 1 inch thick.
  - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

E. Sanitary Waste Piping Where Heat Tracing Is Installed:

1. All Pipe Sizes: Insulation shall be one of the following:
  - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

F. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60° F:

1. All Pipe Sizes: Insulation shall be one of the following:
  - a. Flexible Elastomeric: 1/2 inch thick.
  - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

### 3.13 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Cold, Hot, and Hot Recirculation Water:

1. All Pipe Sizes: Insulation shall be one of the following:
  - a. Flexible Elastomeric: 2 inches thick.
  - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

B. Sanitary Waste Piping Where Heat Tracing Is Installed:

1. All Pipe Sizes: Insulation shall be one of the following:
  - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.

### 3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

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B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.

D. Piping, Exposed:

1. PVC: 30 mils thick.

### 3.15 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. Aluminum, Smooth 0.024 inch thick.

D. Piping, Exposed:

1. Painted Aluminum, Smooth 0.024 inch thick.

END OF SECTION 22 07 19

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## SECTION 22 11 16 - DOMESTIC WATER PIPING

### 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. Under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.
- 2. Encasement for piping.

- B. Related Requirements:

- 1. Section 22 11 13 "Facility Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

#### 1.3 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data, sealed design documentation, and maintenance requirements shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.

#### 1.4 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Architect/Engineer, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of water service.
  - 2. Do not interrupt water service without Construction Manager's and Owner's written permission.

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## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

### 2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
  - 1. MSS SP-123.
  - 2. Cast-copper-alloy, hexagonal-stock body.
  - 3. Ball-and-socket, metal-to-metal seating surfaces.
  - 4. Solder-joint or threaded ends.
- G. Copper Pressure-Seal-Joint Fittings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Elkhart Products Corporation.
    - b. NIBCO Inc.
    - c. Viega.
  - 2. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
  - 3. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

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H. Copper-Tube, Extruded-Tee Connections:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. T-Drill Industries Inc.
2. Description: Tee formed in copper tube according to ASTM F 2014.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.4 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

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. Cascade Waterworks Manufacturing.

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- b. Dresser, Inc.; Piping Specialties Products.
  - c. Ford Meter Box Company, Inc. (The).
  - d. JCM Industries.
  - e. Romac Industries, Inc.
  - f. Smith-Blair, Inc.; a Sensus company.
  - g. Viking Johnson.

## 2.5 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
  - 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. Capitol Manufacturing Company; member of the Phoenix Forge Group.
    - b. Central Plastics Company.
    - c. Hart Industries International, Inc.
    - d. Jomar International.
    - e. Matco-Norca.
    - f. McDonald, A. Y. Mfg. Co.
    - g. Watts; a division of Watts Water Technologies, Inc.
    - h. Wilkins; a Zurn company.
  - 2. Standard: ASSE 1079.
  - 3. Pressure Rating: 125 psig minimum at 180° F.
  - 4. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
  - 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. Capitol Manufacturing Company; member of the Phoenix Forge Group.
    - b. Central Plastics Company.
    - c. Matco-Norca.
    - d. Watts; a division of Watts Water Technologies, Inc.
    - e. Wilkins; a Zurn company.
  - 2. Standard: ASSE 1079.
  - 3. Factory-fabricated, bolted, companion-flange assembly.
  - 4. Pressure Rating: 125 psig minimum at 180° F.

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5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

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. Advance Products & Systems, Inc.
  - b. Calpico, Inc.
  - c. Central Plastics Company.
  - d. Pipeline Seal and Insulator, Inc.
2. Non-conducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

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. Elster Perfection Corporation.
  - b. Grinnell Mechanical Products; Tyco Fire Products LP.
  - c. Matco-Norca.
  - d. Precision Plumbing Products, Inc.
  - e. Victaulic Company.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig at 225° F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Comply with requirements in Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

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### 3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105/A21.5.
- E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 22 05 19 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 22 11 19 "Domestic Water Piping Specialties."
- F. Install shutoff valve immediately upstream of each dielectric fitting.
- G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 22 11 19 "Domestic Water Piping Specialties."
- H. Install domestic water piping level without pitch and plumb.
- I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- N. Install piping to permit valve servicing.
- O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.



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- P. Install piping free of sags and bends.
  - Q. Install fittings for changes in direction and branch connections.
  - R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
  - S. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 22 05 19 "Meters and Gages for Plumbing Piping."
  - T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 22 11 23 "Domestic Water Pumps."
  - U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 22 05 19 "Meters and Gages for Plumbing Piping."
  - V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
  - W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
  - X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

### 3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Braze Joints" chapter.
- E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

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- F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
  - G. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2104. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
  - H. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints according to AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.
  - I. Joint Construction for Grooved-End Steel Piping: Make joints according to AWWA C606. Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.
  - J. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
  - K. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

### 3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
  - 1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
  - 2. Fittings for NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition unions.

### 3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 and Larger: Use dielectric flange kits.

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### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger, support products, and installation in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  - 6. NPS 6: 10 feet with 5/8-inch rod.
  - 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

### 3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

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- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
  - D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
    - 1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
    - 2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
    - 3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
    - 4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

### 3.8 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 22 05 53 "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

### 3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Piping Inspections:
    - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
    - c. Re-inspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for re-inspection.
    - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

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2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
  - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
  - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

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### 3.11 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Fill and isolate system according to either of the following:
      - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    - d. Repeat procedures if biological examination shows contamination.
    - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Clean non-potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
  2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
    - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

### 3.12 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

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- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
  - D. Aboveground domestic water piping, NPS 3 and smaller, shall be one of the following:
    - 1. Hard copper tube, ASTM B 88, Type L; cast or wrought copper, solder-joint fittings; and soldered joints.

### 3.13 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
  - 1. Shutoff Duty: Use ball valves for piping NPS 3 and smaller. Use butterfly or gate valves with flanged ends for piping NPS 4 and larger.
  - 2. Throttling Duty: Use ball or globe valves for piping NPS 3 and smaller. Use butterfly or valves with flanged ends for piping NPS 4 and larger.
  - 3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
  - 4. Drain Duty: Hose-end drain valves.
- B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
- C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 22 11 16

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## SECTION 22 13 16 - SANITARY WASTE, STORM DRAINAGE, AND VENT PIPING

### 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. Pipe, tube, and fittings.
- 2. Specialty pipe fittings.
- 3. Encasement for underground metal piping.

- B. Related Sections:

- 1. Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for sanitary waste, storm drainage and vent piping seismic requirements.
- 2. Section 22 13 13 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.
- 3. Section 33 41 00 "Storm Utility Drainage Piping" for storm drainage piping outside the building.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
  - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

#### 1.4 SUBMITTALS

- A. Submittals shall not be prepared for the Architect/Engineer's review. Project specific product data, sealed design documentation, and maintenance requirements shall be included with the O&M Manuals.
- B. Products provided under this specification will be inspected during job site observations. Failure to comply with these specifications will require remedial action at the expense of the Contractor, and the construction schedule will not be delayed.



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- C. Shop Drawings: For siphonic roof drainage system. Include calculations, plans, and details.

#### 1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

#### 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect/Engineer, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of sanitary waste service.
  - 2. Do not proceed with interruption of sanitary waste service without Construction Manager's and Owner's written permission.

### PART 2 - PRODUCTS

#### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

#### 2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.

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## 2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ANACO-Husky.
    - b. Dallas Specialty & Mfg. Co.
    - c. Fernco Inc.
    - d. Matco-Norca, Inc.
    - e. MIFAB, Inc.
    - f. Mission Rubber Company; a division of MCP Industries, Inc.
    - g. Stant.
    - h. Tyler Pipe.
  - 2. Standards: ASTM C 1277 and CISPI 310.
  - 3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Heavy-Duty, Hubless-Piping Couplings:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ANACO-Husky.
    - b. Clamp-All Corp.
    - c. Dallas Specialty & Mfg. Co.
    - d. MIFAB, Inc.
    - e. Mission Rubber Company; a division of MCP Industries, Inc.
    - f. Stant.
    - g. Tyler Pipe.
  - 2. Standards: ASTM C 1277 and ASTM C 1540.
  - 3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

## 2.4 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
  - 1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.

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2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
  3. Unshielded, Nonpressure Transition Couplings:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Dallas Specialty & Mfg. Co.
      - 2) Fernco Inc.
      - 3) Mission Rubber Company; a division of MCP Industries, Inc.
      - 4) Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
    - b. Standard: ASTM C 1173.
    - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    - d. Sleeve Materials:
      - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
      - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
      - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
  4. Pressure Transition Couplings:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cascade Waterworks Mfg. Co.
      - 2) Dresser, Inc.
      - 3) EBAA Iron, Inc.
      - 4) JCM Industries, Inc.
      - 5) Romac Industries, Inc.
      - 6) Smith-Blair, Inc.; a Sensus company.
      - 7) The Ford Meter Box Company, Inc.
      - 8) Viking Johnson.
    - b. Standard: AWWA C219.
    - c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
    - d. Center-Sleeve Material: Stainless steel.
    - e. Gasket Material: Natural or synthetic rubber.
    - f. Metal Component Finish: Corrosion-resistant coating or material.

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B. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Capitol Manufacturing Company.
    - 2) Central Plastics Company.
    - 3) Hart Industries International, Inc.
    - 4) Jomar International Ltd.
    - 5) Matco-Norca, Inc.
    - 6) McDonald, A. Y. Mfg. Co.
    - 7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 8) Wilkins; a Zurn company.
  - b. Description:
    - 1) Standard: ASSE 1079.
    - 2) Pressure Rating: 125 psig minimum at 180° F.
    - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Capitol Manufacturing Company.
    - 2) Central Plastics Company.
    - 3) Matco-Norca, Inc.
    - 4) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 5) Wilkins; a Zurn company.
  - b. Description:
    - 1) Standard: ASSE 1079.
    - 2) Factory-fabricated, bolted, companion-flange assembly.
    - 3) Pressure Rating: 125 psig.
    - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

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4. Dielectric Nipples:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Elster Perfection.
- 2) Grinnell Mechanical Products.
- 3) Matco-Norca, Inc.
- 4) Precision Plumbing Products, Inc.
- 5) Victaulic Company.

b. Description:

- 1) Standard: IAPMO PS 66
- 2) Electroplated steel nipple.
- 3) Pressure Rating: 300 psig at 225° F.
- 4) End Connections: Male threaded or grooved.
- 5) Lining: Inert and noncorrosive, propylene.

### PART 3 - EXECUTION

#### 3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 31 20 00 "Earth Moving."

#### 3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

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- G. Install piping free of sags and bends.
  - H. Install fittings for changes in direction and branch connections.
  - I. Install piping to allow application of insulation.
  - J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
  - K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
  - L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
  - M. Install soil, waste, and storm drainage and vent piping at the following minimum slopes unless otherwise indicated:
    - 1. Sanitary and Storm Drainage Piping: 1/4 inch per foot percent downward in direction of flow for piping NPS 2-1/2 and smaller; 1/8 inch per foot downward in direction of flow for piping NPS 3 and larger.
    - 2. Vent Piping: 1/8 inch per foot down toward vertical fixture vent or toward vent stack.
  - N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
    - 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.
  - O. Install steel piping according to the plumbing code.
  - P. Install engineered siphonic drain specialties and storm drainage piping in locations indicated.
  - Q. Plumbing Specialties:
    - 1. Install backwater valves in sanitary and storm water gravity-flow piping. Comply with requirements for backwater valves specified in Section 22 13 19 "Sanitary Waste and Storm Drainage Piping Specialties."

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2. Install cleanouts at grade and extend to where building sanitary and storm drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 22 13 19 "Sanitary Waste and Storm Drainage Piping Specialties."
  3. Install drains in sanitary and storm drainage gravity-flow piping. Comply with requirements for drains specified in Section 22 13 19 "Sanitary Waste and Storm Drainage Piping Specialties."
- R. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 22 05 18 "Escutcheons for Plumbing Piping."

### 3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Join stainless-steel pipe and fittings with gaskets according to ASME A112.3.1.
- E. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.

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- F. Plastic, Non-pressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

### 3.4 SPECIALTY PIPE FITTING INSTALLATION

#### A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in OD's.
2. In Drainage Piping: Unshielded, non-pressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.
4. In Underground Force Main Piping:
  - a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
  - b. NPS 2 and Larger: Pressure transition couplings.

#### B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric nipples.
4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

### 3.5 VALVE INSTALLATION

#### A. General valve installation requirements are specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."

#### B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install gate or full-port ball valve for piping NPS 2 and smaller.
3. Install gate valve for piping NPS 2-1/2 and larger.

#### C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

#### D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.



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4. Comply with requirements for backwater valve specified in Section 22 13 19 "Sanitary Waste and Storm Drainage Piping Specialties."

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment."
  1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
  2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
  3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
  4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
  5. Vertical Piping: MSS Type 8 or Type 42, clamps.
  6. Install individual, straight, horizontal piping runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  7. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  8. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron sanitary, storm, and vent piping with the following maximum horizontal spacing and minimum rod diameters:
  1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  2. NPS 3: 60 inches with 1/2-inch rod.
  3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
  4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
  5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
  6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron sanitary, storm, and vent piping every 15 feet.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

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### 3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
  - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
  - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
  - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
  - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
  - 5. Install horizontal backwater valves with cleanout cover flush with floor or in pit with pit cover flush with floor.
  - 6. Comply with requirements for backwater valves, cleanouts, and drains specified in Section 22 13 19 "Sanitary Waste and Storm Drainage Piping Specialties."
  - 7. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

### 3.8 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

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### 3.9 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
  - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
  - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
  - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 6. Prepare reports for tests and required corrective action.

### 3.10 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

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- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
  - D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

### 3.11 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, sanitary, storm, and vent piping shall be any of the following:
  - 1. Hub-less, cast-iron soil pipe and fittings; CISPI heavy-duty hub-less-piping couplings; and coupled joints.
- C. Underground, sanitary, storm, and vent piping shall be any of the following:
  - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

END OF SECTION 22 13 16

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## SECTION 22 33 00 -GAS, DOMESTIC-WATER HEATERS

### 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. Commercial, gas, storage, domestic-water heaters.
  - 2. Domestic-water heater accessories.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

#### 1.4 SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
  - 1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."

#### 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

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## 1.6 QUALITY ASSURANCE

- A. 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.
- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance:
  - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

## 1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including storage tank and supports.
    - b. Faulty operation of controls.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Periods: From date of Substantial Completion.
    - a. Storage Tank: Six years.
    - b. Controls and Other Components: Three year(s).

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## PART 2 - PRODUCTS

### 2.1 GAS, DOMESTIC-WATER HEATERS

#### A. Commercial, Gas, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Bradford White Corporation.
  - b. Cemline Corporation.
  - c. Lochinvar Corporation.
  - d. PVI Industries, LLC.
  - e. Rheem Manufacturing Company.
  - f. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
  - g. State Industries.
2. Standard: UL 1453.
3. Storage-Tank Construction: Non-ASME-code, steel vertical arrangement.
  - a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
    - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
    - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
  - b. Pressure Rating: 150 psig.
  - c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
4. Factory-Installed Storage-Tank Appurtenances:
  - a. Anode Rod: Replaceable magnesium.
  - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
  - c. Insulation: Comply with ASHRAE/IESNA 90.1.
  - d. Jacket: Steel with enameled finish.
  - e. Heating Elements: Gas, screw-in or bolt-on immersion type arranged in multiples of three.
  - f. Temperature Control: Adjustable thermostat.
  - g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
  - h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

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5. Special Requirements: NSF 5 construction.

## 2.2 DOMESTIC-WATER HEATER ACCESSORIES

### A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. AMTROL Inc.
  - b. Flexcon Industries.
  - c. Honeywell International Inc.
  - d. Pentair Pump Group (The); Myers.
  - e. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
  - f. State Industries.
  - g. Taco, Inc.
2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:
  - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
  - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
  - c. Air-Charging Valve: Factory installed.
1. Capacity and Characteristics:
  - a. Working-Pressure Rating: 150 psig.
  - b. Capacity Acceptable: 2 gal. minimum.
  - c. Air Precharge Pressure: Contractor to obtain optimal pressure from tank manufacturer based on final operational system pressure.

- B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

- C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

- D. Heat-Trap Fittings: ASHRAE 90.2.

- E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball-, butterfly-, or



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gate-type shutoff valves to isolate each domestic-water heater and [calibrated] [memory-stop] balancing valves to provide balanced flow through each domestic-water heater.

1. Comply with requirements for ball-, butterfly-, or gate-type shutoff valves specified in Section 220523 "General-Duty Valves for Plumbing Piping."
2. Comply with requirements for balancing valves specified in Section 221119 "Domestic Water Piping Specialties."

- F. Pressure-Reducing Valves: ASSE 1003 for water. Set at 25-psig maximum outlet pressure unless otherwise indicated.
- G. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- H. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
- I. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- J. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.
- K. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.
- L. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

### 2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Gas, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 01 40 00 "Quality Requirements" for retesting and reinspecting requirements and Section 01 73 00 "Execution" for requirements for correcting the Work.
- D. Prepare test and inspection reports.

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## PART 3 - EXECUTION

### 3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Gas, Domestic-Water Heater Mounting: Install commercial, gas, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 03 30 00 "Cast-in-Place Concrete."
1. Exception: Omit concrete bases for commercial, gas, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
  2. Maintain manufacturer's recommended clearances.
  3. Arrange units so controls and devices that require servicing are accessible.
  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 floor.
  6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  7. Install anchor bolts to elevations required for proper attachment to supported equipment.
  8. Anchor domestic-water heaters to substrate.
- B. Install gas, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."
- C. Install commercial, gas, domestic-water heaters with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Section 22 05 48 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- E. Install combination temperature-and-pressure relief valves in water piping for gas, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 22 11 19 "Domestic Water Piping Specialties."

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- G. Install thermometers on outlet piping of gas, domestic-water heaters. Comply with requirements for thermometers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."
  - H. Install thermometers on inlet and outlet piping of residential, solar, gas, domestic-water heaters. Comply with requirements for thermometers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."
  - I. Assemble and install inlet and outlet piping manifold kits for multiple gas, domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each gas, domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each gas, domestic-water heater outlet. Comply with requirements for valves specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping," and comply with requirements for thermometers specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."
  - J. Install pressure-reducing valve with integral bypass relief valve in gas, domestic-water booster-heater inlet piping and water hammer arrester in booster-heater outlet piping. Set pressure-reducing valve for outlet pressure of 25 psig. Comply with requirements for pressure-reducing valves and water hammer arresters specified in Section 22 11 19 "Domestic Water Piping Specialties."
  - K. Install piping-type heat traps on inlet and outlet piping of gas, domestic-water heater storage tanks without integral or fitting-type heat traps.
  - L. Fill gas, domestic-water heaters with water.
  - M. Charge domestic-water compression tanks with air.

### 3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 22 11 16 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to gas, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

### 3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

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### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
  - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Gas, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 01 40 00 "Quality Requirements" for retesting and reinspecting requirements and Section 01 73 00 "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain domestic-water heaters.

END OF SECTION 22 33 00

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## SECTION 22 42 00 - PLUMBING FIXTURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes the following plumbing fixture components:
  - 1. Bathing units.
  - 2. Bathing valves.
  - 3. Drains.
  - 4. Faucets.
  - 5. Hose boxes.
  - 6. Lavatories.
  - 7. Sinks.
  - 8. Toilets.
  - 9. Trim.
  - 10. Water hammer arrestors.

#### 1.3 REFERENCES

- A. ANSI A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- B. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
- C. ANSI A112.19.1M - Enameled Cast Iron Plumbing Fixtures.
- D. ANSI A112.19.2M - Vitreous China Plumbing Fixtures.
- E. ANSI A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- F. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
- G. ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.

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- H. ANSI/NSF 61 - Drinking Water System Components - Health Effects.
  - I. ANSI/NSF 372 - Drinking Water System Components - Lead Content.
  - J. ARI 1010 - Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.
  - K. ASSE 1002 - Water Closet Flush Tank Ball Cocks.
  - L. Americans with Disabilities Act (ADA), Title III.
  - M. The Energy Policy Act (EPAct) of 2005.
  - N. USGBC - Leadership in Energy and Environmental Design (LEED) Rating System.

#### 1.4 SUBMITTALS

##### A. Procedure:

1. Fixture component submittals shall conform to the following procedure requirements. Improperly prepared submittals will not be reviewed but shall be returned to be revised and resubmitted.
2. Refer to the Plumbing Fixture Schedule on the Drawings for plumbing fixture tag and the respective plumbing fixture components associated with each tag. Not all fixture components within this specification may be listed in the Plumbing Fixture Schedule.
3. Submit each plumbing fixture component listed in the Plumbing Fixture Schedule a single time in the order outlined within this specification.
4. Each plumbing fixture component shall be annotated with the fixture component tag in the upper right hand corner of each submittal page.
5. Where multiple fixture component options are listed, annotate the submittal with arrows and strikeouts to clearly indicate applicable options.

##### B. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fixtures.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. All water faucets shall meet NSF Standard 61, Annex G and NSF-372 for drinking water faucets and shall be certified by Underwriter's Laboratory. Product cartons shall feature the UL logo signifying certification to NSF-61, Annex G.

##### C. Shop Drawings:

1. Diagram power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

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D. Maintenance Data::

1. Include operation and maintenance information for each plumbing fixture component with the maintenance manual in accordance with Division 1

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of the amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of the amount of each type and size installed.
3. Flush Valve Repair Kits: Equal to 10 percent of amount of each type installed.
4. Toilet Seats: Equal to 5 percent of the amount of each type installed.

PART 2 - PRODUCTS

2.1 BATHING UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acrylic:
  - a. Aqua Bath.
  - b. Crane Plumbing.
  - c. Fiat.
  - d. Kohler.
  - e. Lasco.
2. Solid surface:
  - a. Comfort Designs
  - b. Watermark
  - c. Willoughby

B. Material (Unless otherwise noted): Acrylic, color as selected by Architect.

C. BT-1 – Combination Tub/Shower Enclosure:

1. Nominal Interior Dimensions: 60" x 30".
2. Threshold Height: 5".
3. Drain: Chrome plated bronze with pop-up drain stop and 2" outlet.
4. Shower Curtain/Rod: White/Stainless steel.

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## 2.2 BATHING VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Standard.
  2. Delta Faucet.
  3. Grohe Commercial.
  4. Kohler.
  5. Symmons.
  6. T&S Brass.
  7. Zurn.
- B. Materials (Unless otherwise noted):
1. Valve Body: Brass.
  2. Shower Head: Plastic.
  3. Hand Spray: Plastic.
  4. Tub Spout: Bronze.
  5. Finish: Chrome plated.
  6. Hose: Braided stainless steel
- C. BV-5 – Tub with shower head and hand spray:
1. Mixing Valve: Pressure balanced with integral stops.
  2. Shower Head: 1.5 GPM with wall shower head fitting.
  3. Tub Spout: Wall mounted with pull-up diverter.
  4. Hand spray: 1.5 GPM with 60” hose, inline vacuum breaker, diverter valve, and wall mounted adjustable bar.

## 2.3 DRAINS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Blucher.
  2. J. R. Smith.
  3. Josam Co.
  4. Mifab.
  5. Quick-Trench.
  6. Sioux Chief.
  7. Wade.
  8. Watts.
  9. Zurn.
- B. Materials (unless otherwise noted):
1. Drain body: Cast iron.
  2. Drain Head: Nickel bronze.
  3. Trap: Deep seal configuration; does not apply to roof drains.
  4. Cleanout: Provide 2-way cleanout fitting downstream of trap. Provide floor cleanout in below grade installations.



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C. Special Requirements:

1. Install top of grate/strainer flush with adjacent floor at low-point. Refer to Architectural drawings for floor sloping requirements, and coordination with all other contractors to ensure positive sloping toward drain.
2. Nominal size of drain outlet as indicated on the Drawing floor plans.
3. Provide drain trap primer connection per the requirements on the Plumbing Fixture Schedule.

D. D-1 – General Floor Drain with Flush Grate:

1. Body: Bottom outlet with flashing collar and weep holes.
2. Head: Adjustable 5” round grate with 2-way drainage pattern.

E. D-2 – Mechanical Room Floor Drain with Flush Grate:

1. Body: Bottom outlet with flashing collar and weep holes.
2. Head: Adjustable 7” round grate with 2-way drainage pattern.

F. D-3 – Floor Drain with Recessed Grate:

1. Body: Bottom outlet with flashing collar and weep holes.
2. Head: Adjustable 7” round recessed grate with 2-way drainage pattern.

## 2.4 FAUCETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Standard.
2. Chicago Faucet.
3. Delta Faucet.
4. Grohe Commercial.
5. Kohler.
6. Moen Commercial.
7. Sloan.
8. Symmons.
9. T&S Brass.
10. Zurn.

B. Materials (Unless otherwise noted):

1. Valve Body: Brass.
2. Finish: Chrome plated.

C. F-3 – Manual Lavatory Faucet: 4-1/2” spout with single lever handle, 4” on center.

1. F-3A: 0.5 GPM laminar spray at end of spout.
2. F-3B: 1.5 GPM aerator at end of spout.

D. F-5 – Single Lever Kitchen Faucet: 7-5/8” L spout with single lever handle, 8” on center.

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1. F-5A: 1.5 GPM aerator at end of spout.
  2. F-5B: 1.5 GPM aerator at end of spout with side spray and vinyl hose.

E. F-7 – Kitchen Faucet with Pull-out Spray: 9” combination spout/pull-out spray with single lever handle, single hole, 1.5 GPM flow rate.

## 2.5 HOSE BOXES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acorn.
2. Elkay
3. Guy Gray.
4. Oatey.
5. Willoughby.

B. HB-1 – Refrigerator/Ice Machine Water Supply Box: 6” x 6” high impact polystyrene box, faceplate, and 1/4 turn brass hammer ball valve with 1/2" sweat inlet connection. Box depth shall allow fully recessed installation in 3-5/8” stud wall.

C. HB-2 – Washing Machine Water Supply and Drain Box: 10” x 8-1/2” hot dipped galvanized 20 gauge steel box and faceplate, hot and cold water 3/4" hose bib supply valves with 1/2" sweat inlet connections, and 2” threaded drain fitting. Box depth shall allow fully recessed installation in 3-5/8” stud wall.

D. HB-5 – Natural Gas Supply Box: 7-1/2” x 5” schedule 20 stainless steel box with faceplate, CSA listed 1/4 turn natural gas valve (3/4” unless supplied by 1/2" gas pipe). Box depth shall allow fully recessed installation in 3-5/8” stud wall.

## 2.6 HOT WATER TAP

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. In-Sink-Erator.

B. HWT-1 – Insulated tank, 1/2 gallon capacity with drain plug, chrome plated faucet, instant self-closing lever valve, gooseneck spout, adjustable thermostat, 750 watts, 6.5 amps, 115 volts.

## 2.7 HYDRANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam.
2. J. R. Smith.
3. Wade.
4. Woodford.
5. Zurn.

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- B. H-1 – Non-Freeze, Flush Wall Hydrant: 4” x 2-1/2” bronze, nickel plated 1/4 turn non-freeze hydrant with 3/4" hose connection, backer plate, wall clamp, integral vacuum breaker with vandal resistant cap and removable “T” handle key. Stem length shall be 6” beyond the inside face of the exterior wall, unless otherwise exposed.

## 2.8 SINKS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acorn.
2. American Standard.
3. Elkay.
4. Just.
5. Kohler.
6. Mansfield.
7. Sloan.
8. Steris.
9. Whitehall.
10. Willoughby.
11. Zurn.

- B. Materials (Unless otherwise noted):

1. Fixture: 18 gauge stainless steel with satin finish.

- C. S-2 – Drop-In Double Bowl Sink: 33” x 21” double compartment, self-rimming sink with 6-1/2” deep equally sized bowls, fully undercoated, and 3-1/2” drain opening. Pre-drilled faucet hole configuration as required to match scheduled faucet configuration. ADA compliant; refer to Architectural drawings for installation dimensions.

## 2.9 TOILETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Fixtures:

- a. American Standard.
- b. Kohler.
- c. Mansfield.
- d. Sloan.
- e. Zurn.

2. Seats:

- a. Bemis.
- b. Beneke.
- c. Centoco.
- d. Church.
- e. Olsonite

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3. Carriers:
- a. J. R. Smith.
  - b. Josam.
  - c. Mifab.
  - d. Wade.
  - e. Watts.
  - f. Zurn.

B. Materials (Unless otherwise noted):

1. Fixture: White vitreous china.
2. Seat: Extra heavy duty antimicrobial fire retardant plastic seat with stainless steel self-sustaining check hinge.

C. T-1 – Floor Outlet Comfort Height Toilet: Elongated bowl, siphon jet, 1.1 – 1.6 GPF compatible, 1,000 gram MaP score rated, 1,000 lb. static load rating on end of bowl, 10” – 12” rough-in range, top spud inlet, 17” – 19” final seat height. ADA compliant; refer to Architectural drawings for installation dimensions.

2.10 TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brass Craft.
2. Bridgeport Brass.
3. Chicago Faucet.
4. McGuire.
5. Truebro.

B. Materials (Unless otherwise noted):

1. P-Trap: Chrome plated cast brass.
2. Ball Stops: Chrome plated brass.
3. Supply Risers: Flexible chrome plated copper.
4. Strainer: Chrome plated brass.

C. TR-1 – Lavatory Trim: Open grid strainer, adjustable p-trap with cleanout and escutcheon, 1/2" X 3/8" angle ball stop with 3/8" supply risers. Provide offset p-trap and waste piping/water supply insulation kit on fixtures scheduled to meet ADA unless a shroud is provided with the casework or fixture.

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- D. TR-2 – Sink Trim: Stainless steel basket strainer with removable drain stopper, adjustable p-trap with cleanout and escutcheon, 1/2" X 3/8" angle ball stop with 3/8" supply risers. Provide offset p-trap and waste piping/water supply insulation kit on fixtures scheduled to meet ADA unless a shroud is provided with the casework or fixture.

## 2.11 WATER HAMMER ARRESTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. J. R. Smith.
  2. Josam.
  3. Mifab.
  4. Precision Plumbing Products.
  5. Sioux Chief.
- B. Materials (Unless otherwise noted):
1. Body: Copper.
  2. Piston: Brass.
  3. Seals: Chlorine and chloramine resistant EPDM.
  4. Lubricant: FDA approved silicone.
- C. Provide water hammer arrestors as required in the Plumbing Fixture Schedule according to the following types and fixture unit ranges:
1. A: 1 – 11 Fixture Units.
  2. B: 12 – 32 Fixture Units.
  3. C: 33 – 60 Fixture Units.
  4. D: 61 – 113 Fixture Units.
  5. E: 114 – 154 Fixture Units.
  6. F: 155 – 330 Fixture Units.
- D. Install water hammer arrestors in an accessible location for inspection, maintenance, and in accordance with the manufacturer's written guidelines. Provide access panels as required; coordinate panel locations and color with the architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.
- B. Examine walls, floors, cabinets, and counters for suitable conditions where fixtures will be installed.

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- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install plumbing fixtures level and plumb according to roughing-in drawings and manufacturers' written instructions.
- B. Install supports, affixed to building substrate, for wall-mounted fixtures.
  - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
  - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
  - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounted water closets on bowl-to-drain, connecting fitting attachments to piping or building substrate.
- E. Install counter-mounted fixtures in and attached to casework.
- F. Install water-supply piping with stop on each supply to each fixture to be connected to water-distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
  - 1. Exception: Use ball, gate, or globe valve if supply stops are not specified with fixture. Comply with valve requirements specified in Section 22 05 23 "General-Duty Valves for Plumbing Piping."
- G. Install flushometer valves on water closets.
- H. Install flushometer valves for accessible water closets, with lever handle mounted on wide side of compartment.
- I. Install toilet seats on water closets.
- J. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts, if faucets are not available with required rates and patterns. Include adapters if required.
- K. Install laminar-flow, faucet-spout fittings in faucet spouts where laminar-flow fittings are specified.
- L. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- M. Install traps on fixture outlets.
  - 1. Exception: Omit trap on fixtures with integral traps.
  - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- N. Install disposer in outlet of sinks indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

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- O. Install hot-water dispensers in back top surface of sink or in counter with spout over sink.
  - P. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Refer to Division 22 Section "Basic Mechanical Materials and Methods" for escutcheons.
  - Q. Set bath tubs, showers in leveling bed of leveling cement grout.
  - R. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."
  - S. Seal joints between healthcare plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
  - T. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 22 05 18 "Escutcheons for Plumbing Piping."
  - U. Inspect installed fixtures for damage and test after water systems are pressurized for proper operation. Replace damaged or malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
  - V. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
    - 1. Position floor drains for easy access and maintenance.
    - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
      - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
      - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
      - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
    - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
    - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

### 3.3 MOUNTING

- A. Refer to Architectural Drawings and Plumbing Details for specific mounting heights. Use the following mounting heights if no other dimension is required on the Drawings or by Code.
  - 1. Water closet: 15" floor to rim.
  - 2. Water closet (ADA): 17" floor to seat.
  - 3. Shower mixing valve: 40" floor to centerline.
  - 4. Shower head: 75" floor to centerline.
  - 5. Wall hydrant: 16" above finished grade.

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### 3.4 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping sized according to the Drawings and Plumbing Fixture Schedule, whichever is larger. Use reducer fittings as required to match fixture connections.
- B. Comply with requirements for water piping specified in Section 22 11 16 "Domestic Water Piping."
- C. Comply with requirements for soil and waste drainage piping and vent piping specified in Section 22 13 16 "Sanitary Waste and Vent Piping."
- D. Comply with requirements for atmospheric vent piping specified in Section 22 13 16 "Sanitary Waste and Vent Piping."
- E. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 22 07 19 "Plumbing Piping Insulation."

### 3.5 ADJUSTING

- A. Operate and adjust fixtures, faucets, and controls. Replace damaged and malfunctioning plumbing fixtures, fittings, and controls.
- B. Adjust water pressure at faucets, shower valves, and flush valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

### 3.6 CLEANING AND PROTECTION

- A. After installing plumbing fixtures, inspect and repair damaged finishes.
- B. Clean plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts. Remove sediment and debris from drains.
- C. Provide protective covering for installed fixtures and fittings.
- D. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- E. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 00



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## SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Piping materials and installation instructions common to most piping systems.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Sleeves.
  - 5. Penetration sealing.
  - 6. Escutcheons.
  - 7. Grout.
  - 8. HVAC demolition.
  - 9. Equipment installation requirements common to equipment sections.
  - 10. Painting and finishing.
  - 11. Concrete bases.
  - 12. Supports and anchorages.
  - 13. Equipment supports.

#### 1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above solid ceilings and within chases.

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- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
  - F. The following are industry abbreviations for plastic materials:
    - 1. CPVC: Chlorinated polyvinyl chloride plastic.
    - 2. PE: Polyethylene plastic.
    - 3. PVC: Polyvinyl chloride plastic.
  - G. The following are industry abbreviations for rubber materials:
    - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
    - 2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Dielectric fittings.
  - 2. Mechanical sleeve seals.
  - 3. Escutcheons.
  - 4. Supports and anchorages.
  - 5. Roof curbs.
  - 6. Equipment supports.
- B. Operations Manual: Include the following:
  - 1. Final processed submittals of all Division 23 specification sections.
  - 2. Subcontractor contact list including name, phone number and e-mail contact information.
  - 3. Valve tag charts.
  - 4. Field reports, including ductwork leakage testing and piping pressure testing.
  - 5. Startup reports for all mechanical equipment.
  - 6. Certifications of piping systems, equipment or systems if specified in the individual specification section.
  - 7. Testing, adjusting and balancing reports.
  - 8. ASME Stamp Certification and Reports: “A”, “S”, or “PP” stamp certificates of authorization.
  - 9. Operations and maintenance information for all equipment.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer’s receipt of submittal.
  - 1. Initial review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal must be delayed for coordination.

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2. Concurrent review: Where concurrent review of submittals by Architect/Engineer's Consultants, Owner or other parties is required, allow 21 days for initial review of each submittal.

D. Submittal Schedule:

1. Contractor shall submit all submittals to the Engineer for initial review within 30 days of award of contract, or within the first 10% of the duration of the project, whichever is less. Submittals which require processing completion prior to 45 days after award of contract shall be scheduled with the Engineer at least 14 days in advance of their requested due date.

## 1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.
- D. Roofing Standards: Comply with the following:
  1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication including flanges and cap flashing to coordinate with type of roofing indicated.
  2. NRCA's "Roofing and Waterproof Manual" details for installing units.
  3. Existing roofs: Maintain existing roof warranty.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture into the pipe.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- C. Deliver, store and install materials and equipment (including supports and hangers) such that they are maintaining "as-new" condition (e.g. no rust) upon installation and up through the date

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of Substantial Completion. Account for environmental conditions of the construction site and schedule work accordingly.

- D. Do not allow any materials nor equipment to be stored in standing water from a rainstorm.

## 1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements with all trades for the location and size of access doors and frames necessary to gain access to HVAC items. Coordinate these requirements for all HVAC items that are concealed behind finished surfaces. See Division 08.
- D. Existing Utilities: Do not interrupt utilities serving facilities occupied or partially occupied by the Owner or others unless specifically allowed under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Owner at least seven days in advance of proposed utility interruptions. Identify extent and duration of utility interruptions.
  - 2. Indicate method of proposed utility interruptions in detail.
  - 3. Do not proceed with proposed utility interruptions without Owner's permission.
  - 4. All air handling units, rooftop units, exhaust fans, pumps, chillers, refrigeration equipment, boilers, heat exchangers, fan coil units, cabinet unit heaters, fin tube radiation, steam system components and unit heaters are to remain disabled and off unless TAB personnel are on-site actively testing that particular piece of equipment.
  - 5. Utilization of the permanent installed HVAC systems to condition or pressurize the construction area is not allowed without prior specific written authorization from the Owner listing which equipment may be operated and under what limiting conditions along with written agreement to compensate the Owner for utility usage. Limiting conditions shall include specific written listing of all of these features: filtration requirements for all airstreams; fire alarm/smoke detection for all air streams; schedule for preventative maintenance for bearings, seals and other operated equipment features; hours of operation and which hours will be supervised by contractor personnel on site; written confirmation of operability of all equipment control sequences safeties and alarms; and written maintenance recordkeeping at a minimum.
- E. New Equipment:
  - 1. All new equipment shall remain disabled and off unless TAB personnel are on-site actively testing that particular piece of equipment.
  - 2. Utilization of the permanent installed HVAC systems to condition or pressurize the construction area is not allowed without prior specific written authorization from the Owner listing which equipment may be operated and under what limiting conditions

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along with written agreement to compensate the Owner for utility usage. Limiting conditions shall include specific written listing of all of these features: filtration requirements for all airstreams; fire alarm/smoke detection for all air streams; schedule for preventative maintenance for bearings, seals and other operated equipment features; hours of operation and which hours will be supervised by contractor personnel on site; written confirmation of operability of all equipment control sequences safeties and alarms; and written maintenance recordkeeping at a minimum.

- F. Coordinate new installations with the existing installations which will remain in place and be reutilized or those that are abandoned in place. Provide transitions and fittings in ductwork and piping as well as extra lengths of ductwork and piping as required to route around these existing installations. Illustrate all such ductwork fittings on the sheet metal duct shop drawing submittal. Existing installations include plumbing, piping, electrical and other building systems components including, but not limited to, roof drain piping, sanitary piping, plumbing piping, fire protection piping, fire protection heads, heating and cooling water piping, condensate drains, steam and condensate return piping, conduit, cable tray, electrical pull boxes, projectors, booms, etc. Coordinate installation of above ceiling components and devices such that maintenance access is achieved at the completion of the project when all ceiling mounted components are installed. Coordinate with all trades. Ultimate responsibility for any rework required to achieve maintenance access is the responsibility of the Contractor responsible for coordination as noted in Division 1 Sections. The required maintenance access is defined here for this contract:
1. A person with a 24" arm length can stand on a folding ladder which rests on the finished floor and which does not extend through the ceiling grid. All lights and diffusers remain in the grid when defining maintenance access. Ceiling tiles with sprinkler heads, smoke detectors, fire alarm devices and other system devices remain in the grid when defining maintenance access. Light fixtures and diffusers/grilles remain in the ceiling grid when defining maintenance access.
  2. While standing on a step of this ladder which is rated for standing upon and while not leaning against the ceiling grid, this person can touch the following items with both hands at the same time:
    - a. Fire damper and fire/smoke damper duct access doors.
    - b. Fire damper and fire/smoke damper fusible links.
- G. Locate buried utility and distribution services within the project area.
- H. Provide temporary connections to maintain existing systems in service during the construction. This may include ductwork, piping, power, controls, water, as well as other connections as required.
- I. Provide the Owner a schedule prior to the start of demolition with phased selected demolition identified by system and by floor. Identify required outages on the schedule and any temporary measures required to maintain existing systems in service.
- J. Coordinate the HVAC demolition with all aspects of demolition and temporary construction (including dust barriers) by other trades.

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## 1.8 CONTRACT DOCUMENTS

- A. The drawings indicate the general arrangement and scope of the systems and shall be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Engineer for approval before proceeding with the Work.
- B. The drawings are not intended to show every vertical offset or horizontal offset that may be necessary to complete the system or clear obstructions and/or the Work of other Contractors and other trades. Contractors shall anticipate during bidding that additional offsets may be required and include same in their proposals.
- C. The Drawings, Schedules and Specifications shall be considered to be cooperative and anything appearing in the Specifications that may not be indicated on the Drawings or vice-versa, shall be considered as part of the Contract and must be executed by the Contractor the same as though indicated by both. Clarify conflicting statements with the Engineer prior to submitting a bid.
- D. Measurements: Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this Work with all other branches and trades in such a manner as to cause a minimum of conflict or delay. The Contractor shall coordinate his work in advance with all other trades and report immediately any difficulty which can be anticipated and propose solutions to resolve the potential difficulty.
- E. Adjustments to Work in the Field:
  - 1. The Engineer reserves the right to make minor adjustments (maximum of 10'-0") in location of sensors, valving, ductwork, dampers, conduit, drains, piping, hangers and/or equipment at no additional charge if so directed prior to their installation.
  - 2. Where the Drawings show equipment, casework, structure, fire rated construction, or the like, Contractors shall lay out the work to avoid conflicts.
  - 3. Where offsets in piping, additional fittings, necessary drains, minor valves, traps and devices are required to complete the installation, to clear obstructions, or for the proper operation of the system (including air vents and drains), these shall be deemed to be included in the Contract and shall be furnished and installed complete by the Contractor at no additional charge.
  - 4. Where offsets in ductwork, additional fittings, necessary transitions, minor fittings, dampers, accessories and devices are required to complete the installation, to clear obstructions, or for the proper operation of the system, these shall be deemed to be included in the Contract and shall be furnished and installed complete by the Contractor at no additional charge.
- F. Clearances: All installations shall be made to maintain maximum headroom and clearance around equipment. When space and/or headroom appear inadequate, the Contractor shall notify the Engineer prior to proceeding with the installation. No claims for additional compensation will be approved for failure on the part of the Contractor or his Subcontractor to comply with this requirement.

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## 1.9 RECORD DRAWINGS

- A. Contractor shall provide owner with a complete set of accurate Record Drawings for all work performed under this contract.
  - 1. Record Drawings shall include all approved change orders and pertinent RFI responses.
  - 2. Include actual dimensions of equipment furnished under this contractor where shown on the floor plans.
  - 3. Record Drawings shall include work performed by all sub-contractors retained.
  - 4. Record Drawings shall include the words "RECORD DRAWING" on each sheet.
- B. Submission:
  - 1. Submit one set of record Drawings for review by Engineer prior to submission of closeout documents. Record Drawings shall be submitted using the established submittal process.
  - 2. Upon satisfactory review of the Record Drawing submittals by Engineer, provide three (3) printed sets of the Record Drawings and three (3) copies in electronic format with closeout documents
  - 3. Paper Record Drawings shall be printed full size using the same sheet size as the construction documents issued to the contractor with the contractor's title block.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
- B. Provide all materials necessary for demolition work to occur, including cutting, capping, removing walls for access, and repairing finishes.

### 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- C. Hex bushings, face bushings, and plugs are not acceptable in any Division 23 piping system.

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## 2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. Steam service: ASME B16.20, spiral wound gasket with stainless steel metal winding strip, flat, asbestos-free graphite filler, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated. Suitable for pressure class of service and a minimum operating temperature of 600 deg F. Similar to Flexitallic Style CG.
  - 2. All other services: Thermoseal C-4401, 1/16" thick.
  - 3. Do not apply compounds, adhesives, or anti-stick lubricants to gasket surface.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements for Joining Plastic Piping:
  - 1. CPVC Piping: ASTM F 493.
  - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
- I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

## 2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.



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- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 225 deg. F. Minimum 400 volts dielectric resistance, insulated against galvanic corrosion, threaded ends, O-ring.
1. Manufacturers:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Company.
    - c. Eclipse, Inc.
    - d. Epcos Sales, Inc.
    - e. Hart Industries, International, Inc.
    - f. Watts Industries, Inc.; Water Products Div.
    - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
1. Manufacturers:
    - a. Capitol Manufacturing Co.
    - b. Central Plastics Company.
    - c. Drake Specialties.
    - d. Epcos Sales, Inc.
    - e. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
1. Manufacturers:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Central Plastics Company.
    - d. Drake Specialties.
    - e. Pipeline Seal and Insulator, Inc.
  2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and non-corrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg. F (107 deg. C).
1. Manufacturers:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.

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- G. Dielectric Nipples: Electroplated steel nipple with inert and non-corrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg. F (107 deg. C).

1. Manufacturers:

- a. Perfection Corp., Clearflow Dielectric Fittings.
- b. Precision Plumbing Products, Inc.
- c. Sioux Chief Manufacturing Co., Inc.
- d. Victaulic Co. of America.

## 2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

- a. Advance Products & Systems, Inc.
- b. Calpico, Inc.
- c. Metraflex Co.
- d. GPT/Pipeline Seal and Insulator/Link-Seal/Enpro Industries.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Glass reinforced nylon polymer or stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.6 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40 up to 10" NPS, standard weight for 12" NPS and larger, galvanized, plain ends, fabricated with 2" integral seal welded waterstop. Touch up cut ends of galvanized pipe sleeves with zinc-rich coating prior to installation.

- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

1. Manufacturers:

- a. Calpico, Inc.

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- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
    - 1. Underdeck Clamp: Clamping ring with set screws.
  - E. Stainless Steel Sheet: Fabricated 304L stainless steel, 0.078” minimum thickness, round tube closed with welded longitudinal joint, fabricated with 2” integral seal welded waterstop.

## 2.7 PENETRATION SEALING

- A. Penetrations in Horizontal Assemblies:
  - 1. Annular space fill:
    - a. Resists the free passage of flame and the products of combustion.
    - b. Approved non-combustible material.
  - 2. Penetration firestopping:
    - a. Fill, void or cavity material that is tested and classified for use in through penetration firestop systems.

## 2.8 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
  - 1. Finish: Polished chrome-plated.

## 2.9 GROUT

- A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume-adjusting, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
  - 3. Packaging: Premixed and factory packaged.

## 2.10 ROOF CURBS

- A. General: If not specified in individual Division 23 specification sections, provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other

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construction to be supported on roof curbs. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported.

- B. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified:
1. Creative Metals, Inc.
  2. Custom Curb, Inc.
  3. Greenheck.
  4. Pate Co. (The).
  5. Thybar Corporation.
- C. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747 inch (1.9 mm) thick, structural quality, hot dip galvanized or aluminum zinc alloy coated steel sheet, factory primed and prepared for painting with welded or sealed mechanical corner joints.
1. Provide fire retardant treated wood nailers at tops of curbs and formed flanges at perimeter bottom for mounting to roof.
  2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
  3. Provide manufacturer's standard rigid or semi-rigid insulation and metal liners.
  4. Provide formed cants and base profile coordinated with roof insulation thickness.
  5. Fabricate units to minimum height of 16 inches (400 mm) unless otherwise indicated.
  6. Sloping roofs: Where slope of roof deck exceeds 1/4-inch per foot (1:48) fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.
  7. Provide curbs suitable for equipment dead weight, wind loads, seismic lifting, and anchoring forces as required.
  8. Provide anchoring instructions.

## 2.11 EQUIPMENT SUPPORTS

- A. General: If not specified in individual Division 23 specification sections, provide equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Coordinate dimensions with rough-in information or shop drawings of equipment to be supported.
- B. Fabricate exterior supports from galvanized or stainless materials which are compatible with the equipment, piping and ductwork being supported.
- C. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
1. Custom Curb, Inc.
  2. Pate Co. (The).
  3. ThyCurb, Inc.

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- D. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747 inch (1.9 mm) thick, structural quality, hot dip galvanized or aluminum zinc alloy coated steel sheet; factory primed and prepared for painting with welded or sealed mechanical corner joints.
1. Provide fire retardant treated wood nailers at tops of curbs and formed flanged at perimeter bottom for mounting to roof.
  2. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
  3. Fabricate units to minimum height of 12 inches (300 mm), unless otherwise indicated.
  4. Sloping roofs: Where slope of roof deck exceeds 1/4-inch per foot (1:48), fabricate support units with water diverters and height tapered to match slope to level tops of units.
  5. Provide supports suitable for equipment dead weight, wind loads, seismic lifting, and anchoring forces as required.
  6. Provide anchoring instructions.

## PART 3 - EXECUTION

### 3.1 HVAC DEMOLITION

- A. Refer to Division 1 Section "Cutting and Patching" and Division 2 Section "Selective Structure Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed. No equipment or components shall be abandoned in place unless specifically noted on the drawings.
1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap remaining piping with same or compatible piping material.
  2. Piping to Be Abandoned in Place: Drain piping and cap piping with same or compatible piping material.
  3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and cap remaining ducts with same or compatible ductwork material. Seal remaining ductwork to seal Class C. Duct tape is not permitted.
  4. Ducts to Be Abandoned in Place: Cap ducts with same or compatible ductwork material.
  5. Equipment to Be Removed: Disconnect and remove services and remove equipment. Cap piping and ductwork as required.
  6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, store equipment and protect in a safe location during construction to prevent damage; when appropriate, reinstall, reconnect, and make equipment operational.
  7. Equipment Piping and Ductwork to Be Removed and Salvaged: Disconnect and cap services and remove equipment. Owner shall be given first right of refusal to all items removed from the Owner's facility or property. Deliver salvaged items to Owner at location requested by Owner.
  8. When removing piping and ductwork components, all accessories, hangers, insulation and hanger rods shall be removed also.

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9. Provide temporary hangers for any pipe or duct to remain which has had hangers removed such that hanger spacing does not exceed 10'-0".
  10. Provide temporary hangers for any pipe or duct which was supported by a wall which was removed.
  11. Locate and identify mechanical systems passing through the affected demolition area which serves other areas outside the demolition limits. Provide information to the Engineer directly of any questionable items.
  12. Systems serving areas outside the work limits shall remain uninterrupted unless specifically authorized in writing by the Owner.
- C. If pipe, insulation, or equipment is damaged in appearance or is unserviceable due to demolition work, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
  - D. All caps installed shall be installed and located such that the pipe or duct may be reconnected to and extended without relocation of other components while utilizing standard fittings. Coordinate with all trades such that any existing, temporary or new installations by other trades does not block access to caps.
  - E. Confirm with the Owner, which if any, supply, return or exhaust air openings associated with systems which serve the project area may remain in use during construction. Cover all supply, return and exhaust air openings with synthetic air filter media, 1-inch thick, with non-oily tackified surface, with a dust holding capacity of at least 250 grams per square yard, an average dust spot arrestance of at least 85 percent, and a MERV rating of at least 6. Allow in the bid to replace the air filter media at least once per month and more often as required for proper operation of the fan systems.
  - F. Removal of portions of systems which are energized or will be energized at any point during the construction project shall be accomplished by skilled trades who will be contractually engaged in connecting new work (piping, ductwork or caps thereof) to these same systems.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

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- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
  - F. Install piping to permit valve servicing.
  - G. Install piping at indicated slopes.
  - H. Install piping free of sags and bends.
  - I. Install fittings for changes in direction and branch connections. Utilize tee fittings for branch connections that have all three connection sizes of NPS 1-1/2" and larger. It is acceptable to utilize threadolet fittings with dielectric nipples on carbon steel piping of NPS 2-1/2" and larger when the branch connection size is NPS 1" or less and a bronze body ball valve is installed on the other end of the dielectric nipple.
  - J. Install piping and ductwork to allow application of insulation.
  - K. Select system components with pressure rating equal to or greater than system operating pressure.
  - L. Install escutcheons for penetrations of walls, barriers, ceilings, and floors in exposed areas. In Dietary, Kitchen, Cafeteria, Sterile Processing, Sterilizer, Sub-Sterile, Animal Holding, Operating Rooms, Procedure Rooms and other sterile areas do not install escutcheons, but seal pipe penetrations airtight with clear food grade silicone.
  - M. New concrete floors, walls, and roof penetrations are required to have sleeves cast-in-place (no core drilling is allowed unless specifically noted on the drawings).
    - 1. Core drilling in buildings that are occupied up to two floors above the construction area or two floors below the construction area or are occupied on the same floor within 100 linear feet shall be accomplished with wet core drilling machines with slurry extraction to reduce noise.
  - N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
    - 1. Cut sleeves to length for mounting flush with both surfaces.
      - a. Exception: Extend top of sleeves installed in all floors (including mechanical equipment areas) and penthouses 2 inches (50 mm) above finished floor level. Waterstop shall be entirely contained within concrete with approximately 1-1/2-inch of concrete cover. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
    - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

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3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Steel pipe sleeves, cast iron pipe sleeves or stainless steel sheet sleeves for all pipes penetrating other than gypsum board partitions or walls.
    - b. Galvanized Steel Sheet Sleeves: For pipes and larger, penetrating gypsum-board partitions or walls.
  4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
  2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
  3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, barriers, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Firestopping" for materials.
- R. Verify final equipment locations for roughing-in.
- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- T. Install piping, hangers and equipment so that they do not interfere with fully opening the access panels on any part of the structure, any contractor installed access panels, nor access panels on any equipment (either contract provided or Owner provided or Owner installed equipment).
- U. Install piping, hangers and equipment so that they do not interfere with personnel movement. Components shall be a minimum of 7'-6" above finished floor unless specifically noted to be



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installed lower. Provide personnel protection on components located less than 6'-6" above finished floor (elastomeric insulation, caution markings).

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints:
  - 1. Construct carbon steel joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
  - 2. Construct stainless steel joints according to AWS D10.4, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
  - 3. Construct aluminum joints according to AWS D10.7, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
  - 4. Utilize AWS D10.11 Guide for Root Pass Welding of Pipe without Backing for all Welding Operations. Purge as required to obtain a smooth root surface.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

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- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
    - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
    - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
    - 4. PVC Non-pressure Piping: Join according to ASTM D 2855.
  - J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
  - K. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.
  - L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
    - 1. Plain-End Pipe and Fittings: Use butt fusion.
    - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
  - M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
  - 4. Wet Piping Systems: Install dielectric coupling and dielectric nipple fittings to connect piping materials of dissimilar metals. Do not utilize dielectric unions with O-rings on wet piping systems.

### 3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated. Provide a minimum of 7'-2" headroom under all exposed equipment.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

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- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
  - D. Install equipment to allow right of way for piping installed at required slope.
  - E. Comply with the equipment manufacturer's written installation instructions.
  - F. Provide access platforms on the side of equipment where the access level is more than 30 inches above the roof or floor. Provide handrail guards that extend 42" above the platform in accordance with the International Building Code. Provide a permanent ladder or stairs to access the platform. All platforms, guards and stair/ladder materials shall be non-corrosive. Handrails shall be readily removable for removal of equipment components.

### 3.6 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 9 Sections.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

### 3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project. If concrete bases are not detailed on the drawings, then furnish:
  1. Construct concrete bases of dimensions indicated, not less than 3.5 inches thick and not less than 4 inches (100 mm) larger in both directions than supported unit.
  2. Install bonding agent to connect concrete base to concrete floor. Apply to 100% of the contact area between base and floor.
  3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section. If not specified, utilize #4 reinforcing at 12" on center each way with #4 around the perimeter.

### 3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

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- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
  - C. Field Welding: Comply with AWS D1.1.

### 3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

### 3.10 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases. Obtain pump manufacturer's written installation instructions.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

### 3.11 ROOF CURBS AND EQUIPMENT AND PIPE SUPPORTS

- A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to support structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

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- B. All roof repairs shall be completed by a roofing contractor that is certified by the manufacturer of the existing and new roofing systems. All roof repairs shall be completed with materials and workmanship that is fully compatible with the roofing system and in full accordance with the roofing manufacturer's written installation requirements to maintain the roof warranty.
  - C. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual" unless otherwise indicated.
  - D. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces or at locations of contact, with bituminous coating or providing other permanent separation.
  - E. Flange Seals: Unless otherwise indicated, set flanges of accessory units with a thick bed of roofing cement to form a seal.
  - F. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.

### 3.12 CUTTING AND PATCHING

- A. Refer to Division 2 for general cutting and patching requirements and procedures.
- B. Cut, channel and drill floors, walls, partitions, shafts, ceiling and other surfaces required to permit electrical installations and demolition. Perform cutting by skilled mechanics of trades involved.
- C. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

### 3.13 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for all installations to restore original fire-resistance rating of assembly. Apply firestopping to structure where demolition exposes the structure. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping".
- B. Apply firestopping as indicated to seal penetrations in Paragraph "Penetration Sealing".
- C. Apply firestopping to all penetrations of smoke barriers. Provide an approved through penetration firestop system installed and tested in accordance with the requirements of UL 1479 for air leakage. The L rating for each firestop system shall not exceed 5.0 cfm per square foot at 0.30 inches of water in both ambient and elevated temperature tests.

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### 3.14 PENETRATION SEALING

- A. Horizontal assembly penetrations of all floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies shall be sealed as follows:
  - 1. Non-fire resistance rated assemblies with non-combustible penetrating items shall utilize annular space fill or penetration firestopping.
  - 2. Fire resistance rated assemblies shall utilize penetration firestopping.
- B. All Penthouse floor penetrations shall be sealed.
- C. All attic floor penetrations shall be sealed.
- D. All enclosed spaces which house HVAC equipment shall have all penetrations of the horizontal and vertical membranes which separate the space from occupied and unoccupied building spaces sealed.
- E. Penetrations to be sealed shall include, at a minimum, all piping, ductwork, flues, vents, chimneys, conduit and cabling penetrations installed.

### 3.15 CLEANING AND PROTECTION

- A. On completion of installation, inspect exposed finish. Remove burrs, dirt, paint spots and construction debris. This requirement applies for components including piping and ductwork which are located above lay-in and hard ceilings, especially their upper surfaces prone to collect dust and debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion. Repair all coatings, finishes and cabinets to “as-new” conditions prior to Substantial Completion.
- C. Remove all un-utilized construction materials from the project area.
- D. Trim rod hangers to a maximum exposed threaded length of 1” below the bottom nut.
- E. Protect all Owner provided spare parts. Obtain written receipt of Owner acceptance of spare parts denoting the quantities and storage location.

END OF SECTION 23 05 00

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## SECTION 23 05 53 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment labels.
  - 2. Access panel and door labels.
  - 3. Pipe labels.
  - 4. Duct labels.
  - 5. Stencils.
  - 6. Ceiling and thermostat labels.
  - 7. Raceway identification materials.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Valve Tag Schedules: For each piping system. Include a listing of all valves to be labeled with proposed content for each label. Include valve numbering scheme. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with proposed content for each label.

#### 1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

#### 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

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- B. Coordinate installation of identifying devices with location of access panels and doors.
  - C. Install identifying devices before installing acoustical ceilings and similar concealment.
  - D. Coordinate identifying devices to be consistent in appearance in all exposed locations.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Labels: Engraved, color-coded, multi-layer, multi-color laminated plastic for mechanical engraving. Include contact-type, permanent adhesive suitable for surface temperature of equipment.
  - 1. Terminology: Match Owner's numbering scheme or drawing schedules with unique equipment number.
  - 2. Size: Length and width vary for required label content, but not less than 4-1/2 by 6 inches (115 by 150 mm) for equipment, 1/8 inch thick.
  - 3. Letters: 1/2 inch minimum.
- B. Access Panel and Door Labels: 1/16-inch- (1.6-mm-) thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch (3.2-mm) center hole for attachment.
  - 1. Terminology: Match Owner's labeling scheme.
  - 2. Fasteners: Self-tapping, stainless steel screws or contact type, permanent adhesive.

### 2.2 DUCT IDENTIFICATION DEVICES

- A. Duct Labels: Preprinted, color-coded with lettering indicating service. Include direction of airflow and duct service (such as supply, return, and exhaust). Include contact-type, permanent adhesive.

### 2.3 DUCT AND ACCESS DOOR STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1; minimum letter height of 1-1/4 inches (32 mm) for ducts; and minimum letter height of 3/4 inch (19 mm) for access panel and door markers and similar operational instructions.
  - 1. Stencil Paint: Exterior, gloss, acrylic enamel black, unless otherwise indicated. Paint may be in pressurized spray-can form.
  - 2. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1, unless otherwise indicated.



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## 2.4 VALVE TAGS

- A. Valve Tags: Stamped with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers, with numbering scheme approved by Owner. Provide 5/32-inch (4-mm) hole for fastener.
1. Material: 0.032-inch- (0.8-mm-) thick brass.
  2. Valve-Tag Fasteners: Brass S-hook.
  3. Lettering: Black filled.
  4. Size: Minimum 1-1/2", larger as required for labeling scheme.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 23 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

### 3.2 EQUIPMENT IDENTIFICATION

- A. Install equipment labels with permanent adhesive on or near each item of mechanical equipment.
1. Letter Size: Minimum 3/4-inch (19 mm) for name of units and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
  2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
  3. Locate labels where accessible and visible. Include labels for each piece of mechanical equipment and for the following general categories of equipment:

### 3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe label indicating service on each piping system. Install with flow indication arrows showing direction of material flow in piping.
1. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Pre-tensioned pipe labels. Use size to ensure a tight fit.
  2. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Self-adhesive pipe labels. Use color-coded, self-adhesive plastic tape, covering full circumference of pipe.
  3. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Self-adhesive pipe labels. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches (38 mm) wide, lapped at least 3 inches (75 mm) at both ends of pipe label, and covering full circumference of pipe.

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B. Locate pipe labels as follows:

1. Near (within 24" of) each valve and control device.
2. Near each branch connection, excluding short takeoffs less than ten feet long for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Each side of penetrations through walls, floors, ceilings, and non-accessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 15 feet (4.5 m) along each run.
7. At a minimum of once over each room for each piping system present over that room. Center the label in the pipe run over the room. If pipe length over the room is less than 15 feet than install labels at each wall penetration.

### 3.4 DUCT IDENTIFICATION

A. Install duct labels with permanent adhesive on air ducts in the following color codes:

1. Green: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.  
Blue: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
3. Letter Size: Minimum 1-inch (26 mm) and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

B. Stenciled Duct Option: Stenciled labels, showing service and direction of flow, may be provided instead of laminated-plastic duct labels, if lettering larger than 1 inch (25 mm) high is needed for proper identification because of distance from normal location of required identification.

C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 15 feet (4.5 m) in each space where ducts are exposed or concealed by removable ceiling system.

D. Duct marker identification shall indicate the associated fan system (e.g., "EF-3 exhaust").

### 3.5 WARNING LABEL INSTALLATION

A. Write required message on and attach warning labels to equipment and other items (e.g., hazardous ductwork systems) where required.

### 3.6 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

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3.7 CLEANING

- A. Clean faces of mechanical identification devices and glass frames of valve schedules.

3.8 TEMPERATURE CONTROL LABEL INSTALLATION

- A. Control panels shall receive equipment labels where the number of the panel matches that on the controls submittal.
- B. All control raceways and junction boxes shall be identified with preprinted self-adhesive vinyl labels.
- C. All cables not located within raceways shall be identified at maximum 25 foot intervals.
- D. Control raceways shall be identified at maximum 15 foot intervals within rooms with no ceiling and at a minimum once over each room the raceway passes through.

END OF SECTION 23 05 53

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## SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes testing, adjusting and balancing HVAC systems to produce design objectives, including the following:
  - 1. Balancing airflow and water flow within distribution systems, including submains, branches and terminals, to indicated quantities according to specified tolerances.
  - 2. Adjusting total HVAC systems to provide indicated quantities.
  - 3. Measuring electrical performance of HVAC equipment.
  - 4. Setting quantitative performance of HVAC equipment.
  - 5. Verifying that automatic control devices are functioning properly.
  - 6. Reporting results of the activities and procedures specified in this Section.

#### 1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TAB Specialist: An entity engaged to perform TAB Work.

#### 1.4 SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice To Proceed, submit documentation that the TAB Contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article. This documentation shall include the following:
  - 1. A list of the names of all individual on-site Field Supervisors and TAB Technicians who may be assigned to the project.
  - 2. A statement that each of the individual listed on-site Field Supervisors and TAB Technicians has met the experience and certification requirements of the specification.

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3. A statement that each of the individual listed on-site Field Supervisors and TAB Technicians has received the required training from the selected Controls Supplier.
  4. A statement noting that apprentice labor may be utilized for lesser skilled tasks if under the direct supervision of one of the listed individual on-site Field Supervisors and TAB Technicians who is on-site at all times the apprentice is working.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
  - C. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
  - D. Pencil-copy initial TAB reports, sent directly to the Engineer, as system TAB progresses.
  - E. Certified TAB reports.
  - F. Instrument calibration reports, to include the following:
    1. Instrument type and make.
    2. Serial number.
    3. Application.
    4. Dates of use.
    5. Dates of calibration. Calibration dates shall be within a period of six months prior to the first recorded measurements on the project site.
  - G. Additional testing reports with verified conditions noted, description of adjustments made and outstanding corrective action items required by other trades.

## 1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Shall meet the following minimum requirements:
  1. TAB Contractor shall be either:
    - a. A current certified member of AABC, registered in the state of the project site.
    - b. A current certified member of NEBB, registered in the state of the project site.
    - c. A registered Professional Engineer licensed in the state of the project site that specialized in the testing, adjusting and balancing of systems with a minimum of ten years of documented experience.
  2. Testing, adjusting and balancing shall be completed under the direct field supervision of the TAB Field Supervisor. The TAB Field Supervisor shall be either:
    - a. A direct employee of the TAB Contractor who is currently certified as an AABC Test and Balance Engineer with at least ten years of demonstrated working experience in the testing, adjusting and balancing of building HVAC systems.

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- b. A direct employee of the TAB Contractor who is currently certified as NEBB Qualified TAB Supervisor with at least ten years of demonstrated working experience in the testing, adjusting and balancing of building HVAC systems.
      - c. A registered Professional Engineer that specialized in the testing, adjusting and balancing of systems with a minimum of ten years of documented experience.
    3. All testing, adjusting and balancing work shall be completed by a TAB technician. The TAB technician shall be either:
      - a. An employee of the TAB Contractor and who is certified by AABC as a test and balance technician.
      - b. An employee of the TAB Contractor and who is certified by NEBB as a qualified TAB technician.
      - c. A registered Professional Engineer that specialized in the testing, adjusting and balancing of systems with a minimum of ten years of documented experience.
    4. In addition to the technical capabilities described herein, the TAB Contractor demonstrates a production capability to plan, control, and integrate manpower and other resources necessary for successful contract completion.
    5. TAB Contractor shall have received software training from the selected Controls Supplier applicable to the software and hardware which will be provided for this project.
    6. TAB Contractor shall have on the project site all required software and hardware necessary from the selected Controls Supplier to perform testing, adjusting and balancing required tasks.
    7. TAB Contractor shall be listed on the Bid Form on bid day.
    8. TAB Contractor shall have at least five years documented experience in the testing, adjusting and balancing of commercial DDC controls. The Owner may ask to verify the qualifications and experience for all field installation technicians assigned to the project prior to the approval of the TAB Contractor.
    9. TAB Contractor shall submit a statement acknowledging agreement with the applicable manufacturer's design guidelines covering the installation of controls and the subsequent requirements of the TAB Contractor.
    10. TAB Contractor shall attend a one hour familiarization session immediately following the project preconstruction meeting.
    11. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
    12. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
  - B. TAB Report Forms: Use standard TAB contractor's forms.
  - C. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

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## 1.6 PROJECT CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## 1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.
- C. The TAB Agent shall telephone the Engineer while on-site TAB work is being undertaken. Provide pencil copy handwritten data directly to the Engineer via fax while on-site TAB work is being undertaken.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements, engage one of the following:
  - 1. Chicago:
    - a. Mechanical Test and Balance, Crown Point, Indiana.
    - b. Independent Testing and Balancing, Wheaton, Illinois.
    - c. Controlled Environmental Testing and Balancing, Schaumburg, Illinois.
    - d. International Test and Balance, Inc., Des Plaines, Illinois.

### 3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the final submittals for HVAC systems and equipment.

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- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
  - E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
  - F. Examine equipment performance data including fan and pump curves.
    - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
    - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
  - G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
  - H. Examine test reports specified in individual system and equipment Sections.
  - I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
  - J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
  - K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
  - L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
  - M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
  - N. Examine system pumps to ensure absence of entrained air in the suction piping.
  - O. Examine operating safety interlocks and controls on HVAC equipment.
  - P. Examine automatic temperature system components to verify the following:
    - 1. Dampers, valves and other controlled devices operate by the intended controller.
    - 2. Dampers and valves are in the position indicated by the controller.



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3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open position. This includes dampers in multi-zone units, mixing boxes and variable air volume terminals.
  4. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.
  5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts and cold walls.
  6. Sensors are located to sense only the intended conditions.
  7. Sequence of operation for control modes is according to the Contract Documents.
  8. Controller setpoints are set at design values. Observe and record system reactions to changes in conditions. Record default setpoints if different from design values.
  9. Interlocked systems are operating.
  10. Changeover from heating to cooling mode occurs according to design values.

- Q. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.3 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
1. Permanent electrical-power wiring is complete.
  2. Hydronic systems are filled, clean, and free of air.
  3. Automatic temperature-control systems are operational.
  4. Equipment and duct access doors are securely closed.
  5. Balance, smoke, and fire dampers are open.
  6. Isolating and balancing valves are open and control valves are operational.
  7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  8. Windows and doors can be closed so indicated conditions for system operations can be met.

### 3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance," ASHRAE 111 NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing," and in this Section.
1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

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- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
    - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
    - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
    - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
  - C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
  - D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity. Submit this plan to all contractors to verify phasing and occupancy concerns. Submit plan to the Engineer prior to execution.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers. Communicate concerns about potential stratification directly to the Engineer.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

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- M. Measure and record for each terminal unit the static air pressure and the damper position (% open) when recording the maximum airflow readings for the space.

### 3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure total airflow.
    - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
  - 2. Measure fan static pressures as follows to determine actual static pressure:
    - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet or through the flexible connection.
    - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
  - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Report the cleanliness status of filters and the time static pressures are measured.
  - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
  - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
  - 6. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
  - 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
  - 8. Replace sheaves and belts as required to deliver the necessary airflow through the system accounting for all system losses. Coordinate final belt and sheave sizes with unit manufacturers. Refer to individual Division 23 specifications for additional information.

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- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
    - 1. Measure airflow of submain and branch ducts.
      - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
    - 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
    - 3. Re-measure each sub-main and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
  - C. Measure air outlets and inlets without making adjustments.
    - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
  - D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
    - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
    - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

### 3.7 BUILDING PRESSURIZATION

- A. Measure building pressurizations across exterior envelope using the blower door test identified in the International Energy Conservation Code Section R402.4.
- B. Report all results in writing.

### 3.8 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
  - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Zero to plus 10 percent.
  - 2. Air Outlets and Inlets: Plus or minus 5 percent.

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### 3.9 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

### 3.10 FINAL REPORT

- A. General: Prepare a certified written report, tabulate and divide the report into separate sections for tested systems and balanced systems.
  - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
  - 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
  - 1. Pump curves.
  - 2. Fan curves.
  - 3. Manufacturers' test data.
  - 4. Field test reports prepared by system and equipment installers.
  - 5. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
  - 1. Title page.
  - 2. Name and address of the TAB contractor.
  - 3. Project name.
  - 4. Project location.
  - 5. Architect's name and address.
  - 6. Engineer's name and address.
  - 7. Contractor's name and address.
  - 8. Report date.
  - 9. Signature of TAB supervisor who certifies the report.
  - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
  - 11. Summary of contents including the following:
    - a. Indicated versus final performance.

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- b. Notable characteristics of systems.
  - c. Description of system operation sequence if it varies from the Contract Documents.
- 12. Nomenclature sheets for each item of equipment.
  - 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  - 14. Notes to explain why certain final data in the body of reports vary from indicated values.
  - 15. Test conditions for fans and pump performance forms including the following:
    - a. Settings for outdoor-, return-, and exhaust-air dampers.
    - b. Conditions of filters.
    - c. Cooling coil, wet- and dry-bulb conditions.
    - d. Face and bypass damper settings at coils.
    - e. Fan drive settings including settings and percentage of maximum pitch diameter.
    - f. Inlet vane settings for variable-air-volume systems.
    - g. Settings for supply-air, static-pressure controller.
    - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
- 1. Quantities of outdoor, supply, return, and exhaust airflows.
  - 2. Water and steam flow rates.
  - 3. Duct, outlet, and inlet sizes.
  - 4. Pipe and valve sizes and locations.
  - 5. Terminal units.
  - 6. Balancing stations.
  - 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
- 1. Unit Data:
    - a. Unit identification.
    - b. Location.
    - c. Make and type.
    - d. Model number and unit size.
    - e. Manufacturer's serial number.
    - f. Unit arrangement and class.
    - g. Discharge arrangement.
    - h. Sheave make, size in inches (mm), and bore.
    - i. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
    - j. Number, make, and size of belts.
    - k. Number, type, and size of filters.
  - 2. Motor Data:
    - a. Motor make, and frame type and size.
    - b. Horsepower and rpm.

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- c. Volts, phase, and hertz.
  - d. Full-load amperage and service factor.
  - e. Sheave make, size in inches (mm), and bore.
  - f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
3. Test Data (Indicated and Actual Values):

- a. Total air flow rate in cfm (L/s).
- b. Total system static pressure in inches wg (Pa).
- c. Fan rpm.
- d. Discharge static pressure in inches wg (Pa).
- e. Filter static-pressure differential in inches wg (Pa).
- f. Preheat-coil static-pressure differential in inches wg (Pa).
- g. Cooling-coil static-pressure differential in inches wg (Pa).
- h. Heating-coil static-pressure differential in inches wg (Pa).
- i. Outdoor airflow in cfm (L/s).
- j. Return airflow in cfm (L/s).
- k. Outdoor-air damper position.
- l. Return-air damper position.
- m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

- a. System identification.
- b. Location.
- c. Coil type.
- d. Number of rows.
- e. Fin spacing in fins per inch (mm) o.c.
- f. Make and model number.
- g. Face area in sq. ft. (sq. m).
- h. Tube size in NPS (DN).
- i. Tube and fin materials.
- j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

- a. Air flow rate in cfm (L/s).
- b. Average face velocity in fpm (m/s).
- c. Air pressure drop in inches wg (Pa).
- d. Outdoor-air, wet- and dry-bulb temperatures in deg. F (deg. C).
- e. Return-air, wet- and dry-bulb temperatures in deg. F (deg. C).
- f. Entering-air, wet- and dry-bulb temperatures in deg. F (deg. C).
- g. Leaving-air, wet- and dry-bulb temperatures in deg. F (deg. C).
- h. Water flow rate in gpm (L/s).
- i. Water pressure differential in feet of head or psig (kPa).
- j. Entering-water temperature in deg. F (deg. C).

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- k. Leaving-water temperature in deg. F (deg. C).
  - l. Refrigerant expansion valve and refrigerant types.
  - m. Refrigerant suction pressure in psig (kPa).
  - n. Refrigerant suction temperature in deg. F (deg. C).
  - o. Inlet steam pressure in psig (kPa).

G. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

- a. System identification.
- b. Location.
- c. Make and type.
- d. Model number and unit size.
- e. Manufacturer's serial number.
- f. Fuel type in input data.
- g. Output capacity in Btu/h (kW).
- h. Ignition type.
- i. Burner-control types.
- j. Motor horsepower and rpm.
- k. Motor volts, phase, and hertz.
- l. Motor full-load amperage and service factor.
- m. Sheave make, size in inches (mm), and bore.
- n. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):

- a. Total air flow rate in cfm (L/s).
- b. Entering-air temperature in deg. F (deg. C).
- c. Leaving-air temperature in deg. F (deg. C).
- d. Air temperature differential in deg. F (deg. C).
- e. Entering-air static pressure in inches wg (Pa).
- f. Leaving-air static pressure in inches wg (Pa).
- g. Air static-pressure differential in inches wg (Pa).
- h. Low-fire fuel input in Btu/h (kW).
- i. High-fire fuel input in Btu/h (kW).
- j. Manifold pressure in psig (kPa).
- k. High-temperature-limit setting in deg. F (deg. C).
- l. Operating set point in Btu/h (kW).
- m. Motor voltage at each connection.
- n. Motor amperage for each phase.
- o. Heating value of fuel in Btu/h (kW).



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H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:
  - a. System identification.
  - b. Location.
  - c. Make and type.
  - d. Model number and size.
  - e. Manufacturer's serial number.
  - f. Arrangement and class.
  - g. Sheave make, size in inches (mm), and bore.
  - h. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
2. Motor Data:
  - a. Motor make, and frame type and size.
  - b. Horsepower and rpm.
  - c. Volts, phase, and hertz.
  - d. Full-load amperage and service factor.
  - e. Sheave make, size in inches (mm), and bore.
  - f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
  - g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
  - a. Total airflow rate in cfm (L/s).
  - b. Total system static pressure in inches wg (Pa).
  - c. Fan rpm.
  - d. Discharge static pressure in inches wg (Pa).
  - e. Suction static pressure in inches wg (Pa).
  - f. System leakage data. Report on system leakage as the difference between the airflows measured at the fan inlet traverse and the summation of airflows measured at the spaces served. Measure fan airflows while the space airflows are all simultaneously at their maximum airflow settings. For leakage rates greater than 3%, perform branch traverse airflow readings to identify locations of leakage.

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:
  - a. System and air-handling-unit number.
  - b. Location and zone.
  - c. Traverse air temperature in deg. F (deg. C).
  - d. Duct static pressure in inches wg (Pa).
  - e. Duct size in inches (mm).
  - f. Duct area in sq. ft. (sq. m).
  - g. Indicated air flow rate in cfm (L/s).

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- h. Indicated velocity in fpm (m/s).
  - i. Actual air flow rate in cfm (L/s).
  - j. Actual average velocity in fpm (m/s).
  - k. Barometric pressure in psig (Pa).

### 3.11 INSPECTIONS

#### A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:
  - a. Measure airflow of at least 10 percent of air outlets.
  - b. Measure water flow of at least 5 percent of terminals.
  - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
  - d. Verify that balancing devices are marked with final balance position.
  - e. Note deviations from the Contract Documents in the final report.

#### B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Engineer.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Engineer of Record.
3. Engineer shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

#### C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

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D. Prepare test and inspection reports.

END OF SECTION 23 05 93

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## SECTION 23 07 00 - HVAC INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Insulation Materials:
  - a. Flexible elastomeric.
  - b. Mineral fiber.
- 2. Insulating cements.
- 3. Adhesives.
- 4. Mastics.
- 5. Sealants.
- 6. Factory-applied jackets.
- 7. Tapes.
- 8. Securements.
- 9. Corner angles.

- B. Related Sections:

- 1. Division 22 Section "Plumbing Insulation."
- 2. Division 23 Section "Metal Ducts" for duct liners.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any). Provide a scheduled listing in the submittal of each type of pipe service, duct service or equipment type that insulates with the thickness and jacket noted for each service and type.

- B. Shop Drawings:

- 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
- 2. Detail insulation application at pipe expansion joints for each type of insulation.

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3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
  4. Detail removable insulation at piping specialties, equipment connections, and access panels.
  5. Detail application of field-applied jackets.
  6. Detail application at linkages of control devices.
  7. Detail field application for each equipment type.

C. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

B. Storage: Insulation material shall be stored to prevent dirt and moisture contamination.

#### 1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

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## 1.7 SCHEDULING

- A. Schedule insulation application after satisfactory pressure testing systems and, where required, after installing and testing heat tracing.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## PART 2 - PRODUCTS

### 2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Aeroflex USA Inc.; Aerocel and Aerocel (EPDM).
    - b. Armacell LLC; AP Armaflex and UT Solaflex (EPDM).
    - c. K-Flex USA; Insul-Sheet, K-Flex and Kflex HT (EPDM).
  - 2. Where flexible elastomeric (EPDM) is required, it shall be suitable for continuous operation up to at least 250 deg. F and down to at least -40 deg. F and be U.V. resistant in accordance with ASTM G7/G90.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Duct Wrap.

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- b. Johns Manville; Microlite.
  - c. Knauf Insulation; Duct Wrap.
  - d. Manson Insulation Inc.; Alley Wrap.
  - e. Owens Corning; All-Service Duct Wrap.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.
    - d. Knauf Insulation; Insulation Board.
    - e. Manson Insulation Inc.; AK Board.
    - f. Owens Corning; Fiberglas 700 Series.
- I. Mineral-Fiber, Preformed Pipe Insulation:
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Fibrex Insulations Inc.; Coreplus 1200.
    - b. Johns Manville; Micro-Lok.
    - c. Knauf Insulation; Earthwool 1000.
    - d. Manson Insulation Inc.; Alley-K.
    - e. Owens Corning; Fiberglas Pipe Insulation.
  - 2. Type I, 850 deg. F (454 deg. C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semi-rigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. (40 kg/cu. m) or more. Thermal conductivity (k-value) at 100 deg. F (55 deg. C) is 0.29 Btu x in./h x sq. ft. x deg. F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; CrimpWrap.
    - b. Johns Manville; MicroFlex.
    - c. Knauf Insulation; Pipe and Tank Insulation.
    - d. Manson Insulation Inc.; AK Flex.

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- e. Owens Corning; Fiberglas Pipe and Tank Insulation.

## 2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Insulco, Division of MFS, Inc.; Triple I.
    - b. P. K. Insulation Mfg. Co., Inc.; Super-Stik.

## 2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Aeroflex USA Inc.; Aero seal.
    - b. Armacell LCC; 520 Adhesive.
    - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
    - d. K-Flex USA.
    - e. RBX Corporation; Rubatex Contact Adhesive.
  - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Childers Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
  - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).



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D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Childers Products, Division of ITW; CP-82.
- b. Foster Products Corporation, H. B. Fuller Company; 85-20.
- c. ITW TACC, Division of Illinois Tool Works; S-90/80.
- d. Marathon Industries, Inc.; 225.
- e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Dow Chemical Company (The); 739, Dow Silicone.
- b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
- c. P.I.C. Plastics, Inc.; Welding Adhesive.
- d. Speedline Corporation; Speedline Vinyl Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Childers Products, Division of ITW; CP-35.
- b. Foster Products Corporation, H. B. Fuller Company; 30-90.
- c. ITW TACC, Division of Illinois Tool Works; CB-50.
- d. Marathon Industries, Inc.; 590.
- e. Mon-Eco Industries, Inc.; 55-40.
- f. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.

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3. Service Temperature Range: Minus 20 to plus 180 deg. F (Minus 29 to plus 82 deg. C).
  4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
  5. Color: White.

## 2.5 SEALANTS

### A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Products, Division of ITW; CP-76.
  - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
  - c. Marathon Industries, Inc.; 405.
  - d. Mon-Eco Industries, Inc.; 44-05.
  - e. Pittsburgh Corning Corporation; Pittseal 444.
  - f. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg. F (Minus 73 to plus 149 deg. C).
5. Color: White or gray.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Products, Division of ITW; CP-76-8.
  - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
  - c. Marathon Industries, Inc.; 405.
  - d. Mon-Eco Industries, Inc.; 44-05.
  - e. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg. F (Minus 40 to plus 121 deg. C).
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Products, Division of ITW; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg. F (Minus 40 to plus 121 deg. C).
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perms) when tested according to ASTM E 96, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with pressure sensitive acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
  - b. Compac Corp.; 104 and 105.
  - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
  - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Minimum width: 3 inches (75 mm).
3. Thickness: 11.5 mils (0.29 mm).
4. Adhesion: 45 ounces force/inch (1.0 N/mm) in width.

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5. Elongation: 2 percent.
  6. Tensile strength: 40 lbf/inch (7.2 N/mm) in width.
  7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
  8. WVTR: 0.02 perms per ASTM E96.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic pressure sensitive adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    - b. Compac Corp.; 110 and 111.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
    - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
  2. Minimum width: 3 inches.
  3. Minimum thickness: 6.5 mils.
  4. Minimum adhesion: 40 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Minimum tensile strength: 40 lbf/inch (7.2 N/mm) in width.
  7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
  8. WVTR: 0.02 perms per ASTM E96.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
    - b. Compac Corp.; 130.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
    - d. Venture Tape; 1506 CW NS.
  2. Width: 2 inches (50 mm).
  3. Thickness: 6 mils (0.15 mm).
  4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
  5. Elongation: 500 percent.
  6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
    - b. Compac Corp.; 120.

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- c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
  - d. Venture Tape; 3520 CW.
2. Width: 2 inches (50 mm).
  3. Thickness: 3.7 mils (0.093 mm).
  4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
  5. Elongation: 5 percent.
  6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

E. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Childers Products; Bands.
  - b. PABCO Metals Corporation; Bands.
  - c. RPR Products, Inc.; Bands.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 3/4 inch (19 mm) wide with wing seal .
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with wing seal .

F. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin (or other material as required for stainless or aluminum ductwork), fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) AGM Industries, Inc.; CWP-1.
    - 2) GEMCO; CD.
    - 3) Midwest Fasteners, Inc.; CD.
    - 4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin (or other material as required for stainless steel or aluminum duct), fully annealed for capacitor-discharge welding, 0.135-inch- (3.5-mm-) diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) AGM Industries, Inc.; CWP-1.
    - 2) GEMCO; Cupped Head Weld Pin.

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- 3) Midwest Fasteners, Inc.; Cupped Head.
  - 4) Nelson Stud Welding; CHP.
3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
      - 2) GEMCO; Perforated Base.
      - 3) Midwest Fasteners, Inc.; Spindle.
    - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
    - c. Spindle: Fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
    - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
  4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm) thick, sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) AGM Industries, Inc.; RC-150.
      - 2) GEMCO; R-150.
      - 3) Midwest Fasteners, Inc.; WA-150.
      - 4) Nelson Stud Welding; Speed Clips.
    - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
  5. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) GEMCO.
      - 2) Midwest Fasteners, Inc.

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- G. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.
  - H. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.
    - 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. C & F Wire.
      - b. Childers Products.
      - c. PABCO Metals Corporation.
      - d. RPR Products, Inc.

## 2.8 CORNER ANGLES

- A. Aluminum Corner Angles: 0.040 inch (1.0 mm) thick, minimum 1 by 1 inch (25 by 25 mm), aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005; Temper H-14.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
  - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
  - 2. Verify that surfaces to be insulated are clean and dry.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.
- C. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

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### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.



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2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
  3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.
    - a. For below ambient services, apply vapor-barrier mastic over staples.
  4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
  5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
  2. Testing agency labels and stamps.
  3. Nameplates and data plates.
  4. Manholes.
  5. Handholes.
  6. Cleanouts.

### 3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
  2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
  3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
  4. Seal jacket to roof flashing with flashing sealant.

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- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
  - C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
    - 1. Seal penetrations with flashing sealant.
    - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant. Fabricate a cellular glass "box" around the pump which is removable. Utilize flexible elastomeric at penetrations and seal with silicone. Allow for removal of suction diffuser screen if a suction diffuser is installed.
    - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
    - 4. Seal jacket to wall flashing with flashing sealant.
  - D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
  - E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches (50 mm).
    - 1. Comply with requirements in Division 7 Section "Firestopping" and fire-resistive joint sealers.
  - F. Insulation Installation at Floor Penetrations:
    - 1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches (50 mm).
    - 2. Pipe: Install insulation continuously through floor penetrations.
    - 3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 7 Section "Firestopping."

### 3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturers' recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
  - 1. Install pipe insulation to outer diameter of pipe flange.

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2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
  3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
  4. Secure insulation to flanges and seal seams with manufacturers' recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

### 3.6 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

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4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's written recommended coverage rates.
2. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
  - a. On exposed ductwork where no ceiling is installed, on all duct sizes greater than 12 inch span, place pins along longitudinal centerline of duct on both duct sides and on the duct bottom. Space pins 3 inches (75 mm) maximum from insulation section joints, and maximum 16 inches (400 mm) on center each way from other pins.
  - b. On concealed ductwork, on duct with dimensions larger than 24 inches, place pins at a maximum of 16 inches (400 mm) on center each way from other pins and 3 inches (75 mm) maximum from insulation section joints. Install pins on any side or the bottom with dimension greater than 24". Install additional pins to hold insulation tightly against the duct surface at structural steel cross bracing.
  - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
  - d. Do not over-compress insulation during installation.
  - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing. Tape shall extend at least 2 inches in all directions from the pin.
3. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples installed at a maximum of 3 inches on center between staples. Install vapor barrier tape at

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each joint. Vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant may be used at joints, seams, and protrusions in lieu of vapor barrier tape.

- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
  - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
4. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches (450 mm) o.c.
  5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.
  7. Insulate duct mounted coils located within terminal units (terminal boxes, supply air valves, fan coil units) by extending external duct insulation over the terminal unit a minimum of two inches. Insulate over return bends.
  8. Insulate the external side of diffusers as noted on the details.

F. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for minimum 50 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
  - a. On duct sides with dimensions 18 inches (450 mm) and smaller, place pins along longitudinal centerline of duct. Space 3 inches (75 mm) maximum from insulation end joints, and 16 inches (400 mm) o.c.
  - b. On duct sides with dimensions larger than 18 inches (450 mm), space pins 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
  - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
  - d. Do not over-compress insulation during installation.
  - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

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4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch (13-mm) outward-clinching staples, 1 inch (25 mm) o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F (10 deg C) at 18-foot (5.5-m) intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches (75 mm).
  5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
  6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- (150-mm-) wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches (150 mm) o.c.

### 3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
  1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
  2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
  3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
  1. Draw jacket material smooth and tight.
  2. Install lap or joint strips with same material as jacket.
  3. Secure jacket to insulation with manufacturer's recommended adhesive.
  4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
  5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

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- C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
    - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
  - D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

### 3.8 FINISHES

- A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 9 painting Sections.
  - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
    - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

### 3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

### 3.10 DUCT INSULATION SCHEDULE, GENERAL

- A. Comply with the requirements in "Indoor Duct and Plenum Insulation Schedule" and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" Articles for where insulating materials shall be applied.
- B. Items Not Insulated:
  - 1. Fibrous-glass ducts.

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2. Factory-insulated flexible ducts.
  3. Factory-insulated plenums and casings.
  4. Flexible connectors.
  5. Vibration-control devices.
  6. Factory-insulated access panels and doors.

- C. Products shall not contain asbestos, lead, mercury or mercury compounds.
- D. Products that come into contact with stainless steel shall be qualified as acceptable according to ASTM C795.

### 3.11 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, rectangular, round and flat oval, supply air duct insulation shall be the following:
  1. Mineral-Fiber Blanket: 2 inches minimum thick and 1.0-lb/cu. ft. nominal density to achieve a minimum installed (at 25% compression) R value of 6.0 at 75 deg. F. mean temperature.
- B. Concealed, rectangular, round and flat oval, return air duct insulation shall be the following:
  1. Mineral-Fiber Blanket: 1-1/2 inches minimum thick and 0.75-lb/cu. ft. nominal density to achieve a minimum installed R value of 3.5 at 75 deg. F mean temperature.
- C. Concealed, rectangular, round and flat-oval, outdoor-air duct and energy recovery device discharge air duct insulation shall be the following:
  1. Mineral-Fiber Blanket: 2 inches (50 mm) minimum thick and 1.0-lb/cu. ft. nominal density to achieve a minimum installed R value of 6.0 at 75 deg. F mean temperature.
  2. Insulate energy recovery device discharge air duct from the outlet of the energy recovery device to the penetration of the building exterior.
- D. Concealed and exposed rectangular and round, exhaust-air and relief air duct insulation between isolation damper and penetration of building exterior shall be the following:
  1. Mineral-Fiber Blanket: 2 inches (50 mm) thick and 1.0-lb/cu. ft. nominal density.
- E. Concealed and Exposed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket insulating system; thickness as required to achieve 2-hour fire rating.
- F. Exposed, supply-air duct, relief air duct, return air duct, outdoor air duct and energy recovery device discharge air duct insulation shall be the following:
  1. Flexible Elastomeric: 1 inch (25 mm) thick on edges, corners, and flanges of ductwork which are less than 6'-6" above finished floor with space below them for personal access.



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2. Mineral-Fiber Blanket: 2 inches (50 mm) thick and 1.0-lb/cu. ft. nominal density on surfaces which are more than 8'-0" above finished floor.
  3. Mineral-Fiber Board: 2 inches (50 mm) thick and 6-lb/cu. ft. nominal density for ductwork which is less than 8'-0" above finished floor.

G. Concealed and exposed ductwork with fire rated blanket insulating system: Fire rated blanket insulating system thickness as required to achieve 2-hour fire rating.

H. Concealed and exposed oven and warewash exhaust duct insulation shall be the following: 2 inches minimum thick and 1.0 lb/cu.ft. nominal density to achieve a minimum installed (at 25% compression) R value of 6.0 at 75 deg. F mean temperature.

### 3.12 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.

B. Concealed, and exposed, rectangular, round and flat-oval, supply-air, return air and exhaust air duct insulation shall be the following:

1. Mineral-Fiber Board: 4 inches minimum thick, 6-lb/cu. ft. (96-kg/cu. m) nominal density to achieve a minimum R value of 17.0 at 75 deg. F. mean temperature.
2. Elastomeric (EPDM): 4 inches minimum thick with additional UV resistant coating furnished by the insulation manufacturer.

### 3.13 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from the materials listed is at the Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

C. Products shall not contain asbestos, lead, mercury or mercury compounds.

D. Products that come into contact with stainless steel shall be qualified as acceptable according to ASTM C795.

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3.14 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg. F (16 Deg. C):

1. All Pipe Sizes: Insulation shall be the following:
  - a. Flexible Elastomeric: 3/4 inch (19 mm) thick..

B. Refrigerant Suction, Liquid, and Hot-Gas Piping and Tubing:

1. NPS 1-1/2 and Smaller: Insulation shall be the following:
  - a. Flexible elastomeric: 1 inch (25 mm) thick.
2. NPS 1-5/8 and Larger:
  - a. Flexible elastomeric: 1-1/2 inches thick.

3.15 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping and Tubing:

1. All Pipe Sizes: Insulation shall be the following:
  - a. Flexible Elastomeric (EPDM): 2 inches (50 mm) thick.

3.16 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option..

END OF SECTION 23 07 00

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## SECTION 23 23 00 - REFRIGERANT PIPING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes refrigerant piping used for air-conditioning applications.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Line Test Pressure for Refrigerant R-22:

1. Suction Lines for Air-Conditioning Applications: 185 psig (1276 kPa).
2. Suction Lines for Heat-Pump Applications: 325 psig (2241 kPa).
3. Hot-Gas and Liquid Lines: 325 psig (2241 kPa).

- B. Line Test Pressure for Refrigerant R-134a:

1. Suction Lines for Air-Conditioning Applications: 115 psig (793 kPa).
2. Suction Lines for Heat-Pump Applications: 225 psig (1551 kPa).
3. Hot-Gas and Liquid Lines: 225 psig (1551 kPa).

- C. Line Test Pressure for Refrigerant R-407C:

1. Suction Lines for Air-Conditioning Applications: 230 psig (1586 kPa).
2. Suction Lines for Heat-Pump Applications: 380 psig (2620 kPa).
3. Hot-Gas and Liquid Lines: 380 psig (2620 kPa).

- D. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).
2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).
3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

#### 1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

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- B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
  - C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

#### 1.5 PRODUCT STORAGE AND HANDLING

- A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

#### 1.6 COORDINATION

- A. Coordinate size and location of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."
- B. Coordinate layout and installation of refrigerant piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- C. Coordinate pipe sleeve installations for foundation wall penetrations.
- D. Coordinate pipe sleeve installations for penetrations in exterior walls and floor assemblies. Coordinate with requirements for firestopping specified in Division 7 Section "Firestopping" for materials and methods for sealing pipe penetrations through fire and smoke barriers.
- E. Coordinate pipe fitting pressure classes with products specified in related Sections.

### PART 2 - PRODUCTS

#### 2.1 COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22, streamlined pattern.
- C. Wrought-Copper Unions: ASME B16.22, female pattern, brass-to-brass seat, ground joints, socket to socket connections.
- D. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (silver) or BAg-2 (silver).
- E. Flexible Connectors:
  - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
  - 2. End Connections: Socket ends.

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3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.
  4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).
  5. Maximum Operating Temperature: 250 deg F (121 deg C).

## 2.2 VALVES AND SPECIALTIES

### A. Packed-Angle Valves:

1. Body and Bonnet: Forged brass or cast bronze.
2. Packing: Molded stem, back seating, and replaceable under pressure.
3. Operator: Rising stem.
4. Seat: Non-rotating, self-aligning polytetrafluoroethylene.
5. Seal Cap: Forged-brass or valox hex cap.
6. End Connections: Socket.
7. Working Pressure Rating: 500 psig (3450 kPa).
8. Maximum Operating Temperature: 275 deg F (135 deg C).

### B. Check Valves:

1. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
2. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
3. Piston: Removable polytetrafluoroethylene seat.
4. Closing Spring: Stainless steel.
5. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
6. End Connections: Socket.
7. Maximum Opening Pressure: 0.50 psig (3.4 kPa).
8. Working Pressure Rating: 500 psig (3450 kPa).
9. Maximum Operating Temperature: 275 deg F (135 deg C).

### C. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.
2. Core: Removable ball-type check valve with stainless-steel spring.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Socket.
5. Working Pressure Rating: 500 psig (3450 kPa).

### D. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.
2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and normally closed ac coil.
6. Working Pressure Rating: 400 psig (2760 kPa).

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7. Maximum Operating Temperature: 240 deg F (116 deg C).
  8. Manual operator.
- E. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
  2. Piston, Closing Spring, and Seat Insert: Stainless steel.
  3. Seat Disc: Polytetrafluoroethylene.
  4. End Connections: Threaded.
  5. Working Pressure Rating: 400 psig (2760 kPa).
  6. Maximum Operating Temperature: 240 deg F (116 deg C).
- F. Thermostatic Expansion Valves: Comply with ARI 750.
1. Body, Bonnet, and Seal Cap: Forged brass or steel.
  2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
  3. Packing and Gaskets: Non-asbestos.
  4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
  5. Suction Temperature: 40 deg F (4.4 deg C) or to match system conditions.
  6. Superheat: Adjustable. Factory set for system superheat conditions.
  7. Reverse-flow option (for heat-pump applications).
  8. End Connections: Socket.
  9. Working Pressure Rating: 450 psig (3100 kPa).
  10. Size and Operating Conditions: As recommended by manufacturer of evaporator.
  11. Hot Gas Bypass Provisions: Provide side connection and external equalizer line.
- G. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
  2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
  3. Packing and Gaskets: Non-asbestos.
  4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
  5. Seat: Polytetrafluoroethylene.
  6. Equalizer: External.
  7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and ac coil.
  8. End Connections: Socket.
  9. Set Pressure: Adjustable.
  10. Throttling Range: Maximum 5 psig (34 kPa), sized for capacity equal to last step of compressor unloading.
  11. Working Pressure Rating: 500 psig (3450 kPa).
  12. Maximum Operating Temperature: 240 deg F (116 deg C).
- H. Straight-Type Strainers:
1. Body: Welded steel with corrosion-resistant coating.

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2. Screen: 100-mesh stainless steel in liquid lines less than 1-1/4", 60 mesh in larger lines. 40 mesh in suction lines.
  3. End Connections: Socket.
  4. Working Pressure Rating: 500 psig (3450 kPa).
  5. Maximum Operating Temperature: 275 deg F (135 deg C).
  6. Select mesh size in accordance with manufacturer's recommendations.

I. Angle-Type Strainers:

1. Body: Forged brass or cast bronze.
2. Drain Plug: Brass hex plug.
3. Screen: 100-mesh monel in liquid lines less than 1-1/4", 60 mesh in larger lines. 40 mesh in suction lines..
4. End Connections: Socket.
5. Working Pressure Rating: 500 psig (3450 kPa).
6. Maximum Operating Temperature: 275 deg F (135 deg C).
7. Select mesh size in accordance with manufacturer's recommendations.

J. Moisture/Liquid Indicators:

1. Body: Forged brass.
2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
3. Indicator: Color coded to show moisture content in ppm.
4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
5. End Connections: Socket.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

K. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support. Replaceable.
3. Desiccant Media: Activated alumina.
4. Designed for reverse flow (for heat-pump applications).
5. End Connections: Socket.
6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
7. Maximum Pressure Loss: 1.0 psig at rated flow.
8. Rated Flow: In accordance with evaporator manufacturer's recommendations.
9. Working Pressure Rating: 500 psig (3450 kPa).
10. Maximum Operating Temperature: 240 deg F (116 deg C).

L. Mufflers:

1. Body: Welded steel with corrosion-resistant coating.

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2. End Connections: Socket.
  3. Working Pressure Rating: 500 psig (3450 kPa).
  4. Maximum Operating Temperature: 275 deg F (135 deg C).
  5. Maximum Pressure Loss: 0.5 psig at rated flow.

M. Receivers: Comply with ARI 495.

1. Comply with ASME Boiler and Pressure Vessel Code for receivers larger than 6 inches; listed and labeled by an NRTL.
2. Comply with UL 207; listed and labeled by an NRTL.
3. Body: Welded steel with corrosion-resistant coating.
4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
5. End Connections: Socket.
6. Working Pressure Rating: 500 psig (3450 kPa).
7. Maximum Operating Temperature: 275 deg F (135 deg C).

N. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket.
3. Working Pressure Rating: 500 psig (3450 kPa).
4. Maximum Operating Temperature: 275 deg F (135 deg C).

## 2.3 REFRIGERANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-22: Monochlorodifluoromethane.

C. ASHRAE 34, R-134a: Tetrafluoroethane.

D. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.

E. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.



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## PART 3 - EXECUTION

### 3.1 PIPING APPLICATIONS FOR REFRIGERANT R-22, R-134a, R407C, R-410A

- A. Suction Lines, Hot Gas Lines and Liquid Lines for Conventional Air-Conditioning Applications: Copper, Type ACR and wrought-copper fittings with brazed joints.
  - 1. Above ground outside building and on roof: Drawn temper tubing.
  - 2. Above ground within building: Annealed temper (soft) tubing.
  - 3. Below ground: Type L (B) tubing.
- B. Safety-Relief-Valve Discharge Piping: Copper, Type L (B), drawn-temper tubing and wrought-copper fittings with brazed joints.

### 3.2 VALVE AND SPECIALTY APPLICATIONS

- A. Install packed-angle valves in suction and discharge lines of compressor for gage taps at hot gas bypass regulators and directly on each side of strainers and dryers.
- B. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- C. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- D. Install check valves in condenser liquid lines on multiple condenser systems.
- E. Except as otherwise indicated, install packed-angle valves on inlet and outlet side of filter dryers, strainers and evaporators.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top. Install all wiring and conduit necessary for a complete functioning installation.
- G. Install thermostatic expansion valves as close as possible to distributors on evaporators.
  - 1. Install valve so diaphragm case is warmer than bulb.
  - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
  - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
  - 4. Install in accordance with evaporator manufacturer's instructions.
- H. Install packed angle valve in liquid line between receiver shutoff valve and thermostatic expansion valve for system charging.

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- I. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
  - J. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube, in liquid line leaving receiver, in liquid line leaving condenser and on leaving side of liquid solenoid valves.
  - K. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
    - 1. Solenoid valves.
    - 2. Thermostatic expansion valves.
    - 3. Hot-gas bypass valves.
    - 4. Compressor suction valves.
  - L. Install replaceable core filter dryers in liquid line between compressor and thermostatic expansion valve and in the suction line at the compressor.
  - M. Install receivers sized to accommodate pump-down charge. Install solenoid valves in liquid lines of systems with pump out or pump down compressor control.
  - N. Install flexible connectors at compressors.

### 3.3 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.

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- I. Select system components with pressure rating equal to or greater than system operating pressure.
  - J. Refer to Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operation" for solenoid valve controllers, control wiring, and sequence of operation.
  - K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
  - L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
  - M. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation. Pipe passing through exterior building walls shall be caulked weathertight with non-hardening epoxy type waterproof compound.
  - N. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.
  - O. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.
  - P. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
  - Q. Slope refrigerant piping as follows:
    - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
    - 2. Install horizontal suction lines with a uniform slope downward to compressor.
    - 3. Install traps and double risers to entrain oil in vertical runs.
    - 4. Liquid lines may be installed level.
  - R. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
  - S. Seal penetrations through fire and smoke barriers according to Division 07 Section "Firestopping."
  - T. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
  - U. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.

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- V. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

### 3.4 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
  - 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
  - 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

### 3.5 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Install the following pipe attachments:
  - 1. Adjustable steel clevis hangers for individual horizontal runs.
  - 2. Spring hangers to support vertical runs.
  - 3. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
  - 1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
  - 2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
  - 3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).
  - 4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
  - 5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).
  - 6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

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7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).
  8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
  9. NPS 4 (DN 100): Maximum span, 10 feet; minimum rod size, 1/2 inch (13 mm).

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).
2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).
3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).
4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multi-floor vertical runs at least at each floor.

### 3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
  - a. Fill system with nitrogen to the required test pressure.
  - b. System shall maintain test pressure at the manifold gage throughout duration of test.
  - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
  - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

### 3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).
4. Charge system with a new filter-dryer core in charging line.

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### 3.8 ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
  - 1. Open shutoff valves in condenser water circuit.
  - 2. Verify that compressor oil level is correct.
  - 3. Open compressor suction and discharge valves.
  - 4. Open refrigerant valves except bypass valves that are used for other purposes.
  - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 23 23 00

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## SECTION 23 33 00 - AIR DUCT ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Backdraft dampers.
  - 2. Pressure relief doors.
  - 3. Manual volume dampers.
  - 4. Fire dampers.
  - 5. Ceiling dampers.
  - 6. Duct silencers.
  - 7. Turning vanes.
  - 8. Duct access panel assemblies.
  - 9. Flexible connectors.
  - 10. Flexible ducts.
  - 11. Duct accessory hardware.

#### 1.3 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.
- C. Perform NFPA 90A acceptance tests and document results. Replace fusible links at the completion of acceptance tests.

#### 1.4 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
  - 1. Galvanized Coating Designation: G90 (Z275).
  - 2. Exposed-Surface Finish: Mill phosphatized.
- C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- D. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

### 2.2 BACKDRAFT DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Air Balance Inc.; a division of Mestek, Inc.
  - 2. American Warming and Ventilating; a division of Mestek, Inc.
  - 3. Cesco Products; a division of Mestek, Inc.
  - 4. Greenheck Fan Corporation.
  - 5. Nailor Industries Inc.
  - 6. NCA Manufacturing, Inc.
  - 7. Pottorff; a division of PCI Industries, Inc.
  - 8. Ruskin Company.
  - 9. SEMCO Incorporated.
  - 10. Vent Products Company, Inc.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 2500 fpm.
- D. Maximum System Pressure: Matching ductwork design pressure.
- E. Frame: 0.063-inch- (1.6-mm-) thick extruded aluminum, with welded corners and mounting flange.



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- F. Blades: Multiple single-piece blades, maximum 6-inch (150-mm) width, 0.025-inch- (0.6-mm-) thick, roll-formed aluminum with sealed edges.
  - G. Blade Action: Parallel.
  - H. Blade Seals: Extruded vinyl, mechanically locked.
  - I. Blade Axles:
    - 1. Material: Non-ferrous metal.
    - 2. Diameter: 0.20 inch (5 mm).
  - J. Tie Bars and Brackets: Aluminum.
  - K. Return Spring: Adjustable tension.
  - L. Bearings: Steel ball or synthetic pivot bushings.
  - M. Accessories:
    - 1. Adjustment device to permit setting for varying differential static pressure.
    - 2. Counterweights and spring-assist kits for vertical airflow installations.
    - 3. Chain pulls.
    - 4. Screen Mounting: Front mounted in sleeve.
      - a. Sleeve Thickness: 20-gage (1.0-mm) minimum.
      - b. Sleeve Length: 6 inches (152 mm) minimum.
    - 5. Screen Material: Aluminum.
    - 6. Screen Type: Insect.
    - 7. 90-degree stops..

## 2.3 MANUAL VOLUME DAMPERS

- A. Small, Low Pressure, Steel, Manual Volume Dampers:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Air Balance Inc.; a division of Mestek, Inc.
    - b. American Warming and Ventilating; a division of Mestek, Inc.
    - c. Cesco.
    - d. Greenheck.
    - e. Lindab.
    - f. Metalaire, Inc.
    - g. Nailor Industries Inc.
    - h. Pottorff; a division of PCI Industries, Inc.

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- i. Ruskin Company.
    - j. Vent Products Company, Inc.
  2. Standard leakage rating, with linkage outside airstream.
  3. Suitable for horizontal or vertical applications.
  4. Frames:
    - a. Hat-shaped, galvanized-steel channels, 0.052-inch minimum thickness.
    - b. Mitered and welded corners.
    - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
    - d. Maximum size 12" X 12".
    - e. Suitable for 2 inch w.g. pressure class construction.
  5. Blades:
    - a. Multiple or single blade.
    - b. Parallel- or opposed-blade design.
    - c. Stiffen damper blades for stability.
    - d. Galvanized-steel, 0.040-inch thick.
    - e. Locking hand quadrant and 2" standoff mounting bracket for all insulated ductwork applications.
  6. Blade Axles: Galvanized steel.
  7. Bearings:
    - a. Molded synthetic.
    - b. Dampers in ducts with pressure classes of 3-inch wg (750 Pa) or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
  8. Tie Bars and Brackets: Galvanized steel.
  9. Provide stainless and aluminum dampers to match ductwork construction where dampers are shown in stainless or aluminum ductwork.

B. Larger Size or Higher Pressure, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
  - a. Air Balance, Inc., a division of Mestek, Inc.
  - b. American Warming and Ventilating; a division of Mestek, Inc.
  - c. Cesco.
  - d. Greenheck.
  - e. Lindab.
  - f. Metalaire, Inc.
  - g. Nailor Industries, Inc.
  - h. Pottorff; a division of PCI Industries, Inc.
  - i. Ruskin Company.
  - j. Vent Products Company, Inc.

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2. Pressure classes of 3-inch w.g. or higher or 14" X 14" and larger duct size:
    - a. Multiple opposed blade design.
    - b. End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
    - c. Suitable for 2000 fpm velocity at the width and height required.
    - d. Jackshaft to operate multi-section dampers from one side.
    - e. Locking hand quadrant and 2" stand-off mounting bracket.
    - f. Minimum 16 gauge frame thickness.
    - g. Linkage out of the airstream.
    - h. Flanged frame on both entering and leaving faces.
  3. Provide stainless and aluminum dampers to match ductwork construction where dampers are shown in stainless or aluminum ductwork.

C. Jackshaft:

1. Size: 1-inch (25-mm) diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting for all pressure class dampers (including low pressure run-outs to diffusers. No bent handles).

## 2.4 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. NCA Manufacturing, Inc.
6. Pottorff; a division of PCI Industries, Inc.
7. Prefco; Perfect Air Control, Inc.
8. Ruskin Company.
9. United Enertech.
10. Vent Products Company, Inc.
11. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

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- B. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.
  - C. Closing rating in ducts up to 4-inch wg (1-kPa) static pressure class and minimum 2000 fpm velocity.
  - D. Fire Rating: 1-1/2 and 3 hours as required.
  - E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.
  - F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
    - 1. Minimum Thickness: 0.052 or 0.138 inch (1.3 or 3.5 mm) thick, as indicated, and of length to suit application.
    - 2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
    - 3. Provide non-breakaway style, seal welded sleeve where the ductwork system is welded.
  - G. Mounting Orientation: Vertical or horizontal as indicated.
  - H. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.
    - 1. Provide double wall airfoil blades for multiple segment dampers.
  - I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
  - J. Heat-Responsive Device: Replaceable, 165 deg. F (74 deg. C) or 212 deg. F (100 deg. C) rated, fusible links.
  - K. Provide 304 stainless steel frame, blades, bearings, jamb seals, axle and linkage for dampers installed within stainless steel duct systems.

## 2.5 CEILING DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Air Balance Inc.; a division of Mestek, Inc.
  - 2. Cesco Products; a division of Mestek, Inc.
  - 3. Greenheck.
  - 4. Nailor Industries Inc.
  - 5. Prefco; Perfect Air Control, Inc.
  - 6. Ruskin Company.
  - 7. United Enertech.

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8. Vent Products Company, Inc.
  9. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. General Requirements:

1. Labeled according to UL 555C by an NRTL.
2. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."

C. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.

D. Blades: Galvanized sheet steel with refractory insulation.

E. Heat-Responsive Device: Replaceable, 165 deg. F (74 deg. C) or 212 deg. F (100 deg. C) rated, fusible links as required.

F. Fire Rating: 2 or 3 hours as required.

## 2.6 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. METALAIRE, Inc.
4. SEMCO Incorporated.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows."

D. Vane Construction: Double wall.

## 2.7 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Ductmate Industries, Inc.

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5. Flexmaster U.S.A., Inc.
  6. Greenheck Fan Corporation.
  7. Kees.
  8. Nailor Industries Inc.
  9. Pottorff; a division of PCI Industries, Inc.
  10. Ruskin.
  11. Ventfabrics, Inc.
  12. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."

1. Door:
  - a. Double wall, rectangular.
  - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
  - c. Hinges and Latches: Piano hinge and cam latches with safety chain.
  - d. Fabricate doors airtight and suitable for duct pressure class.
2. Access doors for ductwork pressure class 3-inch or greater shall include a 1" frame flange for duct mounting (access doors for ductwork pressure class 2-inch and less may be bent over tabs and foam gasketing).[Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
  - a. Access Doors Less Than 12 Inches (300 mm) Square: One hinge and two sash locks.
  - b. Access Doors up to 18 Inches (460 mm) Square: Two hinges and two sash locks.
  - c. Access Doors up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches.
  - d. Access Doors Larger Than 24 by 48 Inches (600 by 1200 mm): Four hinges and two compression latches with outside and inside handles.

## 2.8 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Low Pressure Insulated, Flexible Duct: UL 181, Class 1, 2-ply polymer film supported by helically wound, spring galvanized steel wire; fibrous-glass insulation; black polyethylene fire retardant vapor-barrier film.

1. Pressure Rating and Operating Pressure: 4-inch wg positive and 0.5-inch wg negative.

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2. Maximum Air Velocity: 4000 fpm.
  3. Temperature Range: Minus 20 to plus 175 deg. F.
  4. Insulation R-value: Comply with ASHRAE/IESNA 90.1, minimum R-6.

C. High Pressure Insulated, Flexible Duct: UL 181, Class 1, 2-ply polymer film supported by helically wound, spring galvanized steel wire; fibrous glass insulation, black polyethylene fire retardant vapor barrier film.

1. Pressure Rating: 10-inch wg positive and 2-inch wg negative.
2. Operating Pressure: 6-inch wg positive pressure and 2-inch wg negative minimum all duct sizes.
3. Maximum Air Velocity: 4000 fpm.
4. Temperature Range: Minus 20 to plus 175 deg. F.
5. Insulation R-Value: Comply with ASHRAE/IESNA 90.1, minimum R-6.

D. Flexible Duct Connectors:

1. Clamps: Nylon strap in sizes 3 through 18 inches (75 through 460 mm), to suit duct size.

## 2.9 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

- 
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
    - 1. Install steel volume dampers in steel ducts.
    - 2. Install aluminum volume dampers in aluminum ducts.
  - E. Set dampers to fully open position before testing, adjusting, and balancing.
  - F. Install test holes at fan inlets and outlets and elsewhere as indicated.
  - G. Install fire and smoke dampers according to UL listing written installation instructions. Install manufacturer's UL listed optional sealant around the full perimeter of the angle on both sides of the wall. Install duct sealant for the full perimeter of the breakaway connections in accordance with the manufacturer's written UL listing installation instructions.
  - H. Connect ducts to duct silencers rigidly.
  - I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
    - 1. On both sides of duct coils.
    - 2. Upstream and downstream from duct filters.
    - 3. At outdoor-air intakes and mixed-air plenums.
    - 4. At drain pans and seals.
    - 5. Downstream from control dampers, backdraft dampers, and equipment.
    - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links or to clean duct detectors.
    - 7. Control devices requiring inspection, specifically humidity sensors, airflow sensors and pressure sensors.
    - 8. Elsewhere as indicated. Note that not all access doors required may be indicated on the drawings. Provide in bid to provide and install access doors as specified in addition to those shown on the drawings.
  - J. Install access doors with swing against duct static pressure.
  - K. Install external angle duct reinforcement across the long side of the duct at each access door which is greater than 14" in dimension.
  - L. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
  - M. Install flexible connectors to connect ducts to equipment supported by vibration isolators.
  - N. For fans developing static pressures of 5-inch wg (1250 Pa) and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.



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- O. Connect terminal units to supply ducts directly or with maximum 12-inch (300-mm) lengths of flexible duct. Do not use flexible ducts to change directions.
  - P. Connect light troffer boots with maximum 60-inch (1500-mm) lengths of flexible duct clamped or strapped in place.
  - Q. Connect diffusers to ducts with maximum 96-inch lengths of flexible duct clamped or strapped in place unless indicated length differs on drawings.
  - R. Connect flexible ducts to metal ducts with draw bands.
  - S. Install flexible duct hangers at least once per segment such that each flexible duct is supported a minimum of three times, counting the two end connections. Support at internals no greater than 5 feet and as required such that flexible duct does not contact the ceiling, ceiling hangers, lighting, lighting hangers or piping. Maximum permissible sag is 0.5 inch per foot of spacing between supports. A connection to another duct or to equipment at each end is considered a support point. Flexible duct hangers shall be at least 1.0" in width where they contact the flexible duct.
  - T. Install duct test holes where required for testing and balancing purposes.
  - U. Utilize high pressure flexible duct on the inlet of supply terminal units where the use of flexible duct is indicated on the drawings. Utilize high pressure flexible duct on the discharge side of exhaust valves where the use of flexible duct is indicated on the drawings.

### 3.2 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.
6. Adjust pressure relief doors for relief setting.

#### B. NFPA 90A Acceptance Testing:

1. Perform NFPA 90A acceptance testing for each fire damper and each fire/smoke damper.
2. Acceptance test demonstrating removal and reinstallation of fusible links shall be completed only after all above ceiling installations are complete to confirm acceptable access. Under no circumstances shall the test demonstrations be undertaken greater than two weeks prior to Substantial Completion award is finalized.
3. Test report contents; for each damper list:
  - a. Damper size.
  - b. Room number the damper was accessed from.

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- c. Access means (duct access door or exposed face).
  - d. Results of link removal and reinstallation.
  - e. Name of the person testing the damper.
  - f. Date test was completed.
  - g. The Substantial Completion Date for the area in which the particular damper is located.
  - h. Yes check box that the test date is no greater than two weeks prior to the Substantial Completion date.
4. Relocate the work of any trade which does not provide for required maintenance access to fusible links. See Division 23 Section "Common Work Results for HVAC" coordination requirements.
  5. Submit acceptance test report results prior to occupancy of the building.

END OF SECTION 23 33 00

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## SECTION 23 34 23 - HVAC POWER VENTILATORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. In-line centrifugal fans.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on 700 feet above sea level.
- B. Operating Limits: Classify according to AMCA 99.

#### 1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
  - 1. Certified fan performance curves with system operating conditions indicated.
  - 2. Certified fan sound-power ratings.
  - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
  - 4. Material thickness and finishes, including color charts.
  - 5. Dampers, including housings, linkages, and operators.
  - 6. Roof curbs.
  - 7. Fan speed controllers.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

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## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

## 1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

## 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Final Fan Belts: Two sets for each belt-driven fan. Field installed and sized by the Testing, Adjusting and Balancing Contractor. Sized as required to deliver the necessary airflow through the system accounting for all system losses.
  - 2. Final Fan Sheave: One set for each belt-driven fan. Field installed and sized by the Testing, Adjusting and Balancing Contractor. Sized as required to deliver the necessary airflow through the system accounting for all system losses.

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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Aerovent; a Twin City Fan Company.
  - 2. Greenheck.
  - 3. Loren Cook Company.
  - 4. JencoFan; Div. of Breidert Air Products.
  - 5. Penn Barry.
  - 6. Twin City Fan and Blower.

### 2.2 IN-LINE CENTRIFUGAL FANS

- A. Description: In-line, belt driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
- B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
- C. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
- D. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- E. Accessories: Refer to Fan Schedule on drawings for individual fan requirements.

### 2.3 MOTORS

- A. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
- B. Roof Ventilator Direct Drive Fans with Single Phase Motors: Furnish electronically commutated (EC) motor to convert AC power to DC power. Furnish a speed controller matched to the motor which allows for at least a 50% speed reduction adjustment via a manual potentiometer. Provide all transformers and wiring factory mounted for a completely functional unit.
- C. Fan Motor Wiring:
  - 1. Each fan shall be wired separately to a non-fused disconnect mounted with thermal overload protection on the exterior of the fan section per NEC requirements.

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2. Provide conduit sized for motor conductors routed from the fan motor to the disconnect. Provide power wiring inside the conduit.
  3. For fans indicated to be driven by variable frequency controllers (VFC), the disconnect shall incorporate a remote contact connection for the interlock of the variable frequency controller.
  4. Penetrations of junction boxes and disconnects shall be sealed watertight inside (around the wires) and outside of the conduit.

#### 2.4 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."
- C. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 07 Section "Roof Accessories" for installation of roof curbs.
- D. Install units with clearances for service and maintenance.
- E. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."

#### 3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.

- 
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
  - D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Verify that shipping, blocking, and bracing are removed.
  - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
  - 3. Verify that cleaning and adjusting are complete.
  - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
  - 5. Adjust belt tension.
  - 6. Adjust damper linkages for proper damper operation.
  - 7. Verify lubrication for bearings and other moving parts.
  - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
  - 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
  - 10. Shut unit down and reconnect automatic temperature-control operators.
  - 11. Remove and replace malfunctioning units and retest as specified above.
- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

### 3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Refer to Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 23 34 23

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## SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

### 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 ceiling and wall mounted diffusers, registers and grilles.
- B. Related Sections:
  - 1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
  - 2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
  - 1. Data Sheets: Indicate materials of construction, finish, and mounting details; performance data including horizontal throw and vertical drop, total pressure and static-pressure drop, and noise ratings. Include all assumptions utilized for noise ratings. Indicate thermal insulation and acoustic insulation provided with materials information. Indicate mounting type.
  - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
  - 3. Color chips: Where custom colors are required.
  - 4. Techzone compatibility statement: Where Armstrong TechZone ceiling system compatibility is required.

#### 1.4 EXTRA MATERIALS

- A. Furnish extra materials that match product installed.
  - 1. Air baffles: Furnish quantity equal to 5 percent of the diffusers installed or a minimum of five.



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## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

#### A. Manufacturers:

1. Anemostat Products; a Mestek company.
2. Donco.
3. Krueger
4. Metalaire; as manufactured by Metal Industries, Inc.
5. Nailor Industries Inc.
6. Price Industries.
7. Titus.

#### B. See drawing schedules, plans and details for required materials, finishes, style, sizes, pattern, performance and accessories.

1. Internal insulation of slot diffuser plenums is not allowed. All slot diffuser plenums shall be externally insulated.

### 2.2 SOURCE QUALITY CONTROL

#### A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Engineer for a determination of final location.

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- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, fire dampers, terminal units, control valves and other above ceiling components.
  - D. Do not install diffuser neck mounted dampers, except where specifically scheduled as noted as such. Clarify the installation of all neck mounted dampers directly with the Engineer prior to furnishing the submittal.
  - E. Support all slot diffusers and laminar flow diffusers independently of the ceiling. Support all other diffusers, registers and grilles which weigh more than five pounds independently of the ceiling. Support all components independently of the ceiling if so required by Division 09 ceiling specifications and CISCA recommendations.

### 3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.
- B. Install air baffles in diffusers identified as being drafty. Confirm individual diffusers to be corrected with the space occupants and coordinate the installation of air baffles with the occupant's schedule. Confirm acceptability of draft reduction forty-eight (48) hours after air baffle installation with the space occupants and report results in writing.

END OF SECTION 23 37 13

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## SECTION 23 51 00 - BREECHINGS, CHIMNEYS, AND STACKS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Listed double wall chimneys.

#### 1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer..

#### 1.4 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Listed Type B, BW, L vents and building heating appliance chimneys.
    - a. Metal-Fab, Inc.
    - b. Schebler Co.
    - c. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
    - d. Simpson Dura-Vent Co., Inc.; Subsidiary of Simpson Manufacturing Co.

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- e. Van Packer Co.

## 2.2 LISTED TYPE B AND BW VENTS

- A. Description: Double-wall metal vents tested according to UL 441 and rated for 480 deg F (248 deg C) continuously for Type B, or 550 deg F (288 deg C) continuously for Type BW; with neutral or negative flue pressure complying with NFPA 211.
- B. Construction: Inner shell and outer jacket separated by at least an 1/4-inch (6-mm) airspace.
- C. Inner Shell: ASTM B 209 (ASTM B 209M), Type 3105 aluminum.
- D. Outer Jacket: Aluminized steel.
- E. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
  - 1. Termination: Stack cap designed to exclude minimum 90 percent of rainfall..

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATION

- A. Listed Chimney Liners: High-efficiency boiler or furnace vents in masonry chimney, dishwasher exhaust, or Type II commercial kitchen hood.
- B. Listed Type B and BW Vents: Vents for certified gas appliances..

### 3.3 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- B. Seal between sections of positive-pressure vents and grease exhaust ducts according to manufacturer's written installation instructions, using sealants recommended by manufacturer.

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- C. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
  - D. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
  - E. Lap joints in direction of flow.
  - F. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
  - G. Erect stacks plumb to finished tolerance of no more than 1 inch (25 mm) out of plumb from top to bottom. Install guy wires and cable encasement on portions of guy wires less than 7'-0" above the finished roof surface. Portions of guy wires above 7'-0" shall not be encased.

#### 3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 23 51 00

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## SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Electrical equipment coordination and installation.
  - 2. Sleeves for raceways and cables.
  - 3. Sleeve seals.
  - 4. Grout.
  - 5. Common electrical installation requirements.
  - 6. Electrical demolition.
  - 7. Cutting and patching for electrical construction.

#### 1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
- B. Comply with NFPA 70.
- C. Include in the Work, as a part of the Bid Proposal, labor, materials, services, apparatus, drawings (in addition to the Contract Documents) as required to complete the intended work.

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- D. Work for the Project must be performed in accordance with Federal, State and Local Laws, Ordinances, Codes, Rules and Regulations, pertaining to the Work which are hereby made a part of the Contract Documents by reference, the same as if repeated herein in their entirety. Where Contract Documents exceed these requirements, the Contract Documents shall govern. In no case shall Work be installed contrary to or below the minimum legal standards.

## 1.6 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  3. To allow right of way for piping and conduit installed at required slope.
  4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Firestopping."

## 1.7 RECORD DRAWINGS

- A. Contractor shall provide owner with a complete set of accurate Record Drawings for all work performed under this contract.
1. Record Drawings shall include all approved change orders and pertinent RFI responses.
  2. Include actual dimensions of equipment furnished under this contractor where shown on the floor plans.
  3. Record Drawings shall include work performed by all sub-contractors retained.
  4. Record Drawings shall include the words "RECORD DRAWING" on each sheet.
  5. Record Drawings shall be completed using **AutoCAD** in a version as directed by the owner.
- B. Submission:
1. Submit one set of record Drawings for review by Engineer prior to submission of closeout documents. Record Drawings shall be submitted using the established submittal process.

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2. Upon satisfactory review of the Record Drawing submittals by Engineer, provide three (3) printed sets of the Record Drawings and three (3) copies in electronic format with closeout documents
  3. Paper Record Drawings shall be printed full size using the same sheet size as the construction documents issued to the contractor with the contractor's title block.
  4. Electronic Record Drawings shall include **AutoCAD compatible files** and **[individual PDF files named by sheet and organized in folders by disciplines]**

## PART 2 - PRODUCTS

### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
  2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
  3. Pressure Plates: Carbon steel. Include two for each sealing element.



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4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting 2"-3" extending out of both surfaces of walls.

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- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
  - G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
  - H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
    - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
  - I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 7 Section "Firestopping."
  - J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
  - K. Above Ground, Exterior-Wall Penetrations: Seal penetrations using [steel] [cast-iron] pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - L. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

### 3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.4 CUTTING AND PATCHING

- A. Refer to Division 2 for general cutting and patching requirements and procedures.
- B. Cut, channel, chase and drill floors, walls, partitions, ceilings and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- C. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

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### 3.5 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

### 3.6 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 26 05 00

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## SECTION 26 27 26 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Twist-locking receptacles.
  - 3. Wall-box motion sensors.
  - 4. Snap switches and wall-box dimmers.
  - 5. Solid-state fan speed controls.
  - 6. Wall-switch and exterior occupancy sensors.
  - 7. Floor service outlets, poke-through assemblies, service poles, and multi-outlet assemblies.
  - 8. Safety type receptacle (tamperproof).

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.
- G. IG: Isolated ground type.
- H. ST: Safety type (tamperproof).

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#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and plug sets: Match equipment requirements.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Cooper Wiring Devices, a division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated, Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).
  - 4. Pass & Seymour/Legrand, Wiring Devices & Accessories (Pass & Seymour).

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## 2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper 5351 (single), 5352 (duplex).
    - b. Hubbell HBL5351 (single), CR5352 (duplex).
    - c. Leviton 5891 (single), 5352 (duplex).
    - d. Pass & Seymour 5381 (single), 5352 (duplex).

## 2.3 ISOLATED GROUND RECEPTACLES

- A. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper IG 5362BLS.
    - b. Hubbell CR 5253IG.
    - c. Leviton 5362-IG.
    - d. Pass & Seymour IG6300.
  2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

## 2.4 SAFETY TYPE (TAMPER-RESISTANT) RECEPTACLES

- A. Tamper-Resistant Hospital grade duplex receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper TR8300.
    - b. Hubbell HBL8300SG.
    - c. Leviton 8300-SGG.
    - d. Pass & Seymour 63H.
  2. Description: Labeled to comply with NFPA 70,

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## 2.5 GFCI RECEPTACLES

- A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper GF20.
    - b. Hubbell GF 5352.
    - c. Leviton 8898.
    - d. Pass & Seymour 2084.

## 2.6 TWIST-LOCKING RECEPTACLES

- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Cooper L520R.
    - b. Hubbell HBL2310.
    - c. Leviton 2310.
    - d. Pass & Seymour L520-R.

## 2.7 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
  - 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
  - 2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.8 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.

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B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:
  - a. Cooper 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
  - b. Hubbell HBL1221 (single pole), HBL1222 (two pole), HBL1223 (three way), HBL1224 (four way).
  - c. Leviton 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
  - d. Pass & Seymour 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

2.9 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable slider with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
  1. 1000W; dimmers shall require no derating when ganged with other devices. Illuminated when "OFF."
- D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.10 FAN SPEED CONTROLS

- A. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.
  1. Continuously adjustable slider, 5 A.
  2. Three-speed adjustable rotary knob, 1.5 A.

2.11 OCCUPANCY SENSORS

- A. Wall-Switch Sensors:
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Hubbell ATD1600WRP.



- 
- b. Leviton ODW12-MRW.
      - c. Watt Stopper (The) DT-200.
    - 2. Description: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, and a minimum coverage area of 1200 sq. ft. (111 sq. m).
  - B. Exterior Occupancy Sensors:
    - 1. Products: Subject to compliance with requirements, provide one of the following:
      - a. Leviton PS200-10.
      - b. Watt Stopper (The) EW-100-120.
    - 2. Description: Passive-infrared type, 120/277 V, weatherproof, adjustable time delay up to 15 minutes, 180-degree field of view, and 110-foot (34-m) detection range. Minimum switch rating: 1000-W incandescent, 500-VA fluorescent.

## 2.12 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  - 3. Material for Unfinished Spaces: Galvanized steel.
  - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant thermoplastic with lockable cover.

## 2.13 FLOOR SERVICE FITTINGS

- A. Type: Modular, flap-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6 configuration 5-20R, ivory finish, as per Contract Documents unless otherwise indicated.

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## 2.14 MULTIOUTLET ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hubbell Incorporated; Wiring Device-Kellems.
  - 2. Isoduct.
  - 3. Panduit.
  - 4. Wiremold Company (The).
- B. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- C. Raceway Material: metal, with manufacturer's standard finish.
- D. Wire: No. 12 AWG.

## 2.15 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
  - 1. Wiring Devices Connected to Normal Power System: Ivory or as selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
  - 2. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
  - 1. Receptacles: 18 inches A.F.F. to center unless noted otherwise.
  - 2. Switches/dimmer/wall occupancy sensor: 46 inches A.F.F. to center unless noted otherwise.
- B. Coordination with Other Trades:
  - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

- 
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
  - a. Cut back and pigtail, or replace all damaged conductors.
  - b. Straighten conductors that remain and remove corrosion and foreign matter.
  - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

- 
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
  - H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

### 3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
  - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black letter for utility power filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  - 1. Test Instruments: Use instruments that comply with UL 1436.
  - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 26 27 26

## SECTION 32 1313 - CONCRETE PAVING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Concrete driveways, and sidewalks

#### 1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- B. Section 31 2323 - Fill: Compacted subbase for paving.

#### 1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- C. State of Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, adopted January 1, 1997, including all addenda.
- D. Accessibility Code (current issue) in accordance with the Environmental Barriers Act.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.
- F. ACI 305R - Hot Weather Concreting; American Concrete Institute International.
- G. ACI 306R - Cold Weather Concreting; American Concrete Institute International.
- H. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- I. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- J. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- K. ASTM C 33 - Standard Specification for Concrete Aggregates.
- L. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- M. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete.
- N. ASTM C 150 - Standard Specification for Portland Cement.
- O. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- P. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- Q. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- R. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- S. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- T. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types).
- U. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

#### 1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.
- C. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

#### **1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.

#### **1.06 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

### **PART 2 PRODUCTS**

#### **2.01 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
  - 1. Thickness: 3/8 inch.

#### **2.02 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
- C. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

#### **2.03 CONCRETE MATERIALS**

- A. Concrete Materials: As specified in Section 03 3000.

#### **2.04 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.
- B. Joint Sealer: Type as specified in Section 07 9005.

#### **2.05 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Concrete Properties:
  - 1. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.
  - 2. Maximum Slump: 3 inches.

#### **2.06 MIXING**

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

- B. Verify gradients and elevations of base are correct.

### 3.02 SUBBASE

- A. Prepare subbase in accordance with State of Illinois Highways standards.

### 3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.

### 3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient in accord with IDOT specification.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### 3.05 REINFORCEMENT

- A. Place reinforcement as indicated.
- B. Place reinforcement to achieve pavement and curb alignment as detailed.
- C. Provide doweled joints at with one end of dowel set in capped sleeve to allow longitudinal movement.

### 3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to pattern indicated.
- E. Retamping will not be allowed except at exposed aggregate areas.
- F. Do not allow concrete to free fall more than 4'.
- G. Once started, place concrete continuously between predetermined construction and control joints. Continue placing until panel or section is complete; keep top surfaces level. Do not break or interrupt successive pours such that cold joint occur.
- H. Weather conditions:
  - 1. Concrete temperatures when deposited:
    - a. Minimum: 50 degrees F
    - b. Maximum: 85 degrees F
  - 2. Cold weather concreting: Comply with ACI 306 except as follows:
    - a. In freezing weather, provide suitable means for maintaining concrete temperature at a minimum of 70 degrees F for three days, or 50 degrees F for five days after placing
    - b. Cooling of concrete to outside temperature: not faster than 1 degree F per hour for the first day and 2 degrees F per hour thereafter until outside temperature is reached.
    - c. Maximum temperature of concrete produced with heated aggregate, heated water, or both at any time during its production or transportation: 90 degrees F.
    - d. Do not mix salt, chemicals or other foreign materials in concrete to prevent freezing or to accelerate hardening of concrete, except as approved by Architect/Engineer.
- I. Slabs on Aggregate Base:
  - 1. Provide aggregate base as specified.
  - 2. Place concrete for all slabs continuously between construction joints; consolidate by vibration. Bring to level with a straight edge and strike off. Use bull floats or darbies to force coarse aggregate down and to produce a smooth surface, free from lumps and hollows.

3. Saw cut control joints in locations shown on Drawings, as soon as operation can be performed without marring or tearing concrete surface, within 24 hours after finishing. Use 3/16" thick blade, cutting 1/4 into depth of slab thickness.
4. Pitch to drains 1/4"/ft. nominal, except as otherwise indicated on drawings.

### 3.07 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.
  1. Form joints with joint filler extending from bottom of pavement to within 1/4 inch of finished surface.
  2. Place joint filler between paving components and buildings and other appurtenances.
- C. Provide scored joints:
  1. At intervals as shown on drawings.
  2. Between sidewalks and curbs.
- D. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

### 3.08 FINISHING

- A. Finish all concrete in accord with IDOT specification, Section 504.14 Paving: Wood float.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- E. Exterior slabs: trowel to a smooth, dense surface. Finish with a fine-hair push broom, perpendicular to the direction of pedestrian or vehicular traffic. Finish to Class B tolerance per ACI 301.

### 3.09 JOINT SEALING

- A. See Section 07 9005 for joint sealer requirements.

### 3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

### 3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
  1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
  1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.



**3.12 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement until 75 percent design strength of concrete has been achieved.

**3.13 SCHEDULES**

- A. Driveways and Sidewalks: 3,000 psi 28 day concrete, 5 inches thick, buff color Portland cement, exposed aggregate finish.

**END OF SECTION**

# (GROUP 1) COLUMBIA HOUSING AUTHORITY SCATTERED SITE REHAB - ZONE 1



## PROJECT ADDRESS

**OWNER** COLUMBIA HOUSING AUTHORITY  
1917 HARDEN ST.  
COLUMBIA, SOUTH CAROLINA, 29204-1117  
CONTACT: (803)254-3886

**ARCHITECT** 1919 ARCHITECTS, P.C.  
4000 MORSAY DRIVE  
ROCKFORD, IL 61107  
RONALD G. BILLY, JR., NCARB, LEED AP

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## SHEET INDEX

**GENERAL**  
G000 COVER SHEET  
G100 GENERAL NOTES AND PROJECT STANDARDS  
G200 SITE LOCATIONS

**ARCHITECTURAL**  
A100 26 THISTLE  
A100.1 INTERIOR ELEVATIONS  
A101 41 SALVIA  
A101.1 INTERIOR ELEVATIONS  
A102 104 PEACHTREE  
A102.1 INTERIOR ELEVATIONS  
A103 218 BARGER  
A103.1 INTERIOR ELEVATIONS  
A104 817 RIVERWALK  
A104.1 INTERIOR ELEVATIONS  
A105 1620 HOLLINGSBRED  
A105.1 INTERIOR ELEVATIONS  
A106 2317 HILLBECK  
A106.1 INTERIOR ELEVATIONS  
A107 4232 DONAVAN  
A107.1 INTERIOR ELEVATIONS  
A108 4316 LEEDS  
A108.1 INTERIOR ELEVATIONS  
A109 4817 FAULKLAND  
A109.1 INTERIOR ELEVATIONS  
A110 ROSEWOOD HILLS UNITS  
A110.1 INTERIOR ELEVATIONS  
A110.2 INTERIOR ELEVATIONS  
A200 DETAILS  
A201 DOOR SCHEDULE  
A201.1 ROOM FINISH SCHEDULE  
A201.2 FIXTURE SCHEDULES

### BUILDING CODES:

REQUIREMENTS BASED ON THE FOLLOWING:  
IRC-2021

USE GROUP:  
R-3 RESIDENTIAL

BUILDING CONSTRUCTION TYPE:  
TYPE V UNPROTECTED

### STATEMENT OF COMPLIANCE

I HEREBY CERTIFY THAT THESE PLANS WERE PREPARED BY ME OR UNDER MY SUPERVISION, AND TO THE BEST OF MY KNOWLEDGE, COMPLY WITH ALL APPLICABLE CODES.

Signed: \_\_\_\_\_  
Architect/Engineer  
SOUTH CAROLINA REGISTRATION NO.: 8927  
Exp. Date: 11/30/22  
PROFESSIONAL DESIGN FIRM NO.: 184.003452

1919 Architects  
4000 Morsay Drive  
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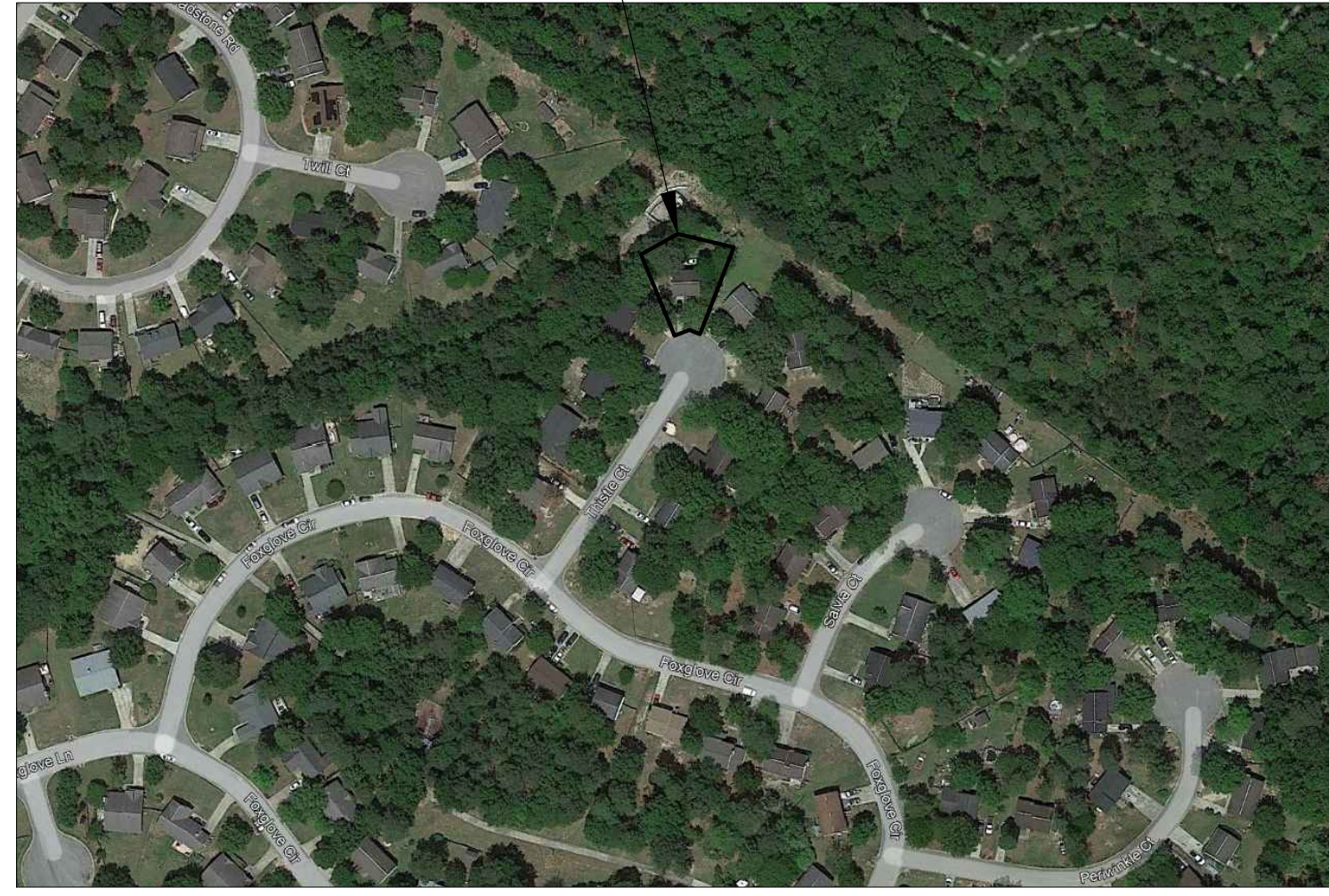
ARCHITECT	BONDING CO.
OWNER	CONTRACTOR

COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)	RGE	JMK	Date
20-12-14	Project Number		

Rev. Date	
Sheet No.	G000



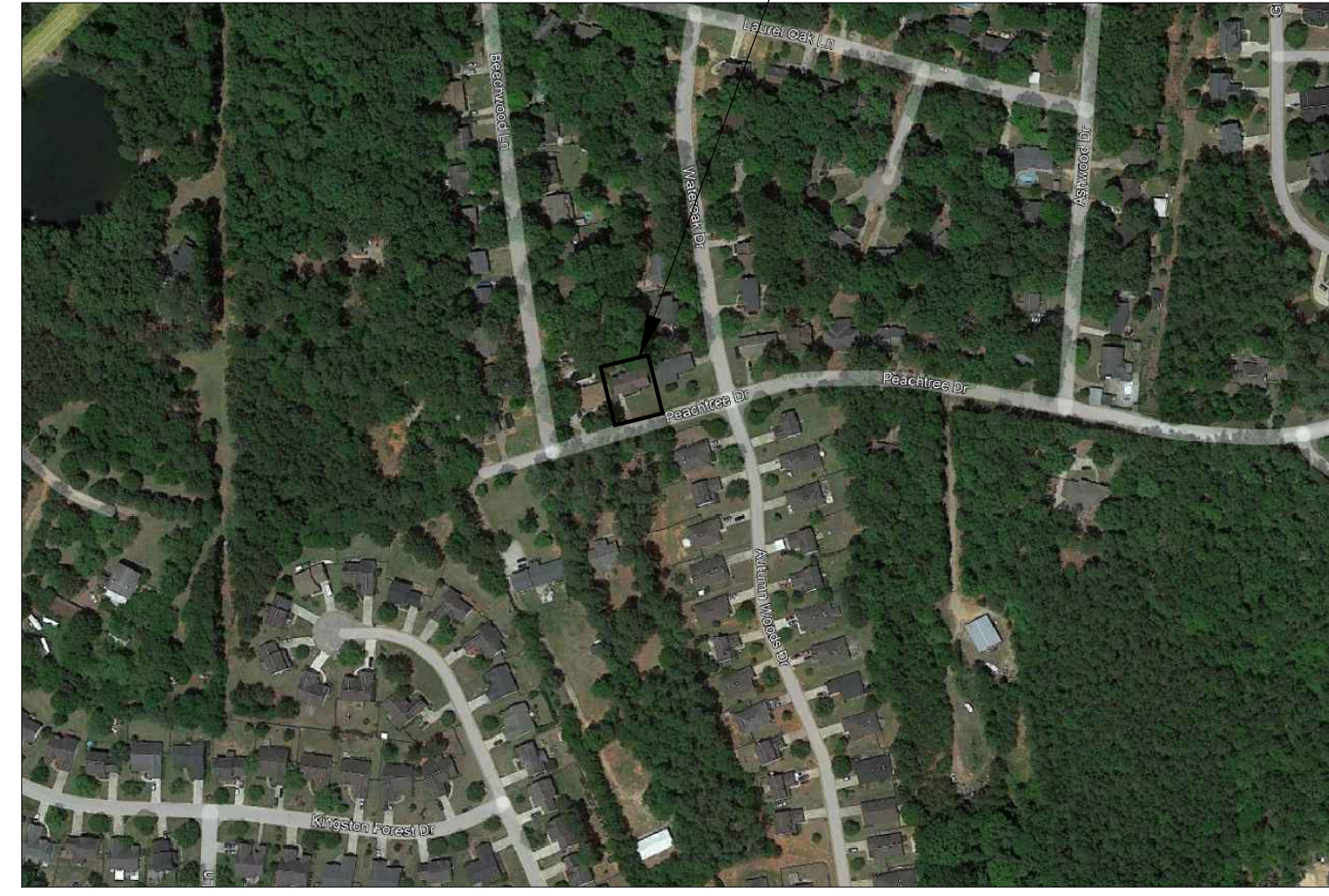
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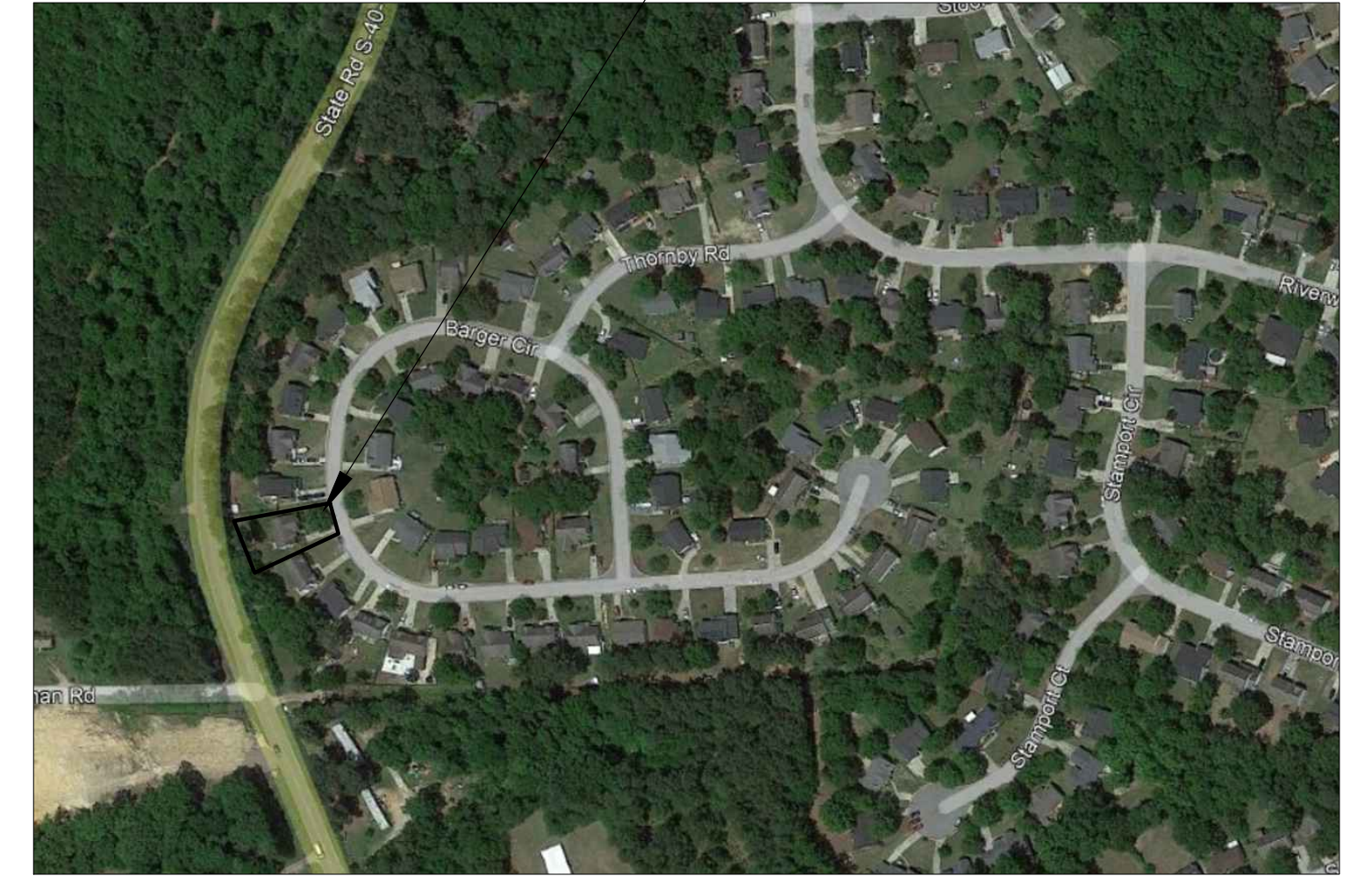
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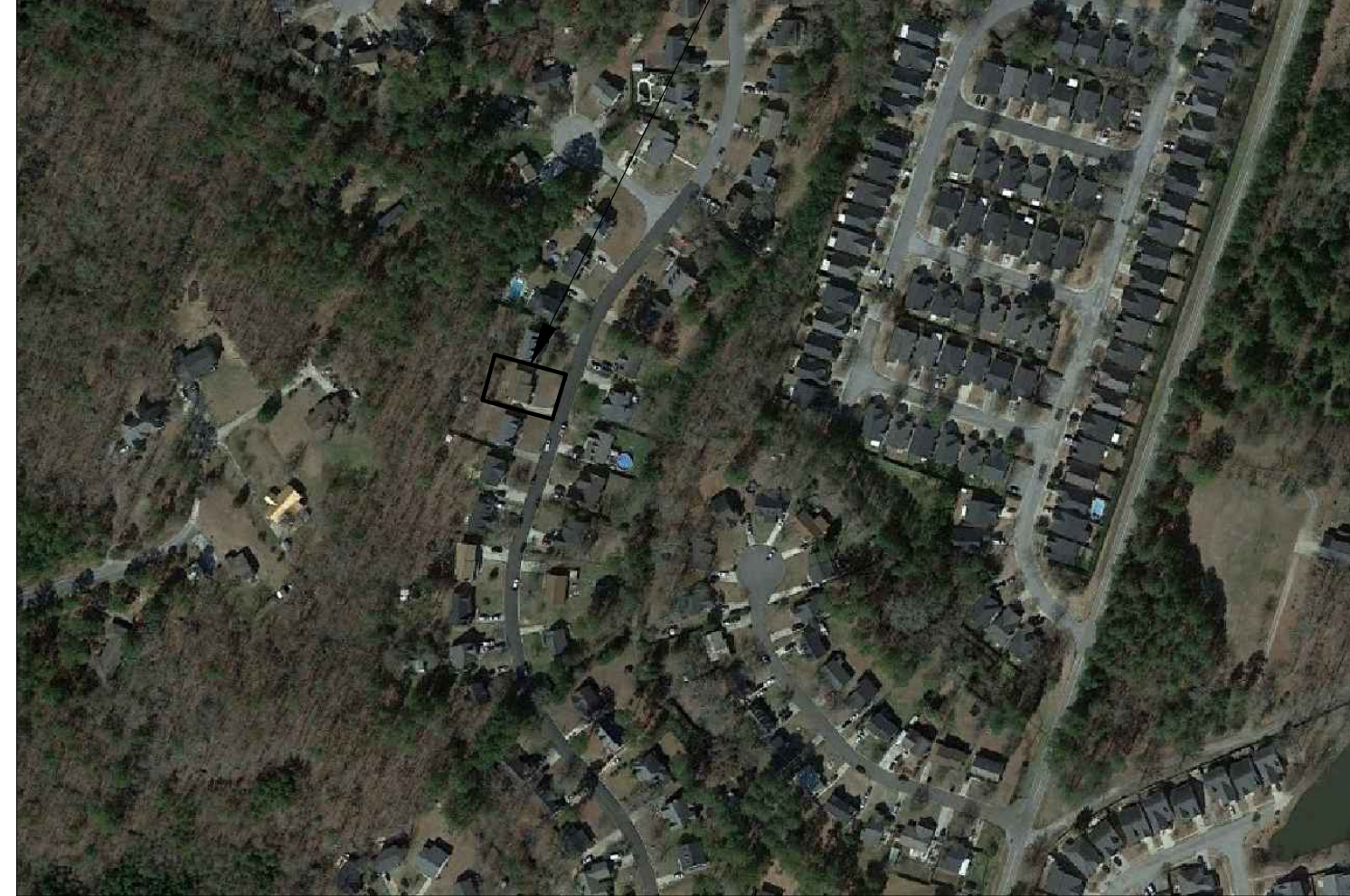
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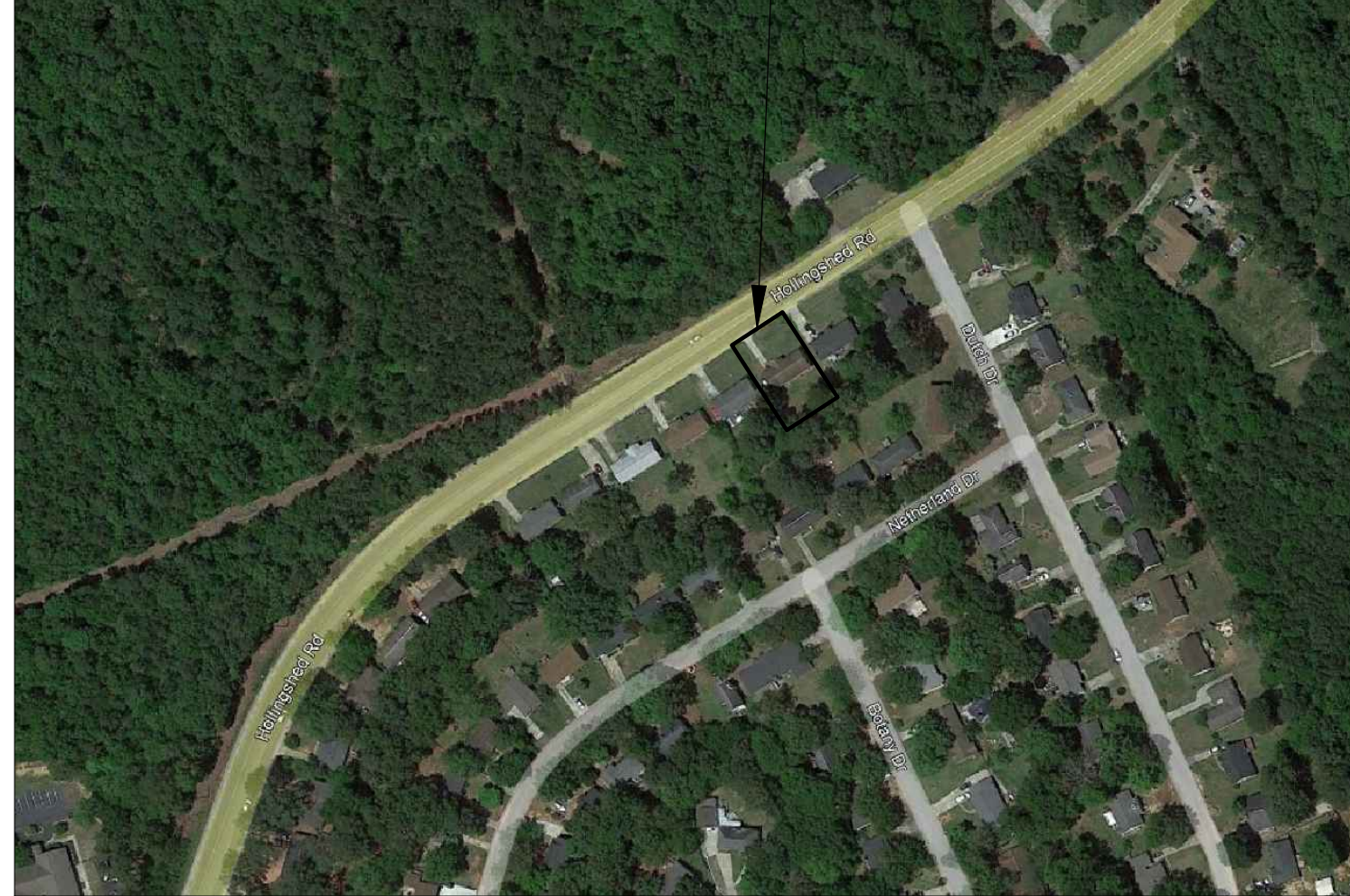
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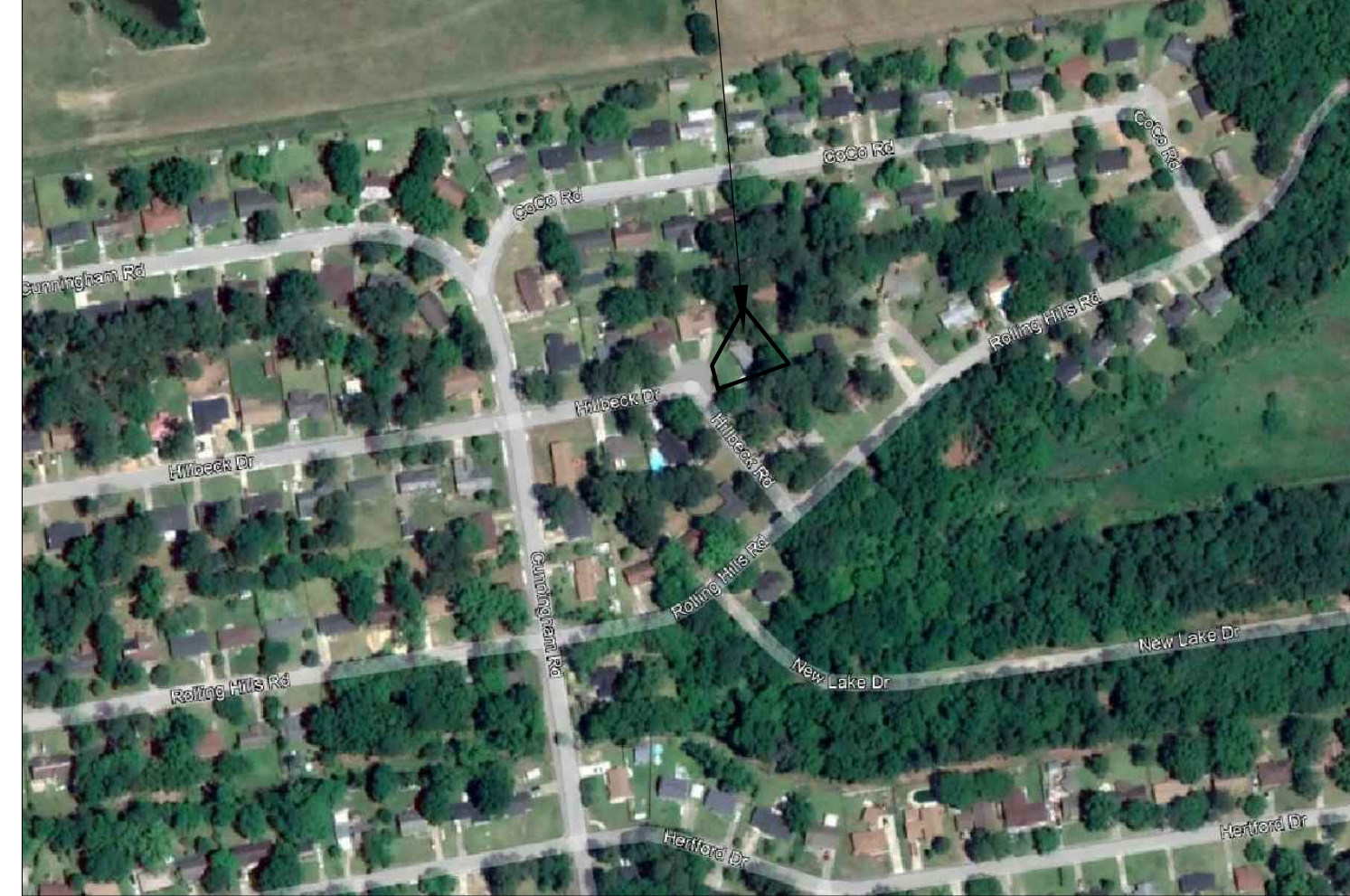
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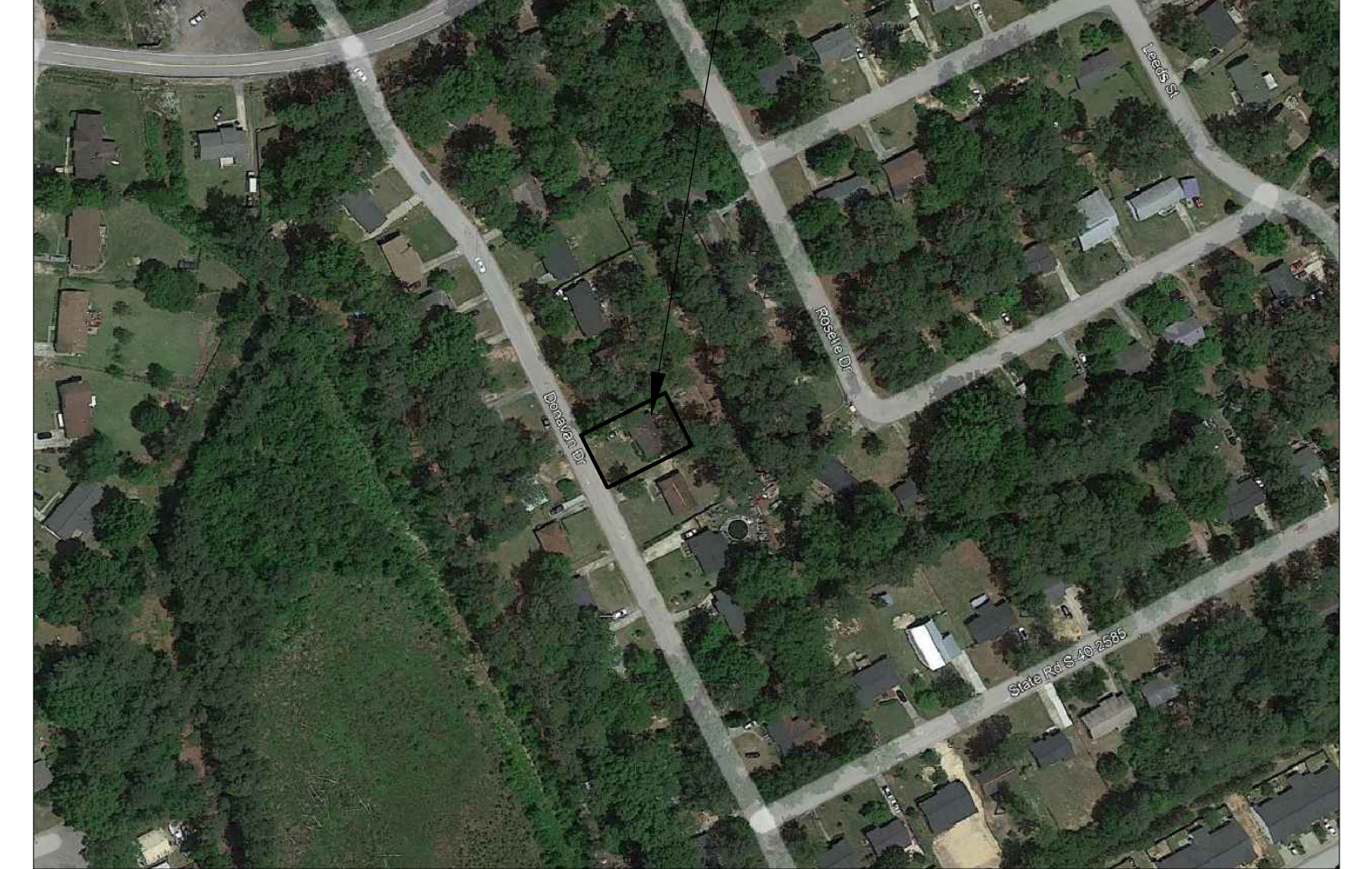
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SITE LOCATION (2317 HILLBECK DR.) ↗



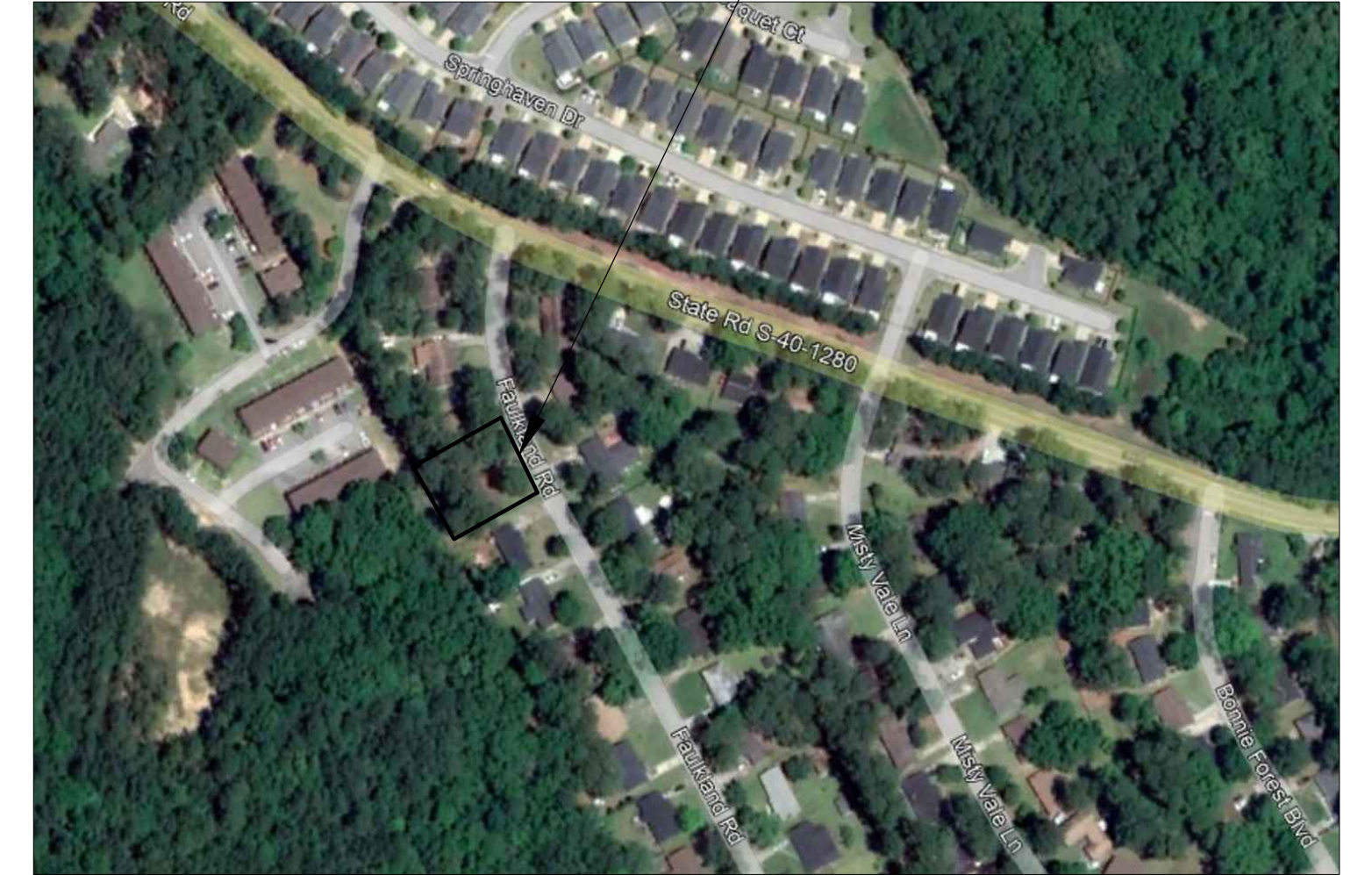
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SITE LOCATION (4316 LEEDS ST.) ↗

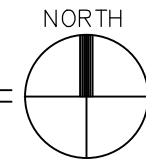


SITE LOCATION (4817 FAULKLAND RD.) ↗



SITE LOCATION PLANS

SCALE: N.T.S.



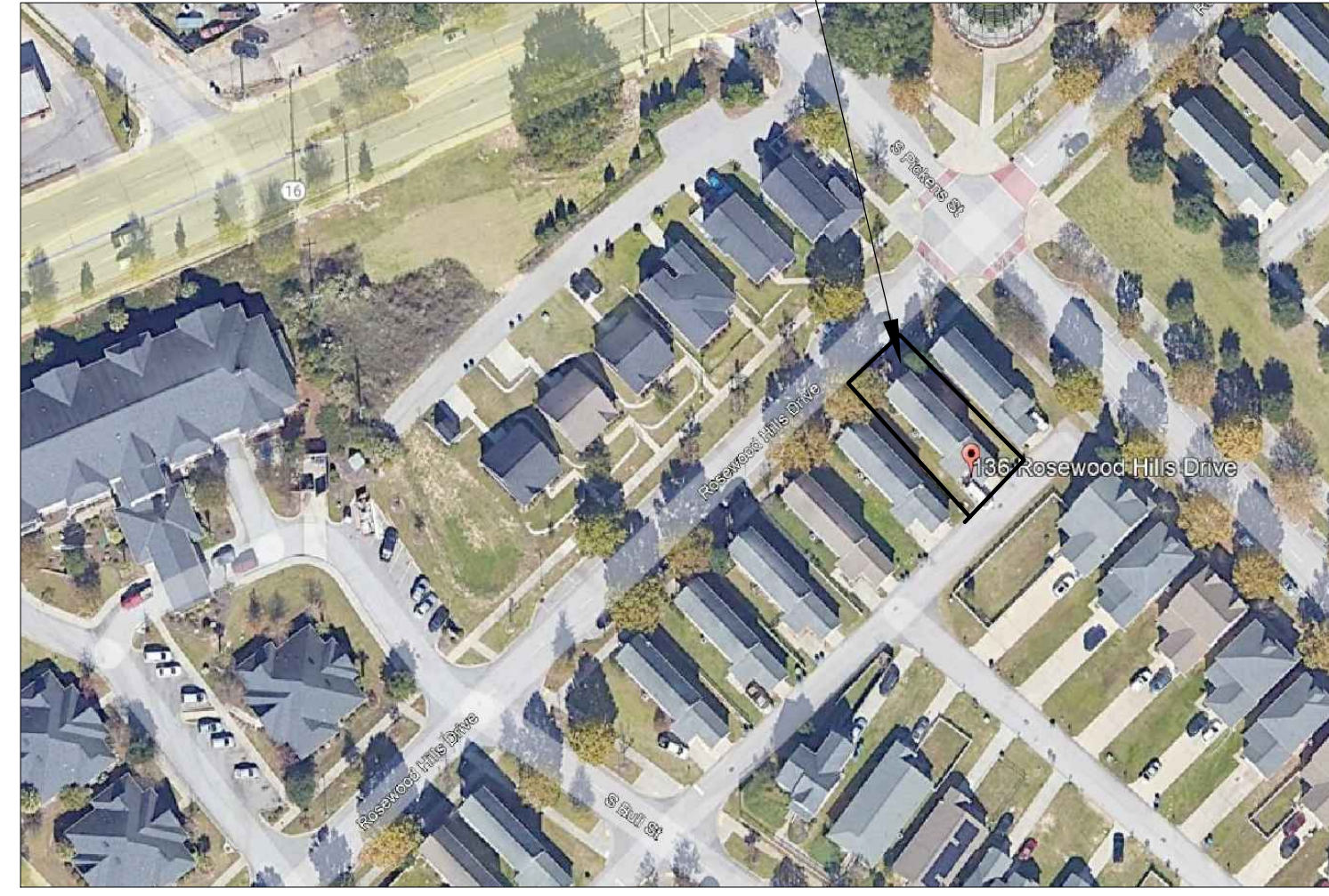
UNIT LOCATIONS-I	Rev. Date
Sheet No.	
G200	

OWNER	ARCHITECT
CONTRACTOR	BONDING CO.

SITE LOCATION (108 ROSEWOOD HILLS DR.)



SITE LOCATION (136 ROSEWOOD HILLS DR.)



SITE LOCATION (164 ROSEWOOD HILLS DR.)



SITE LOCATION (168 ROSEWOOD HILLS DR.)



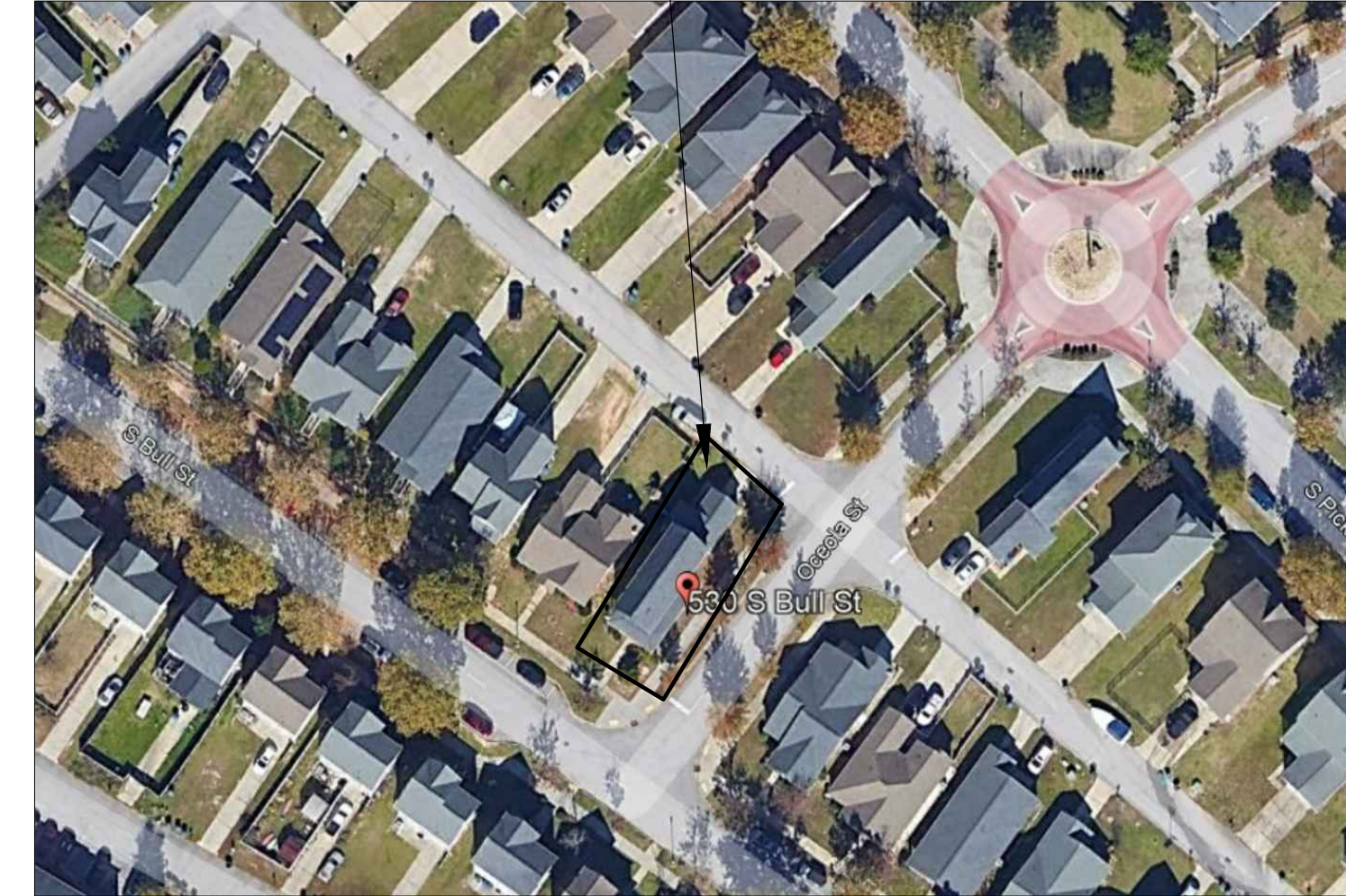
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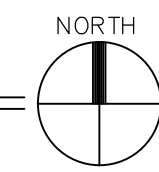
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SITE LOCATION (530 S. BULL ST.)



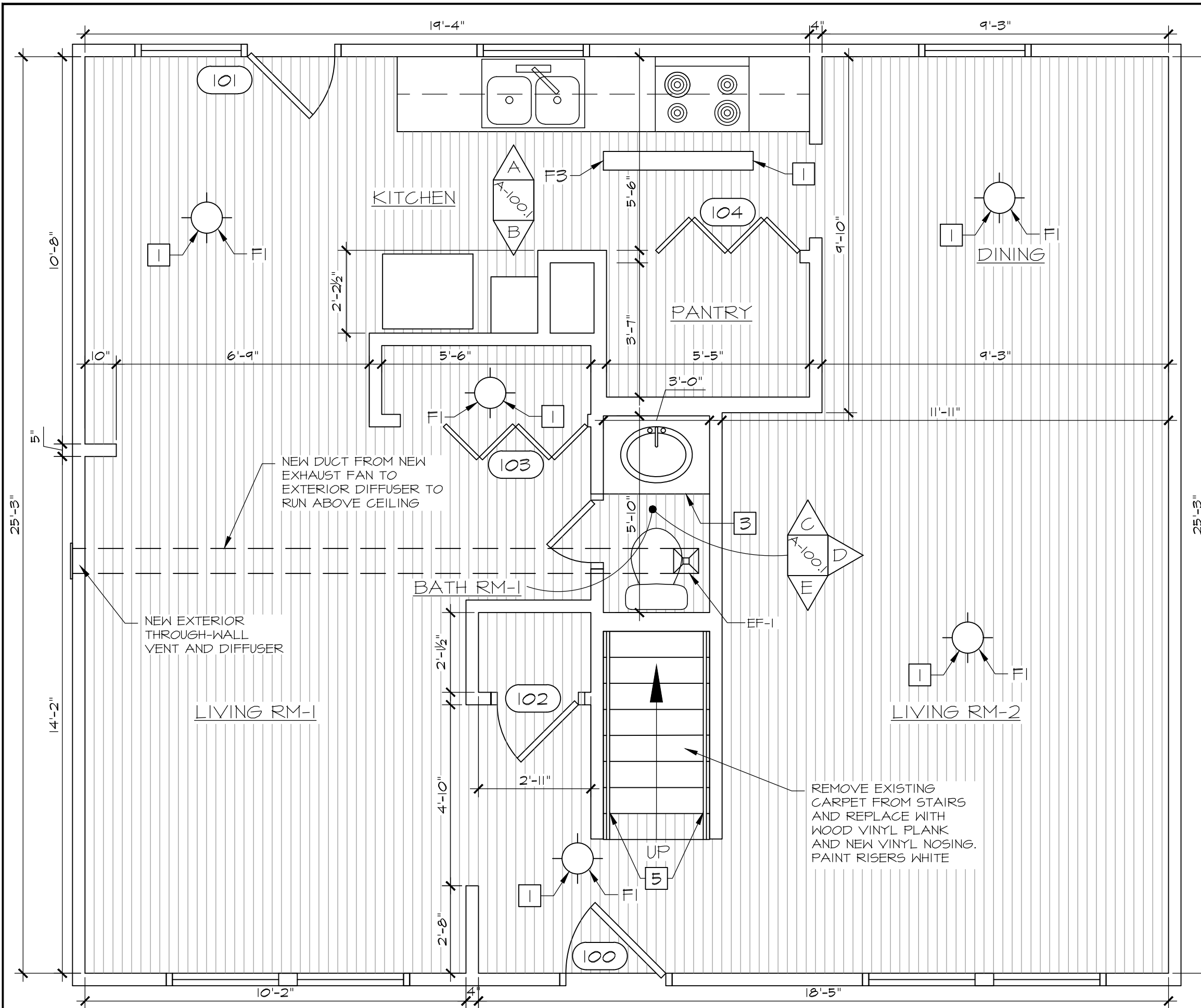
SITE LOCATION PLANS  
SCALE: N.T.S.



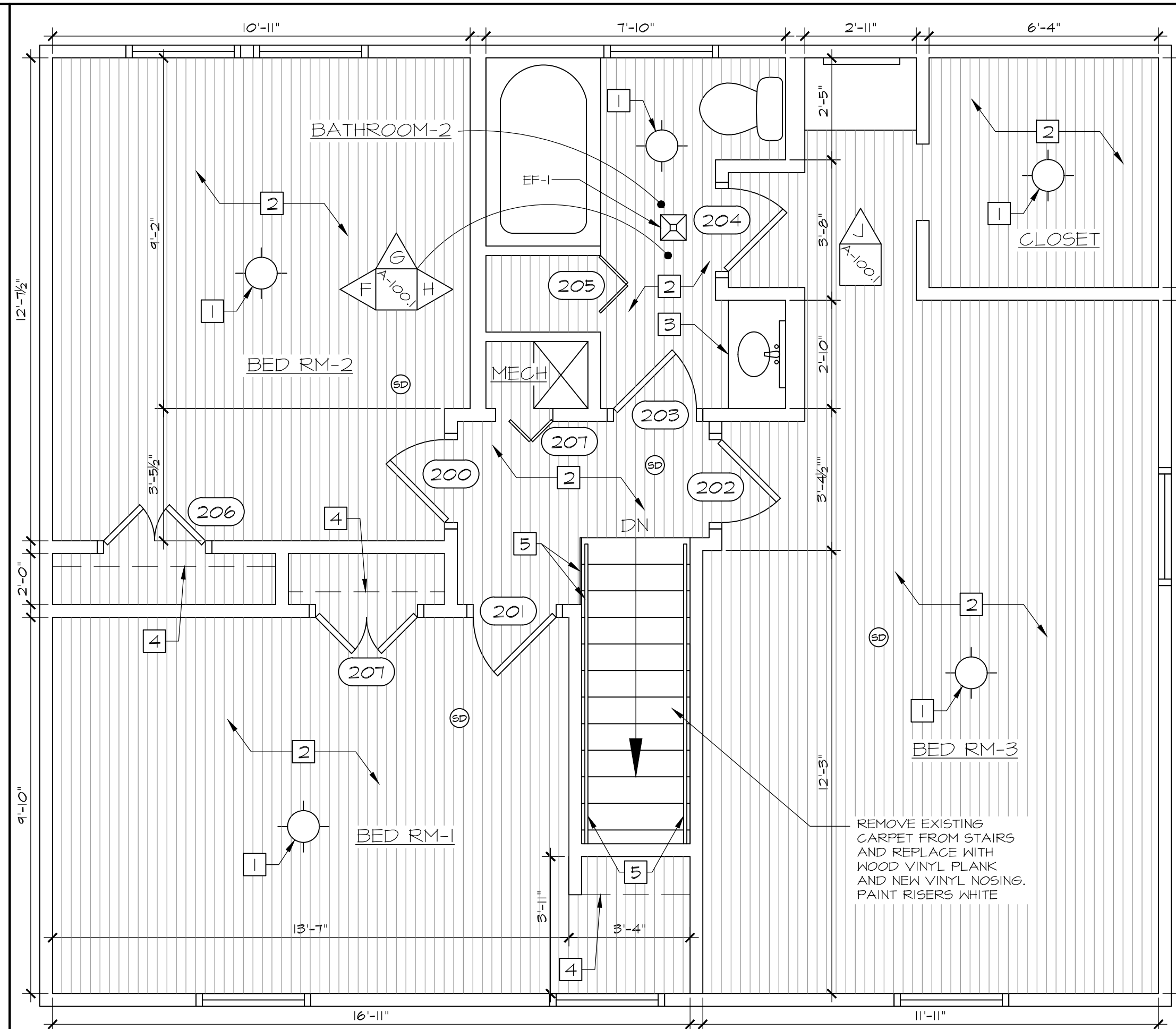
OWNER	ARCHITECT	CONTRACTOR	BONDING CO.

Project Number	Date	Appr.	RGE
20-12740	06-06-2023	JMK	

Rev. Date	
Sheet No.	G300

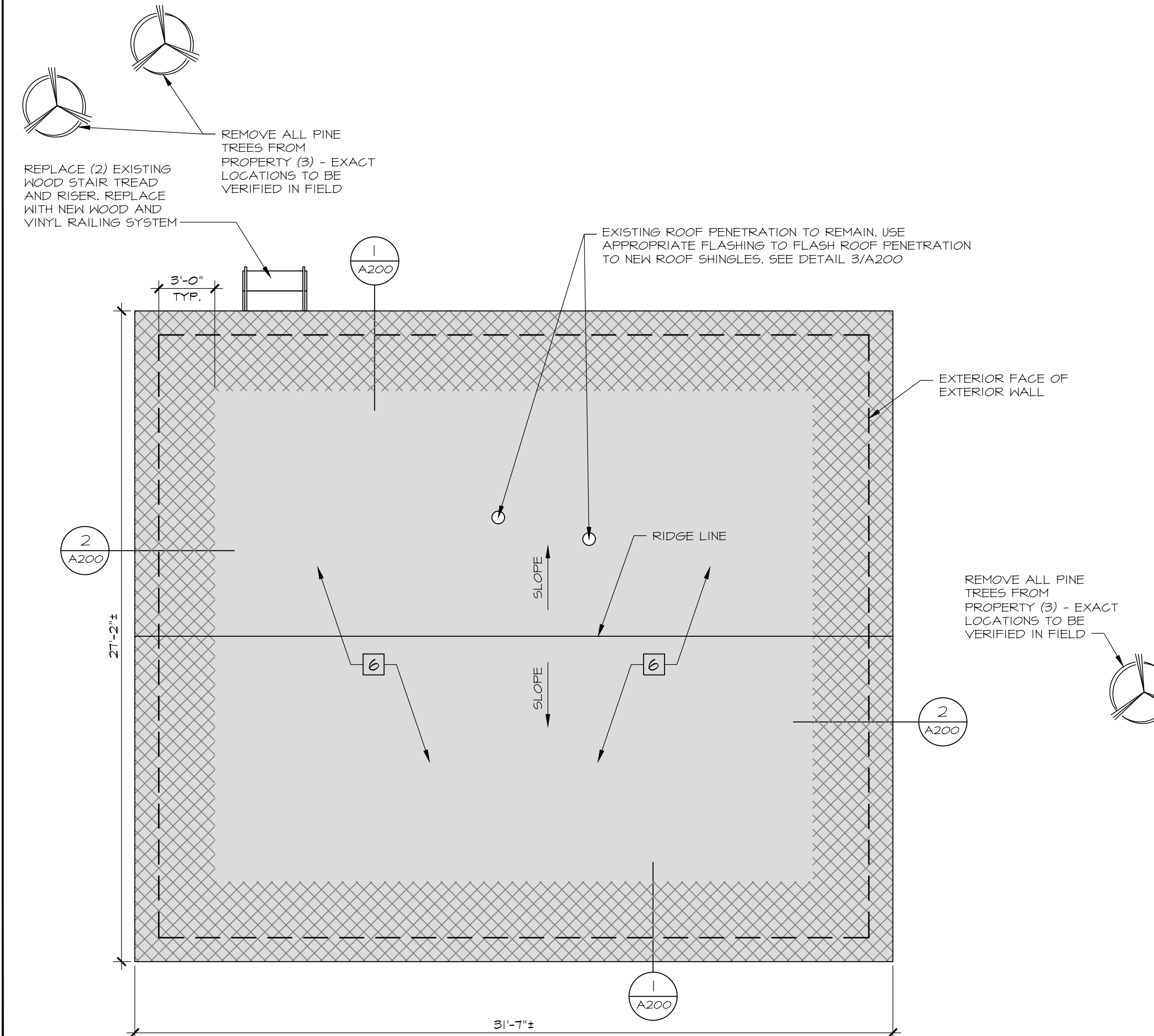


1  
A-100  
**LOWER LEVEL FLOOR PLAN**  
SCALE: 3/8" = 1'-0"



2  
A-100  
**UPPER LEVEL FLOOR PLAN**  
SCALE: 3/8" = 1'-0"

- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON 6100.
  - ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
  - ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
  - CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
  - ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
  - ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
  - ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
  - ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
  - REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
  - ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.



3  
A-100  
**SITE AND ROOF PLAN**  
SCALE: 1/4" = 1'-0"

- ### KEYNOTES (THIS SHEET ONLY)
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - CLEAN, PREPARE, PRIME AND PAINT ENTIRE EXISTING HANDRAIL OR GUARDRAIL AT THIS LOCATION. TAKE CARE NOT TO DAMAGE EXISTING FINISHES.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

- ### LEGEND OF SYMBOLS
- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
  - NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
  - AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR - SEE GENERAL NOTE 15
  - CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

**1919**  
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www.1919architects.com

	ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
26 THISTLE	COLUMBIA H.A. SCATTERED SITE REHAB	26 THISTLE CT., COLUMBIA, SC.	RGE	JMK
20-12740	Date	06-06-2022	Appr.	Dm.
Rev.	Date			
Sheet No.	A100			

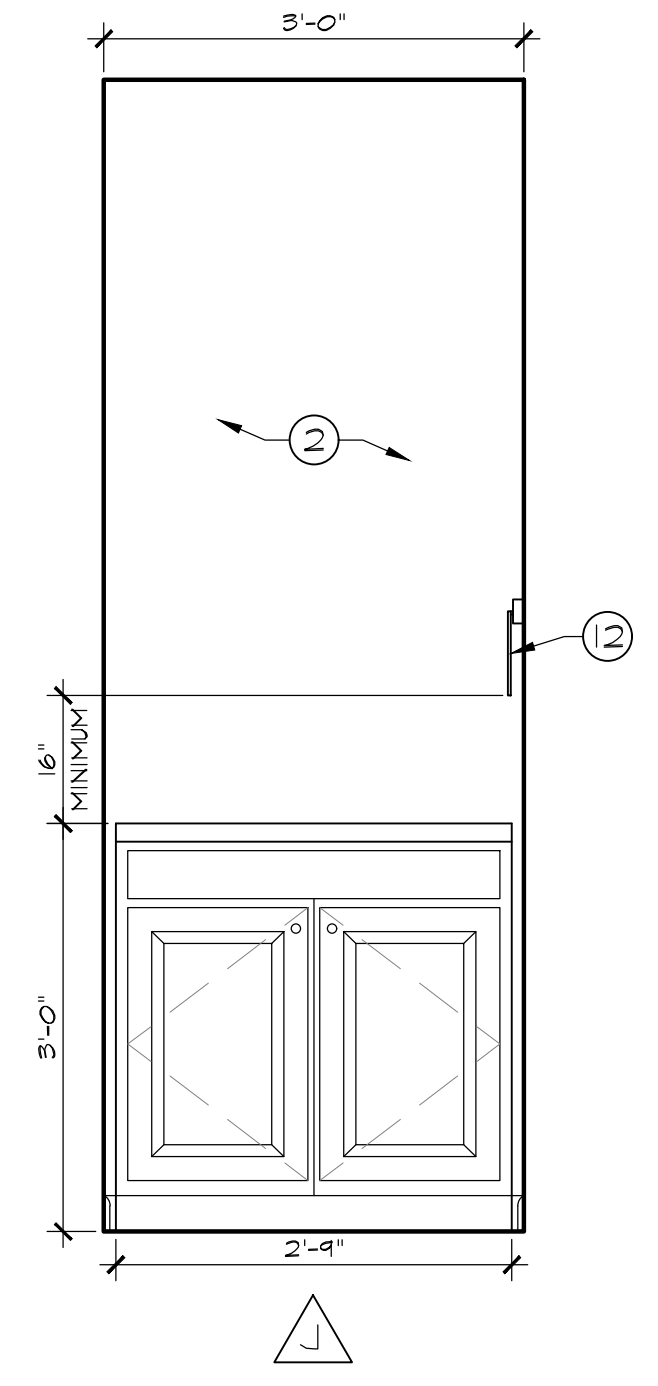
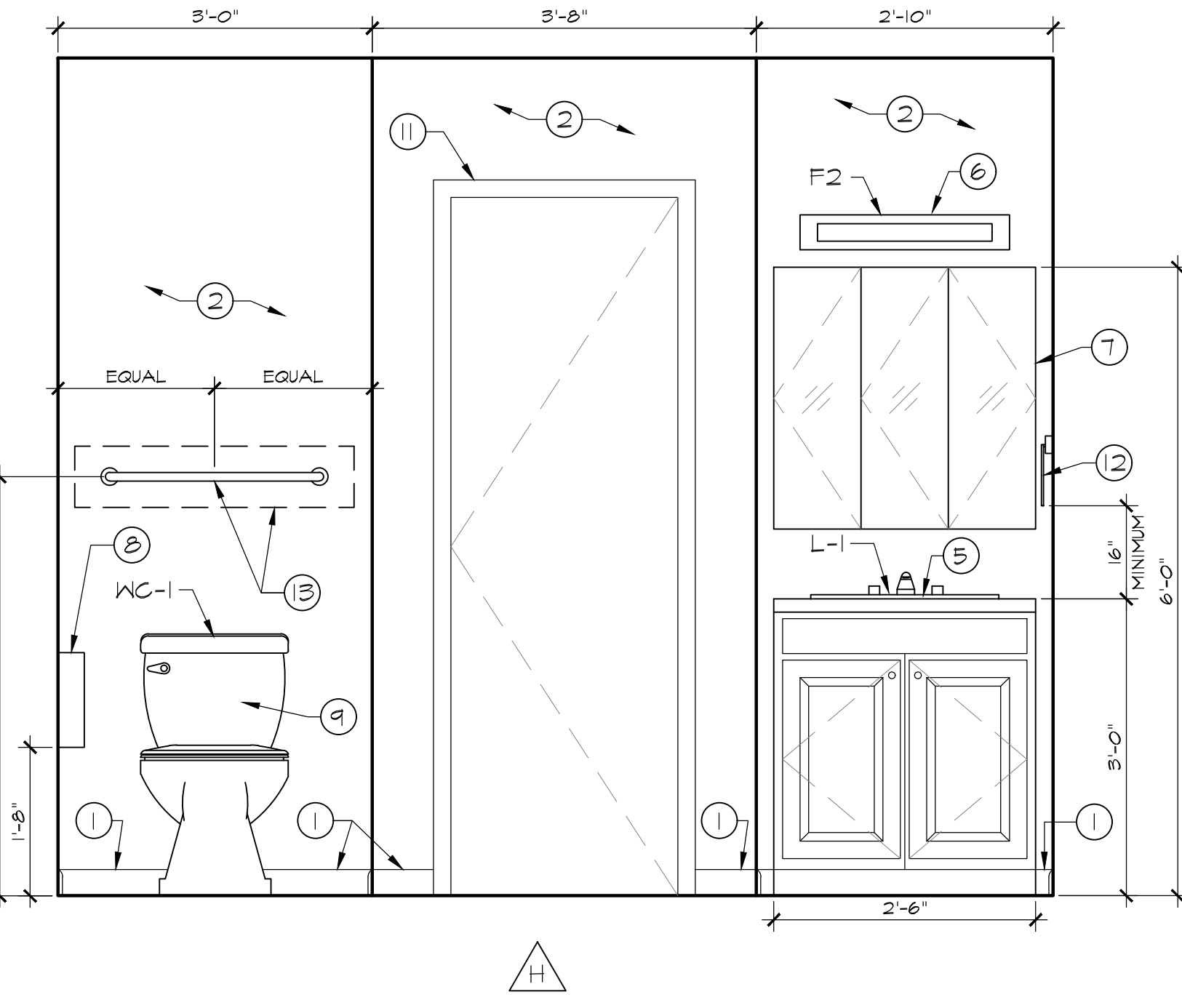
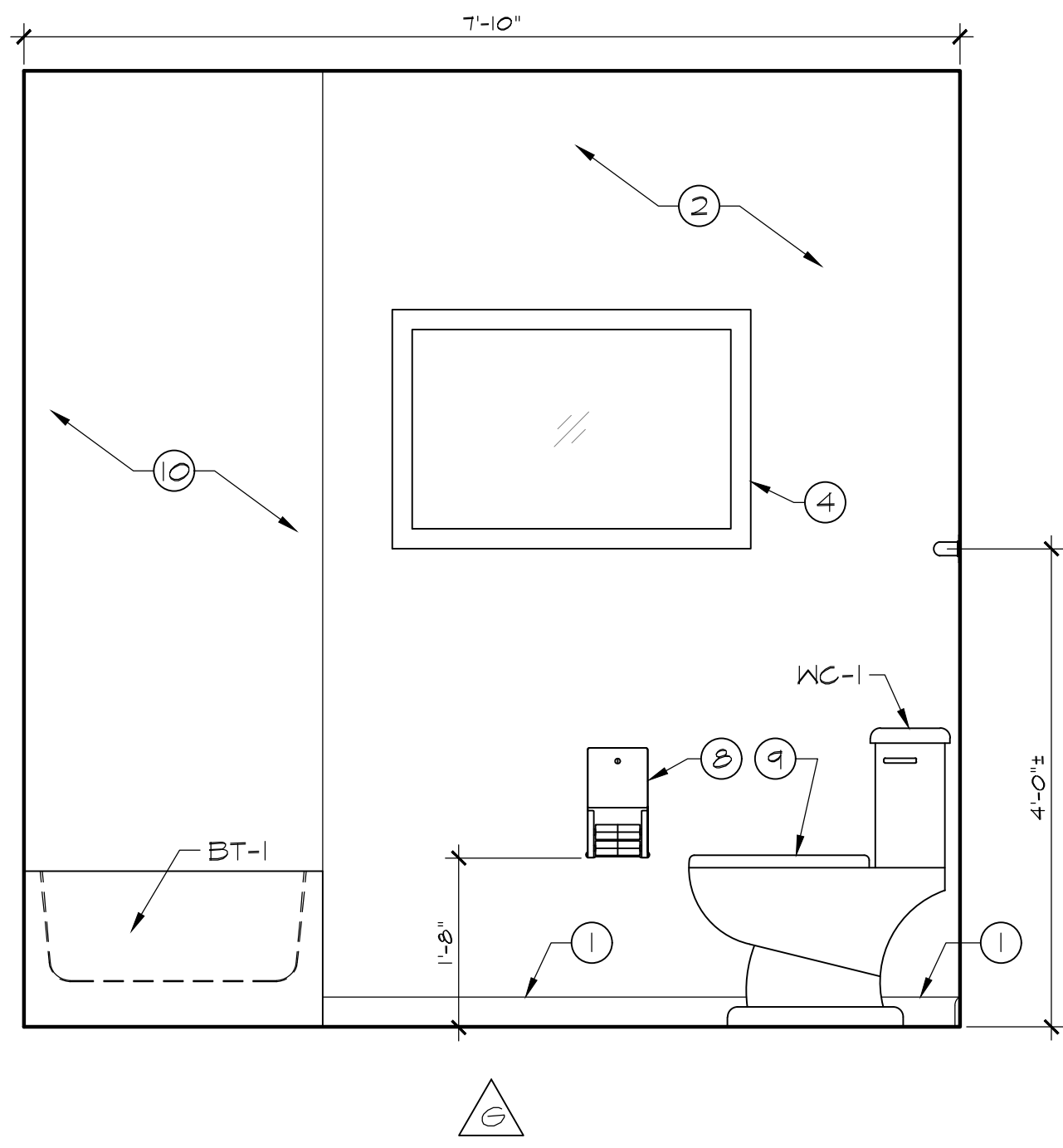
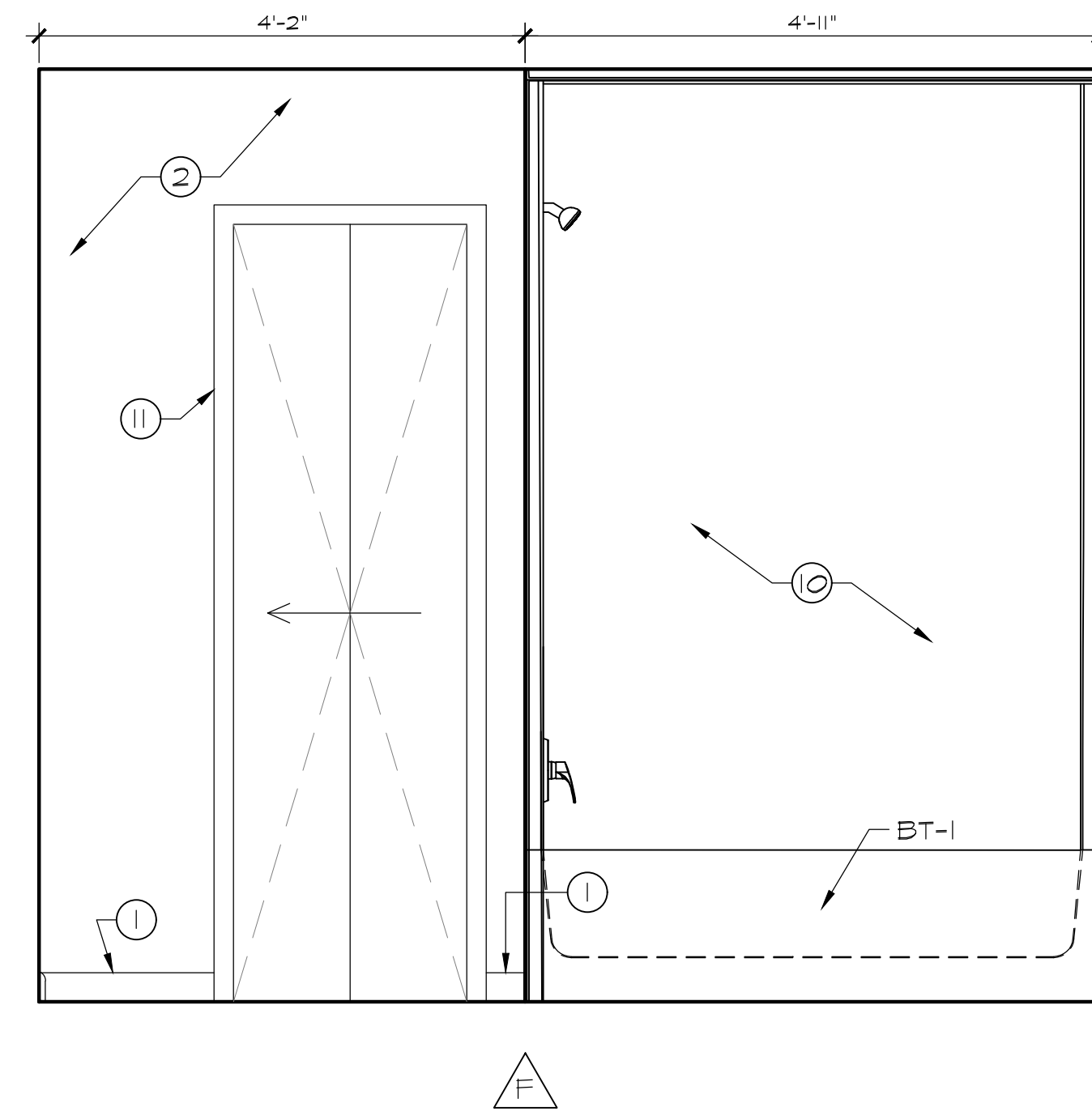
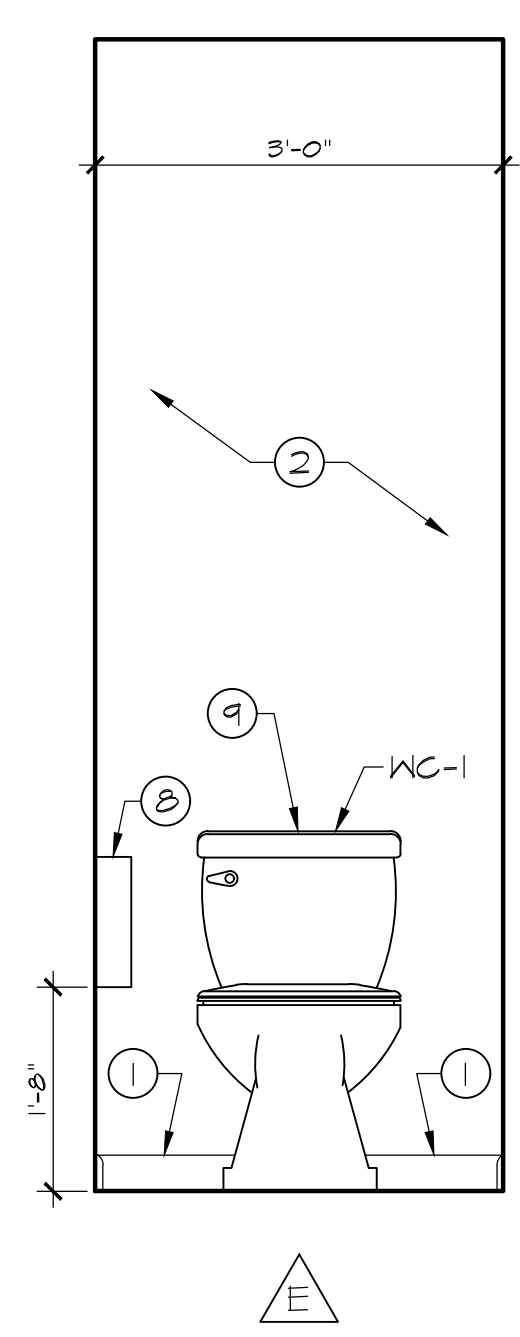
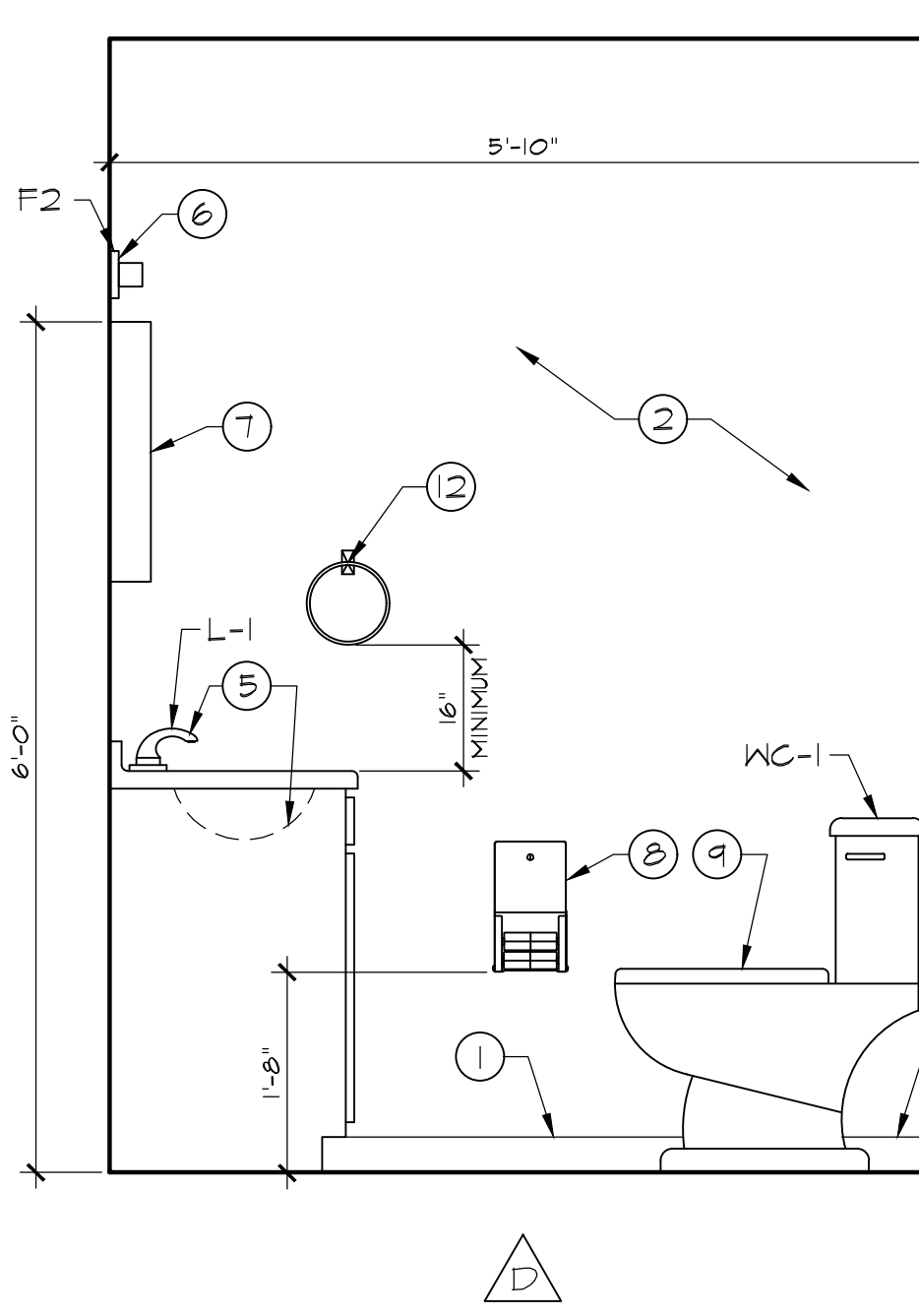
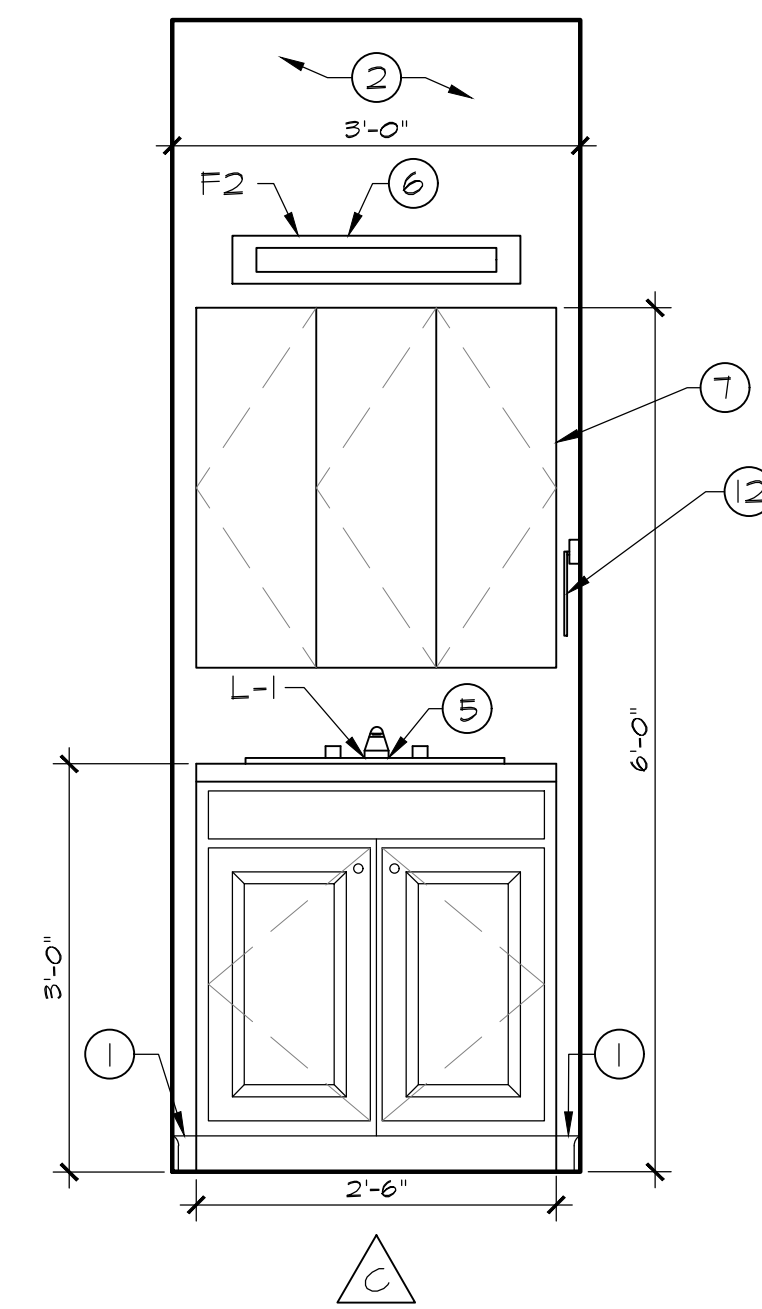
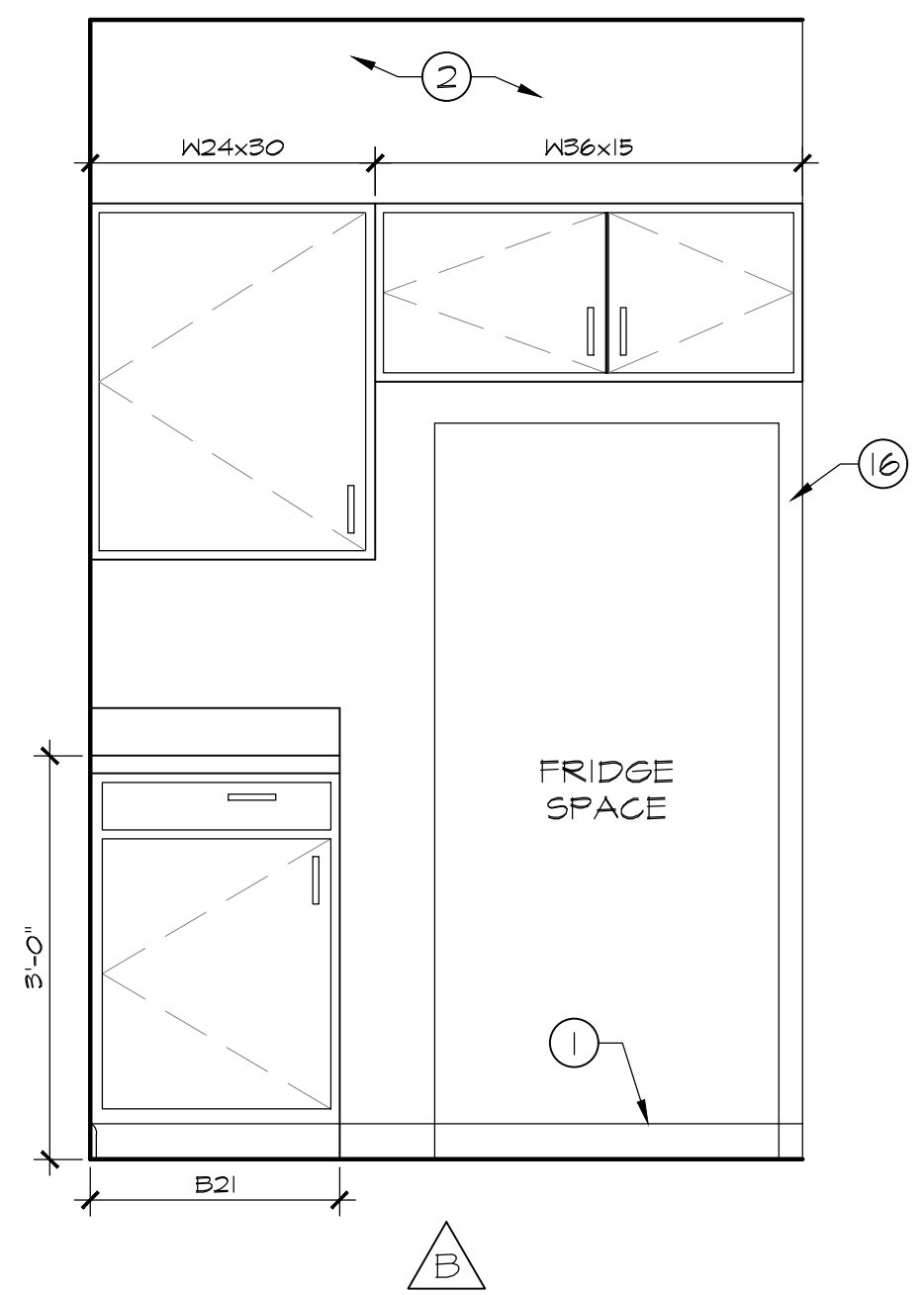
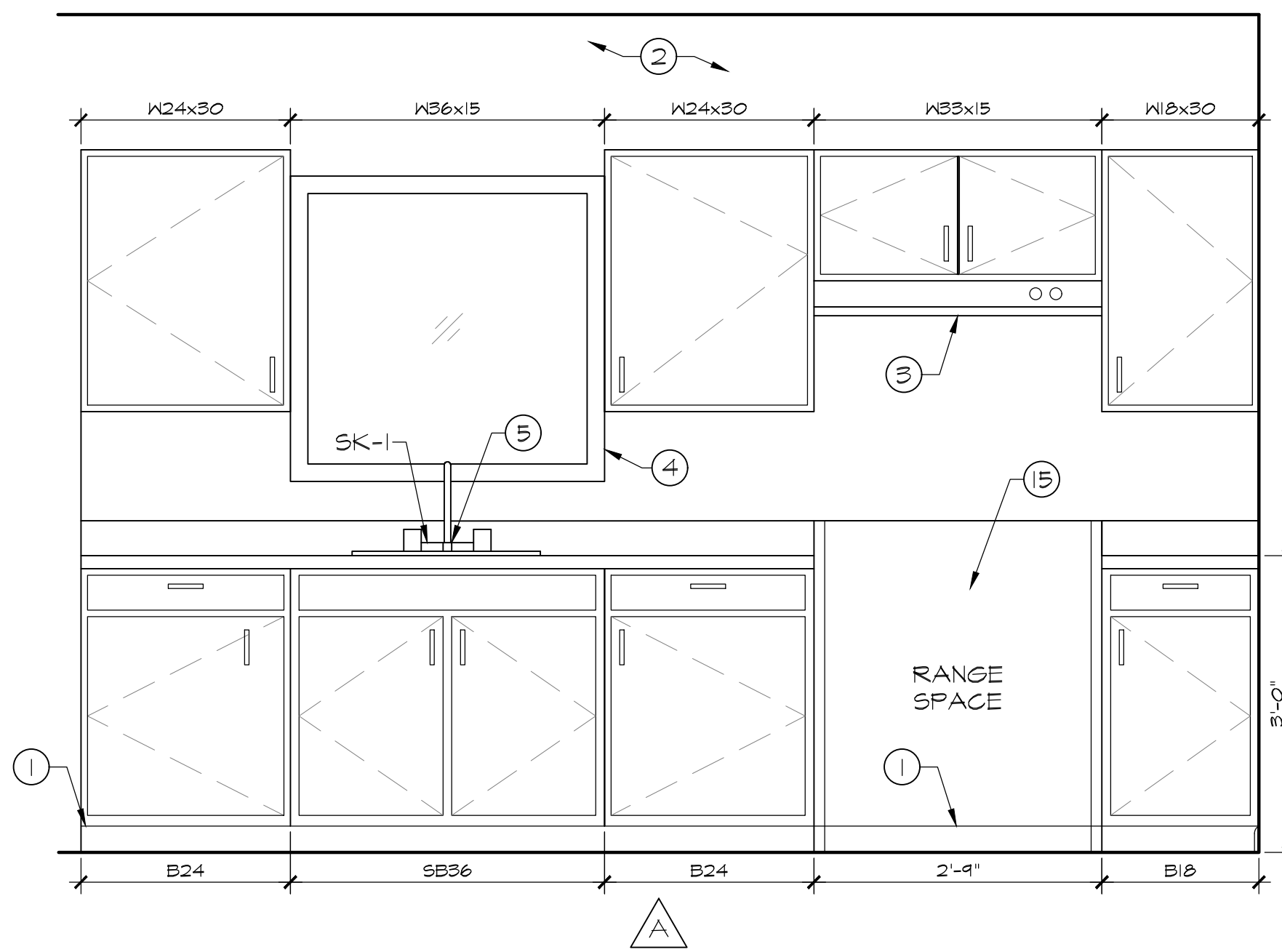
GENERAL NOTES (THIS SHEET ONLY)

1. SEE PROJECT GENERAL NOTES ON G100.
2. ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
3. ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
4. ALL CEILING IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
5. ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
6. ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

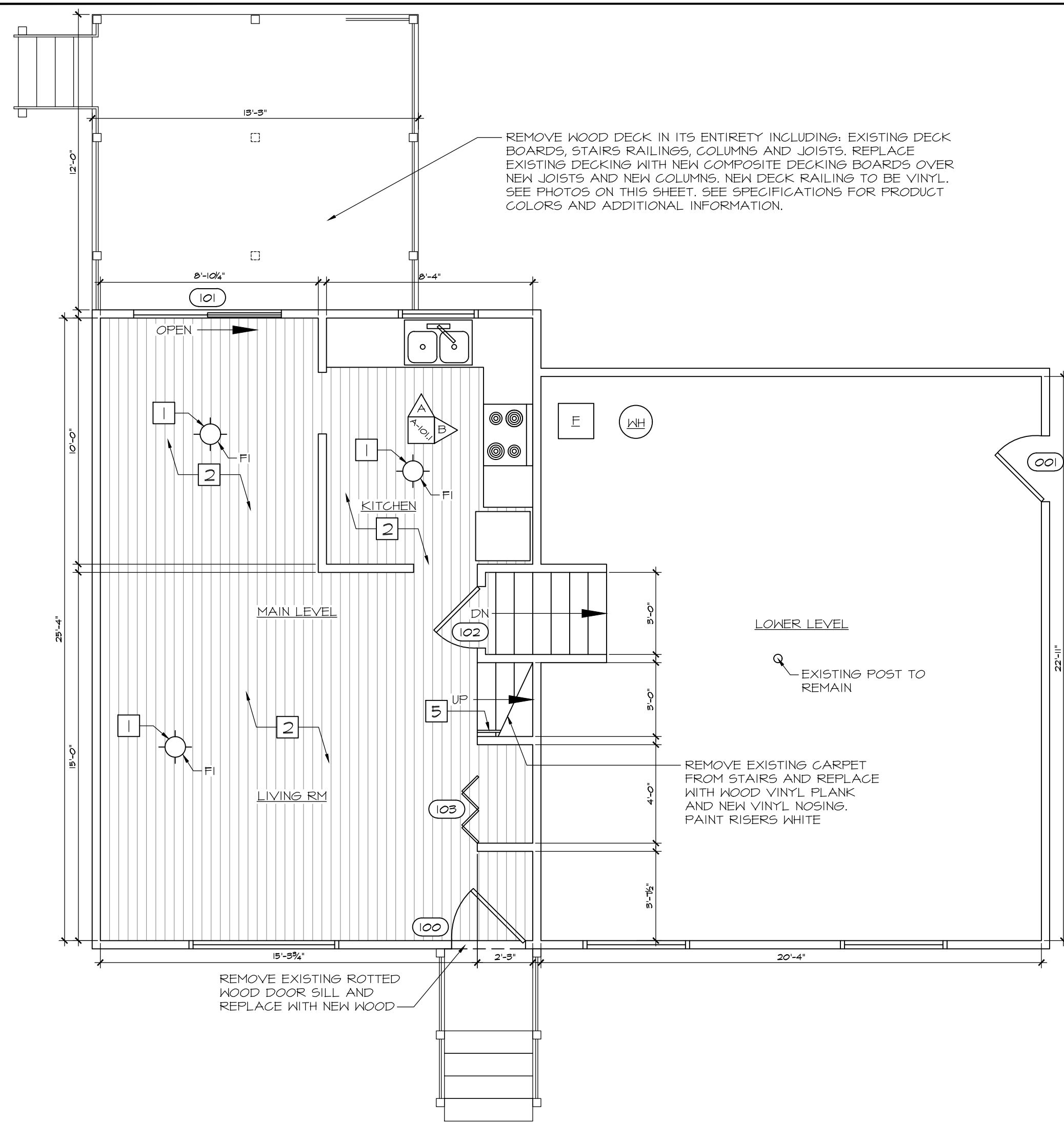
KEYNOTES (THIS SHEET ONLY)

INTERIOR ELEVATIONS

- ① EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- ② PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
- ③ REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- ④ EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- ⑤ REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑥ REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- ⑦ REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- ⑧ NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- ⑨ REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑩ REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑪ EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- ⑫ NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- ⑬ NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- ⑭ NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- ⑮ RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- ⑯ FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.



ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		RGE	
20-12740		JMK	Appal
COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)		Date	
26 THISTLE CT., COLUMBIA, SC.		06-06-2023	
Project Number		Date	
Rev. Date		Date	
Sheet No.		Date	
A100.1		Date	



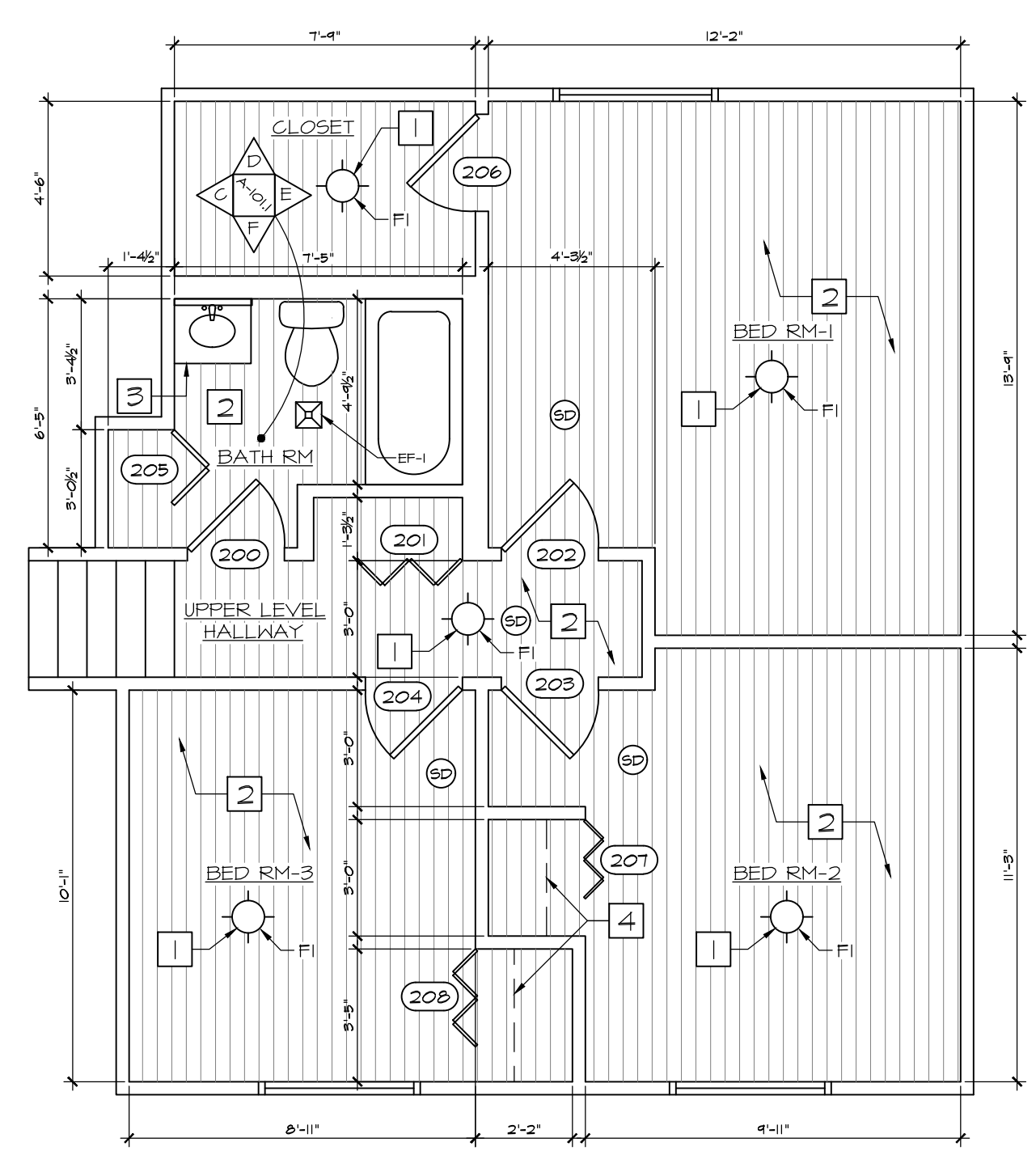
1 A-101 LEVEL 1 AND LOWER LEVEL FLOOR PLAN  
SCALE: 3/8" = 1'-0"



PIC 1  
SCALE: N.T.S.



PIC 2  
SCALE: N.T.S.



2 A-101 LEVEL 2 FLOOR PLAN  
SCALE: 3/8" = 1'-0"

\*GRAVEL SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:

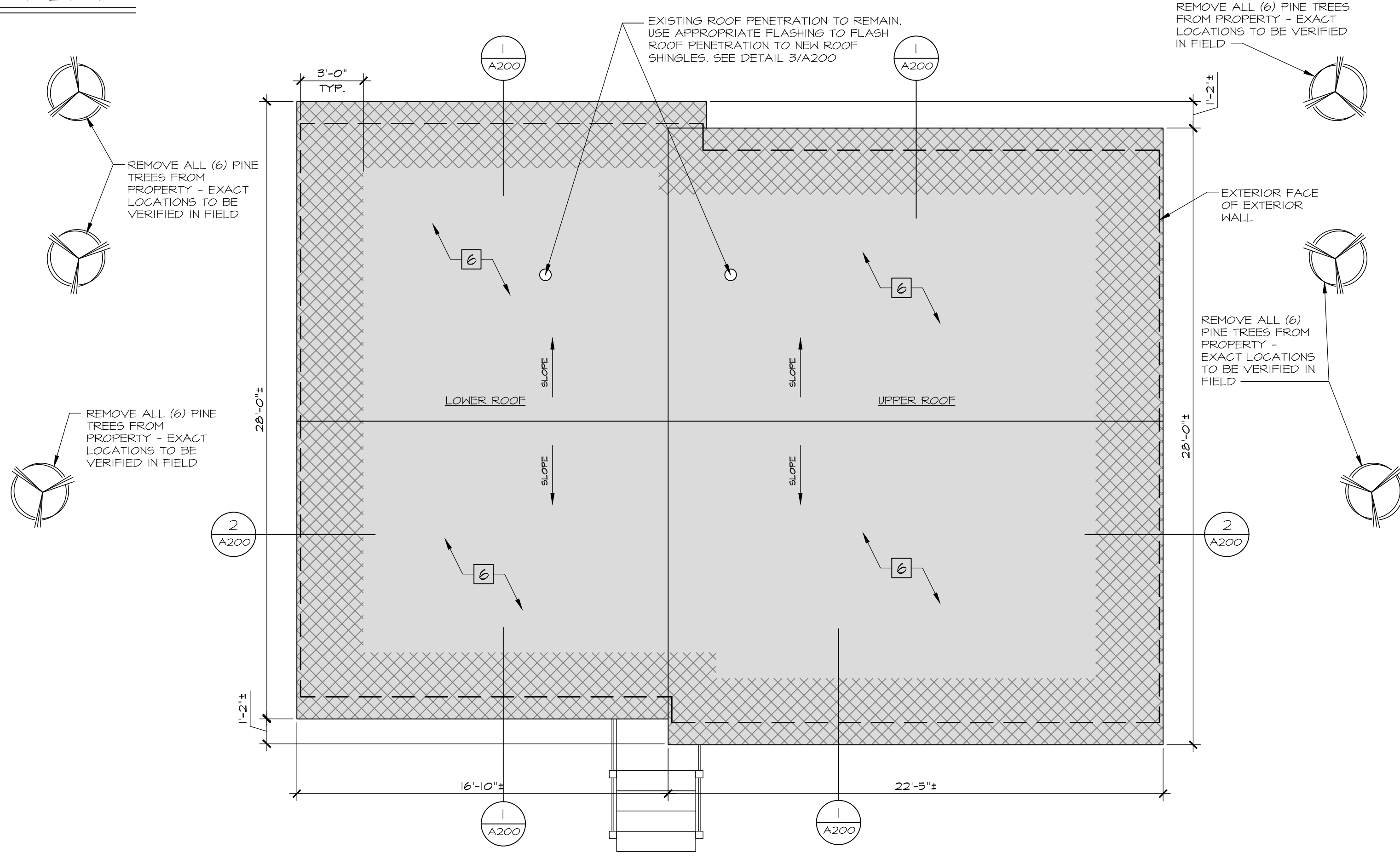
- 1 3/4" CELLULAR PVC DOOR WITH NEW DEADBOLT
- BRICKMOLD
- STAINLESS STEEL HARDWARE
- 3/4" JAMB AND HEAD DEPTH
- OVERLAY CONFIGURATION
- SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY GUSB APPEAL PRODUCTS  
W: (888)CARBAPPEALPRODUCTS.COM/GRAVEL-SPACE-DOORS/  
P: (414)846-8088

- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON 6100.
  - ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
  - ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
  - ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
  - ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
  - ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
  - ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
  - REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
  - ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

- ### KEYNOTES (THIS SHEET ONLY)
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOWL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - CLEAN, PREPARE, PRIME AND PAINT ENTIRE EXISTING HANDRAIL OR GUARDRAIL AT THIS LOCATION. TAKE CARE NOT TO DAMAGE EXISTING FINISHES.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

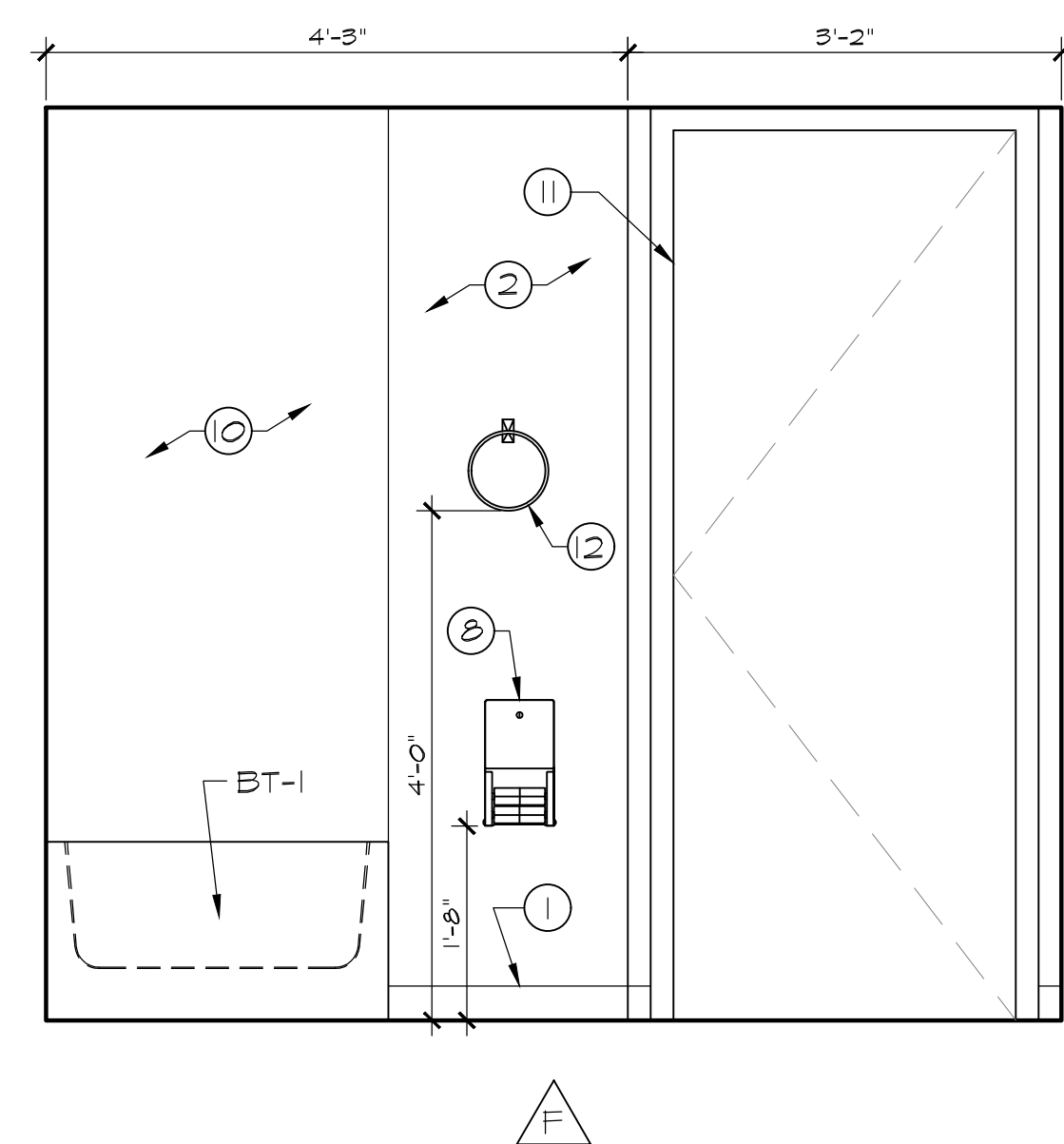
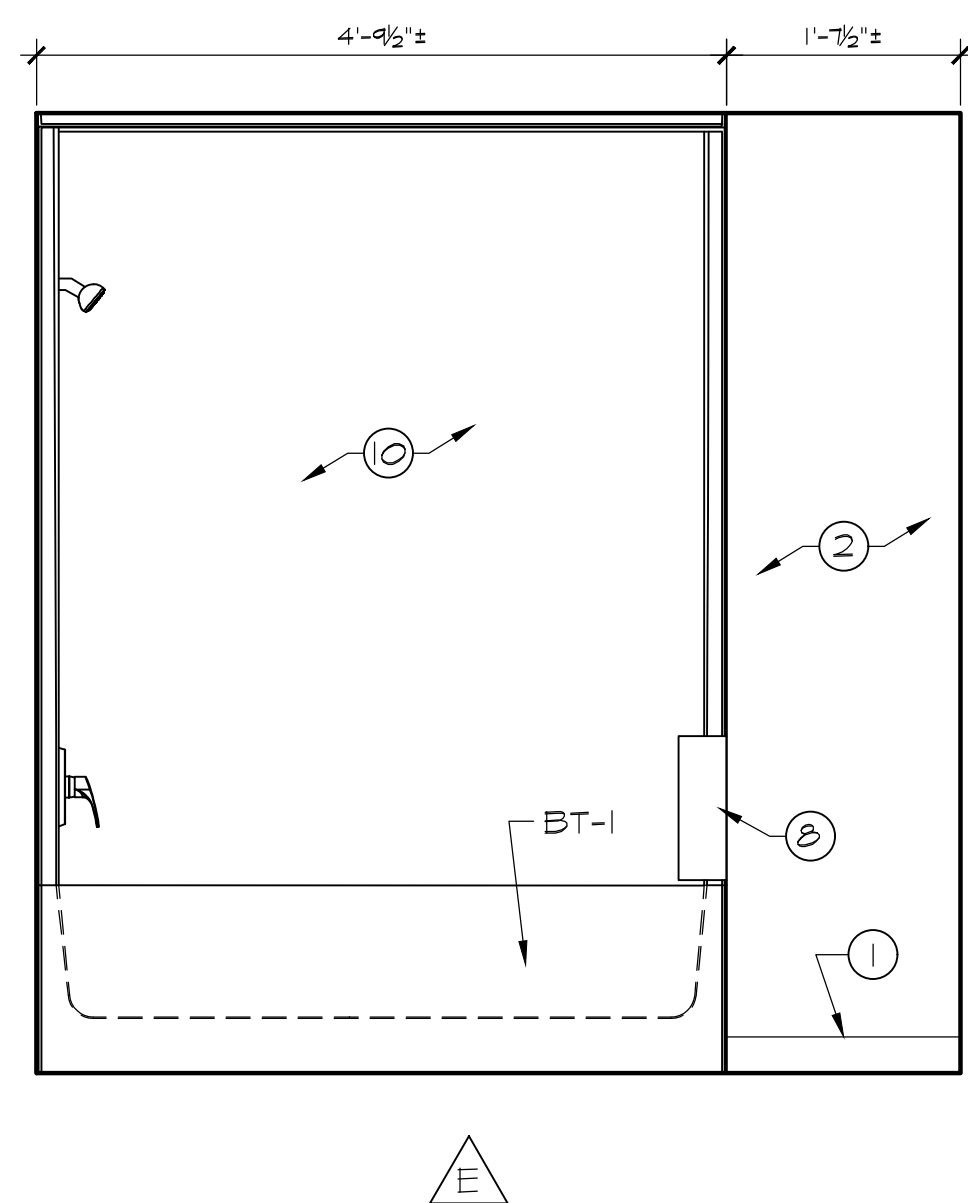
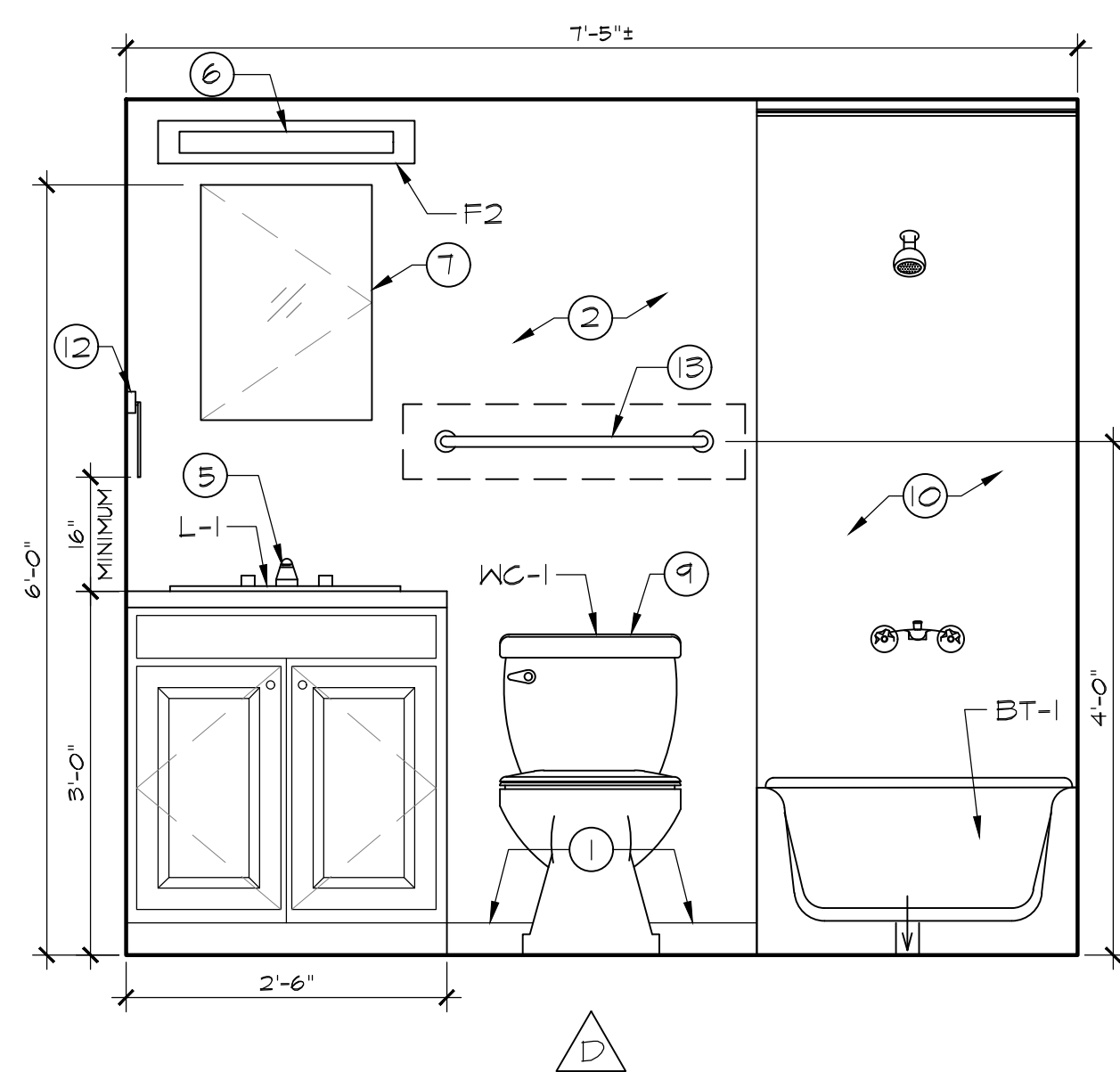
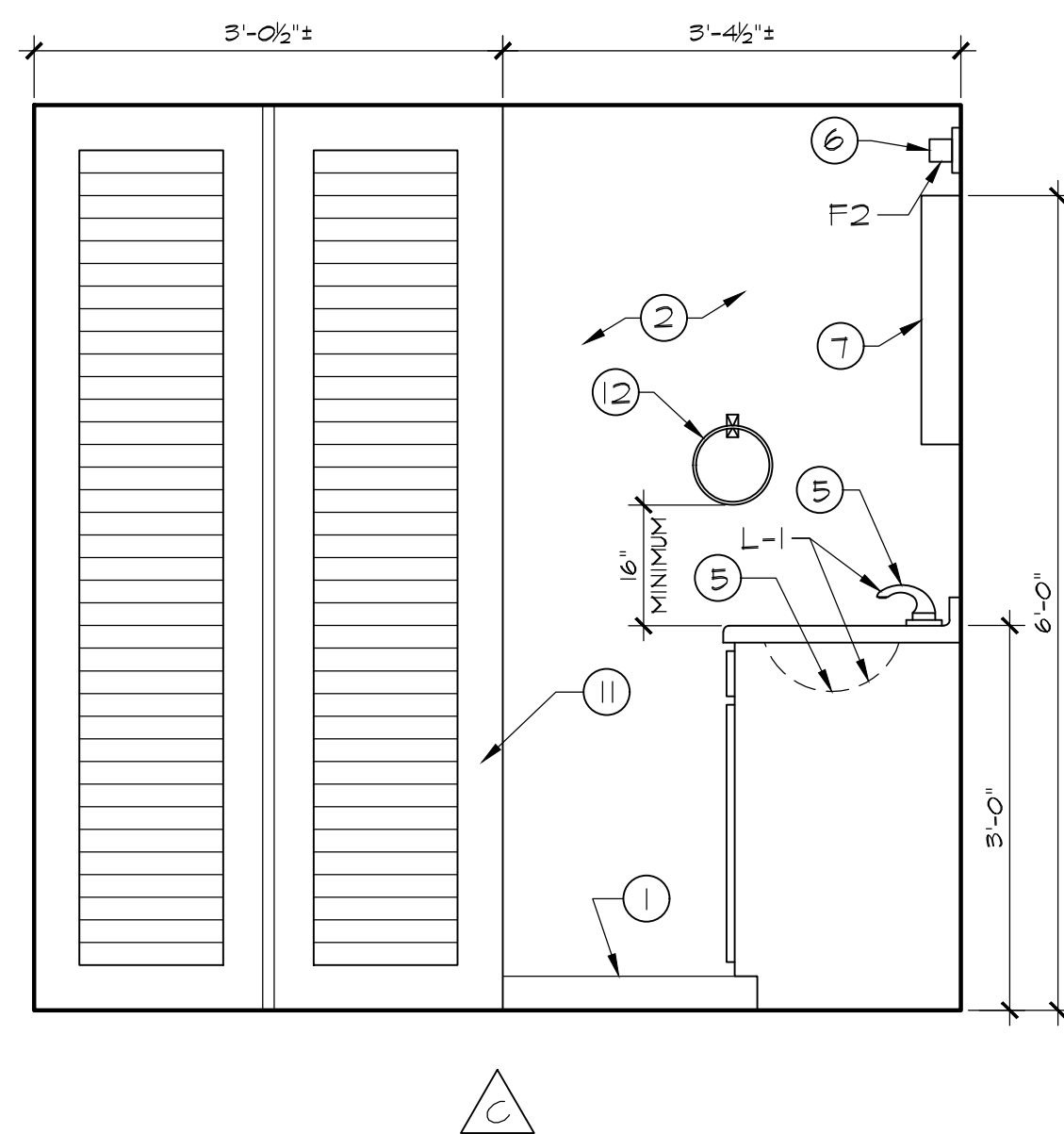
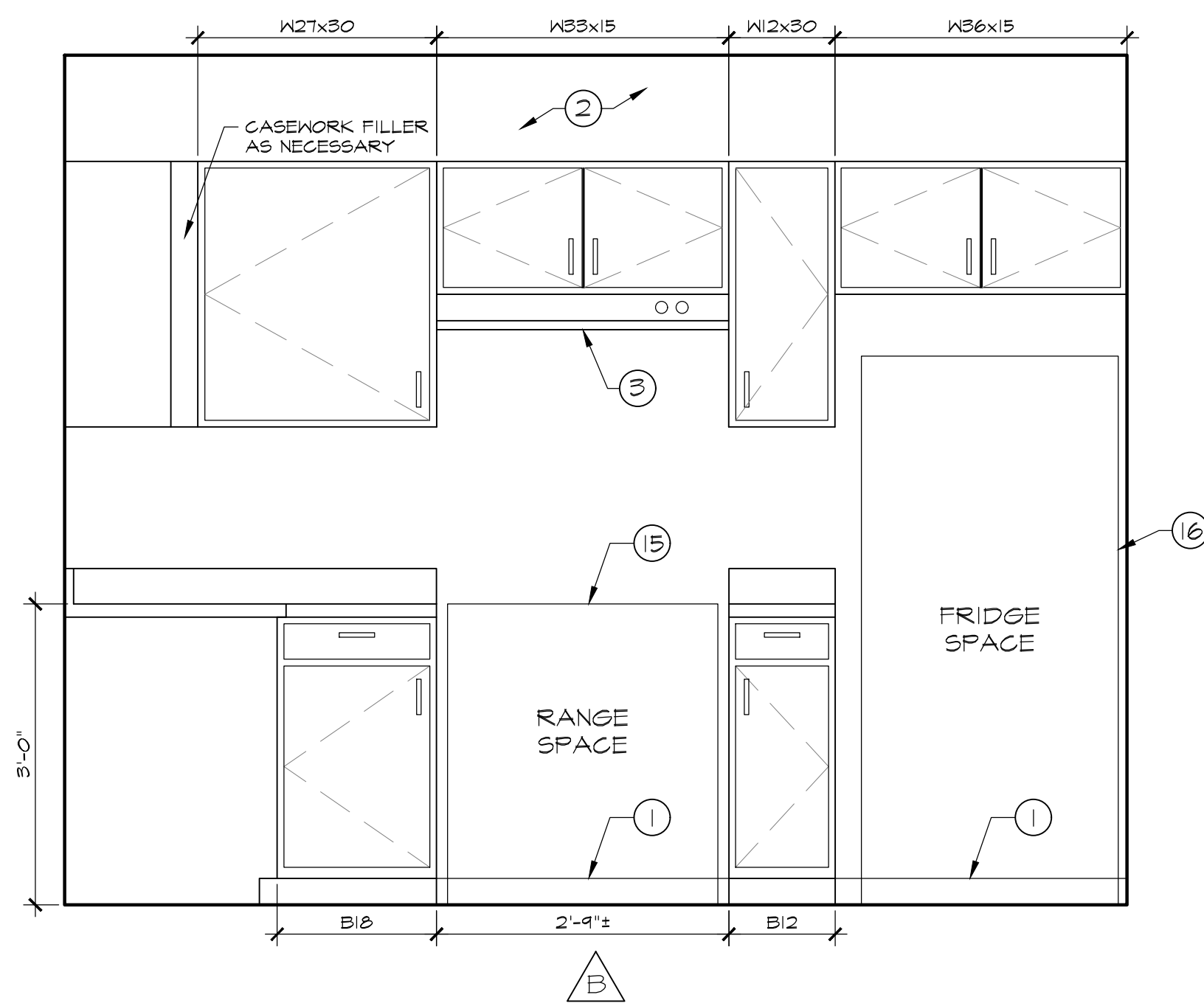
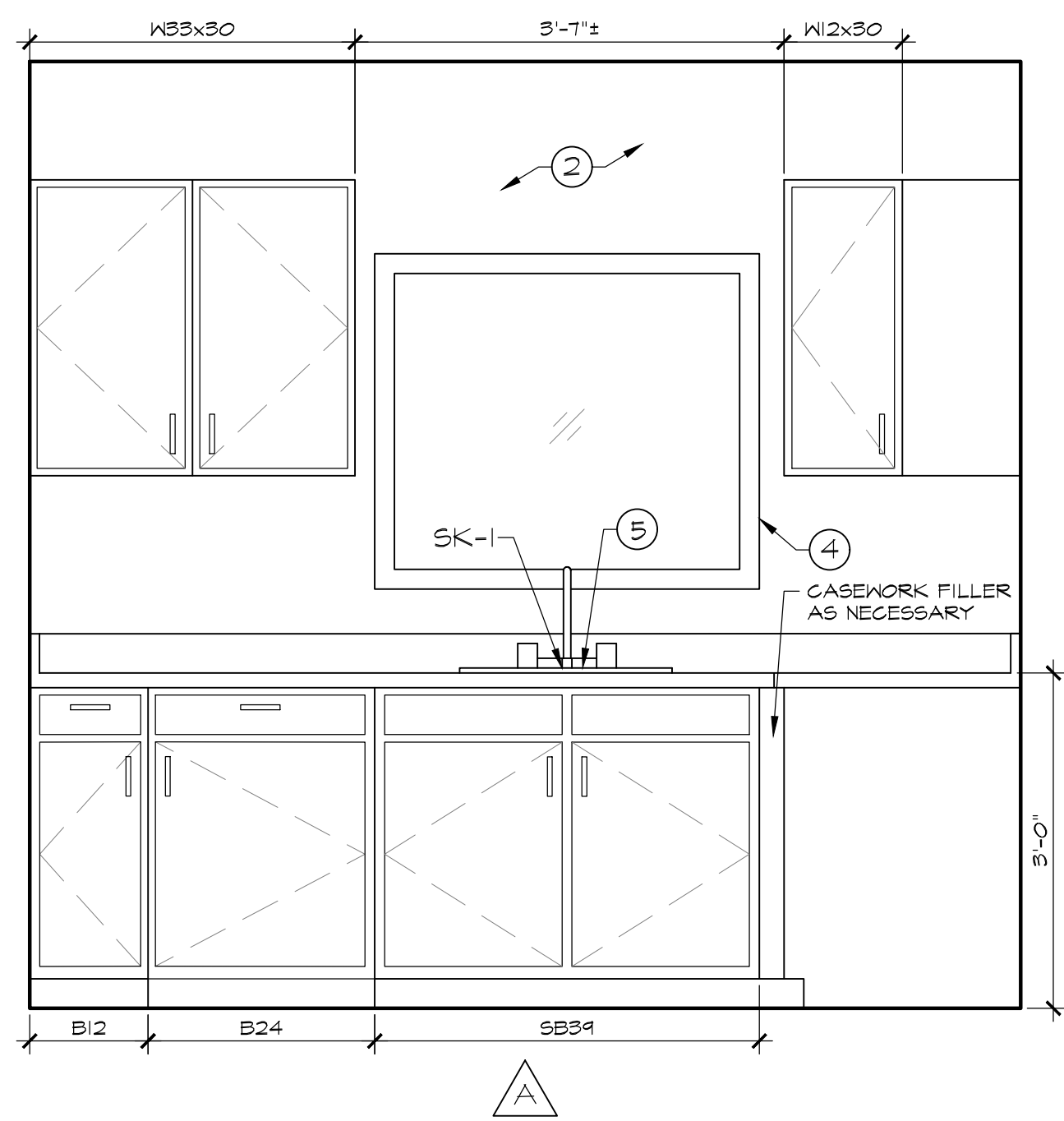
- ### LEGEND OF SYMBOLS
- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
  - NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
  - AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR - SEE GENERAL NOTE 15
  - CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17



3 A-101 SITE AND ROOF PLAN  
SCALE: 1/4" = 1'-0"

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB			
41 SALVIA CT. COLUMBIA, SC.			
20-12740	06-06-2023	JMK	Appr.
Project Number	Date	Drawn	Scale
Rev. Date			
Sheet No.	A101		
481T FAULKLAND			





### GENERAL NOTES (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

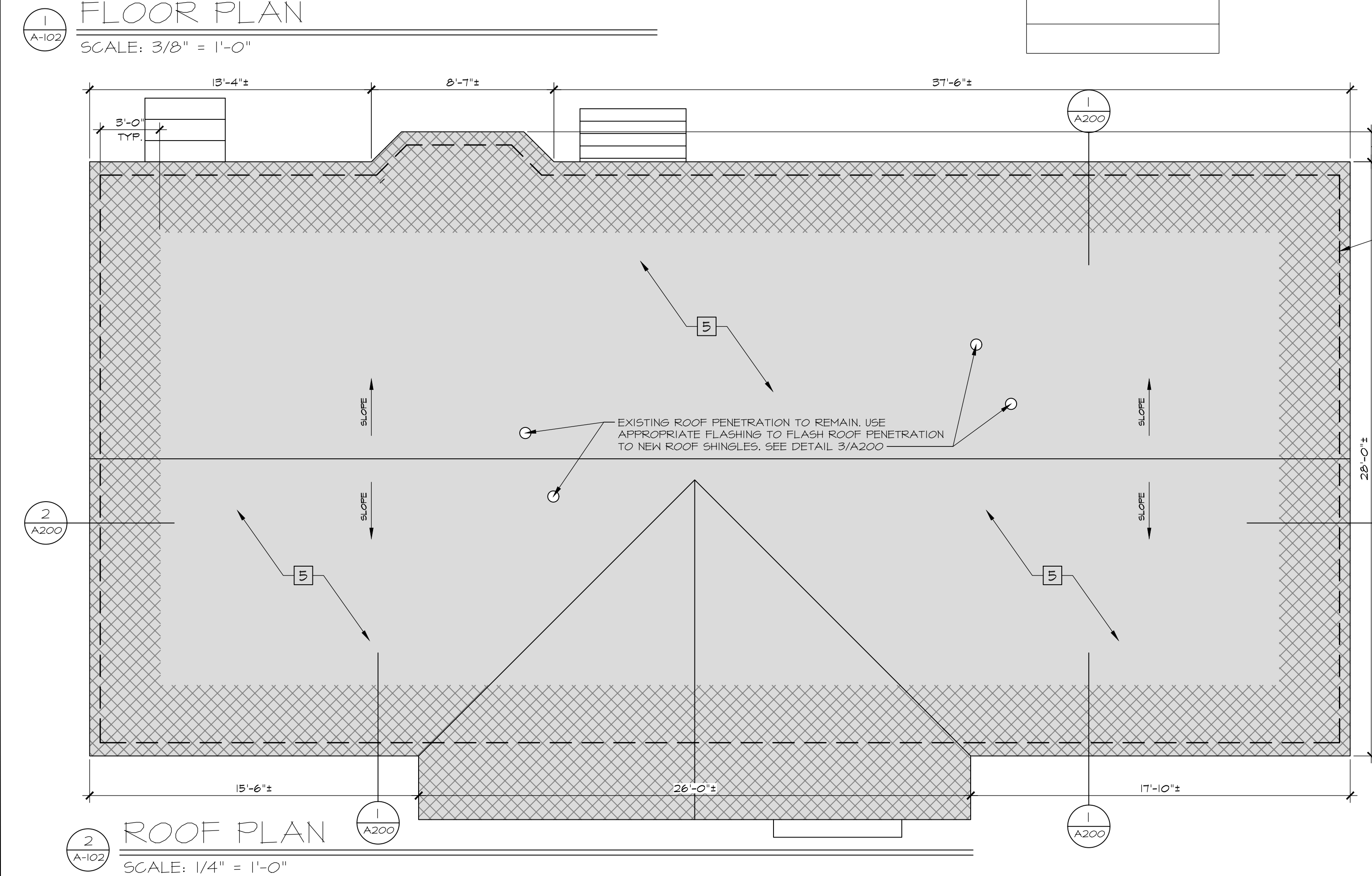
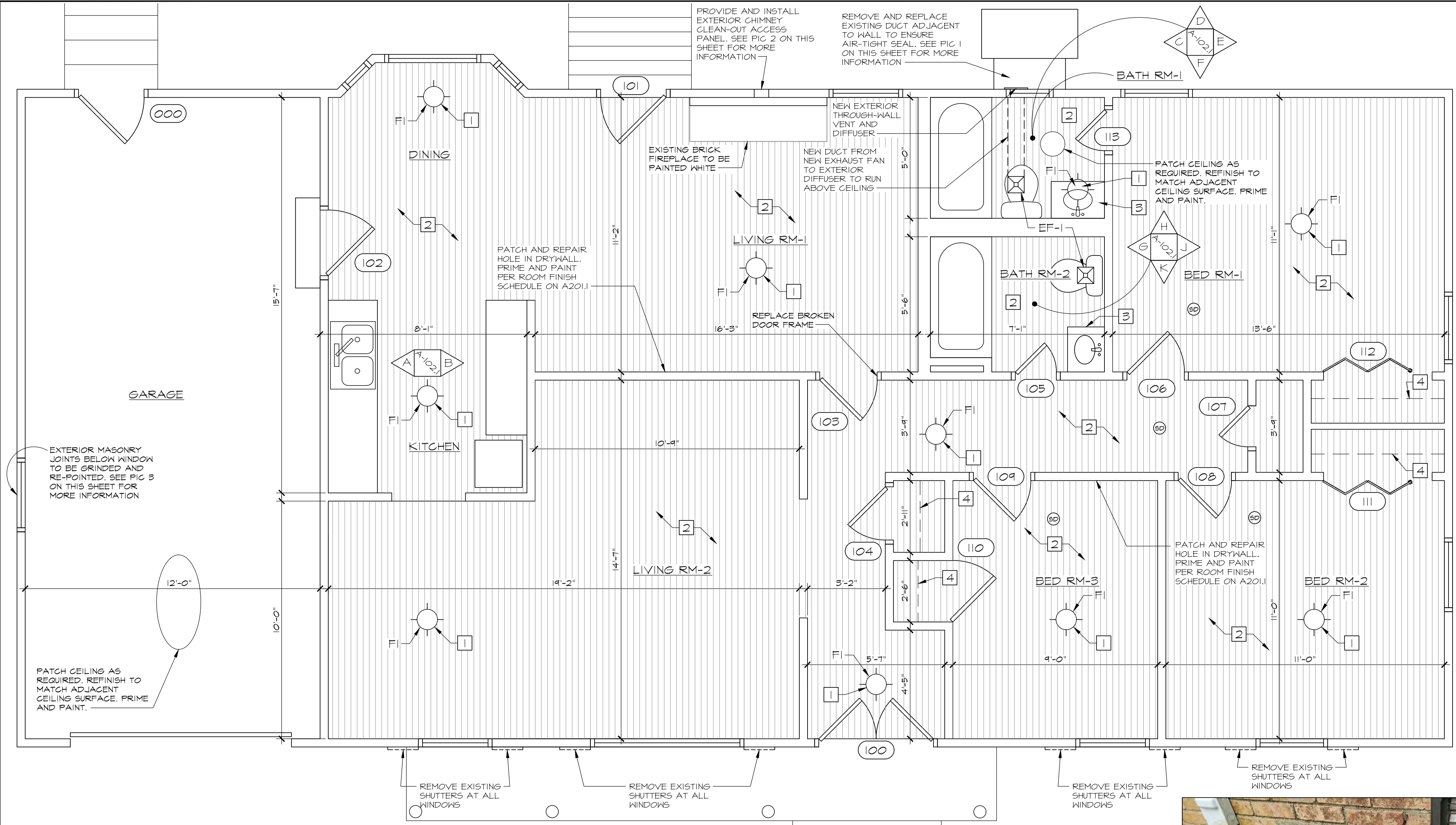
### KEYNOTES (THIS SHEET ONLY)

#### INTERIOR ELEVATIONS

- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

1 A-101 INTERIOR ELEVATIONS  
SCALE: 3/4" = 1'-0"

		1919 Architects 4000 Mesary Drive Rockford, IL 61107 (815) 223-8222		www.1919architects.com
		ARCHITECT	BIDDING CO.	
COLUMBIA H.A. SCATTERED SITE REHAB		OWNER	CONTRACTOR	RGE
(ZONE 1) 41 SALVIA CT. COLUMBIA, SC.		20-12740	JMK	Appr.
Project Number 06-06-2023		Date		
INTERIOR ELEVATIONS	Rev. Date			
	Sheet No.			
	A101.1			



- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON 6100.
  - ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
  - ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
  - ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
  - ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
  - ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
  - ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
  - REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
  - ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

- ### KEYNOTES (THIS SHEET ONLY)
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

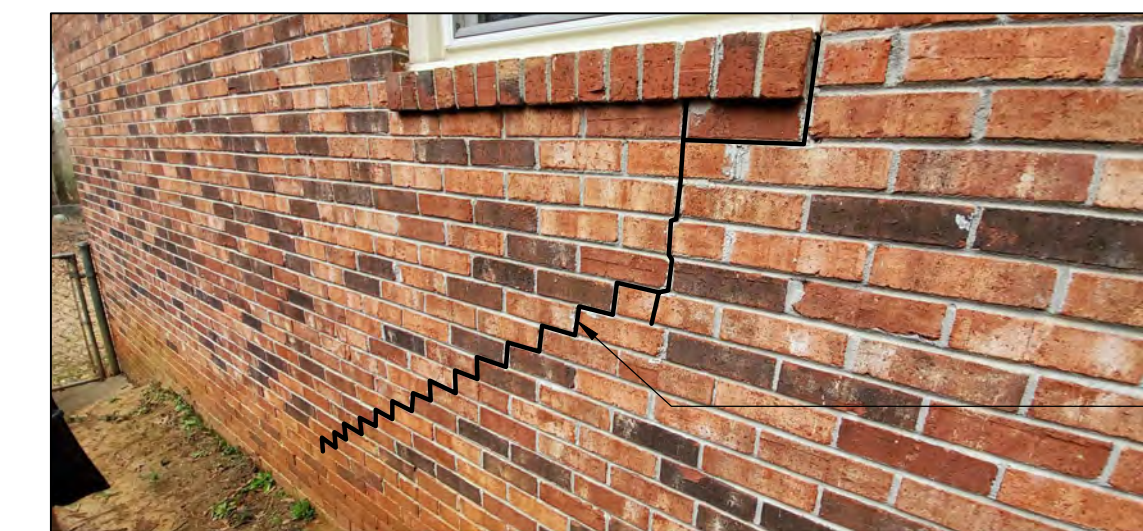
- ### LEGEND OF SYMBOLS
- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
  - NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
  - AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR - SEE GENERAL NOTE 15
  - CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17



PIC 1  
SCALE: N.T.S.



PIC 2  
SCALE: N.T.S.



PIC 3  
SCALE: N.T.S.

MASONRY JOINTS TO BE GRINDED AND RE-POINTED

MASONRY POINTING DETAILS LOCATED ON SHEET A200 (DETAILS)

\*CRAWL SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:

- 1 3/4" CELLULAR PVC DOOR WITH NEW DEADBOLT
- BRICK MOULD
- STAINLESS STEEL HARDWARE
- 3/8" JAMB AND HEAD DEPTH
- OVERLAY CONFIGURATION
- SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY GURB APPEAL PRODUCTS  
 WWW.GURBAPPEALPRODUCTS.COM/CRAWL-SPACE-DOORS/1  
 P: (919)846-8088

**1919**  
Architects

1919 Architects  
4000 Mesary Drive  
Rockford, IL 61107  
(815) 228-9222  
www.1919architects.com

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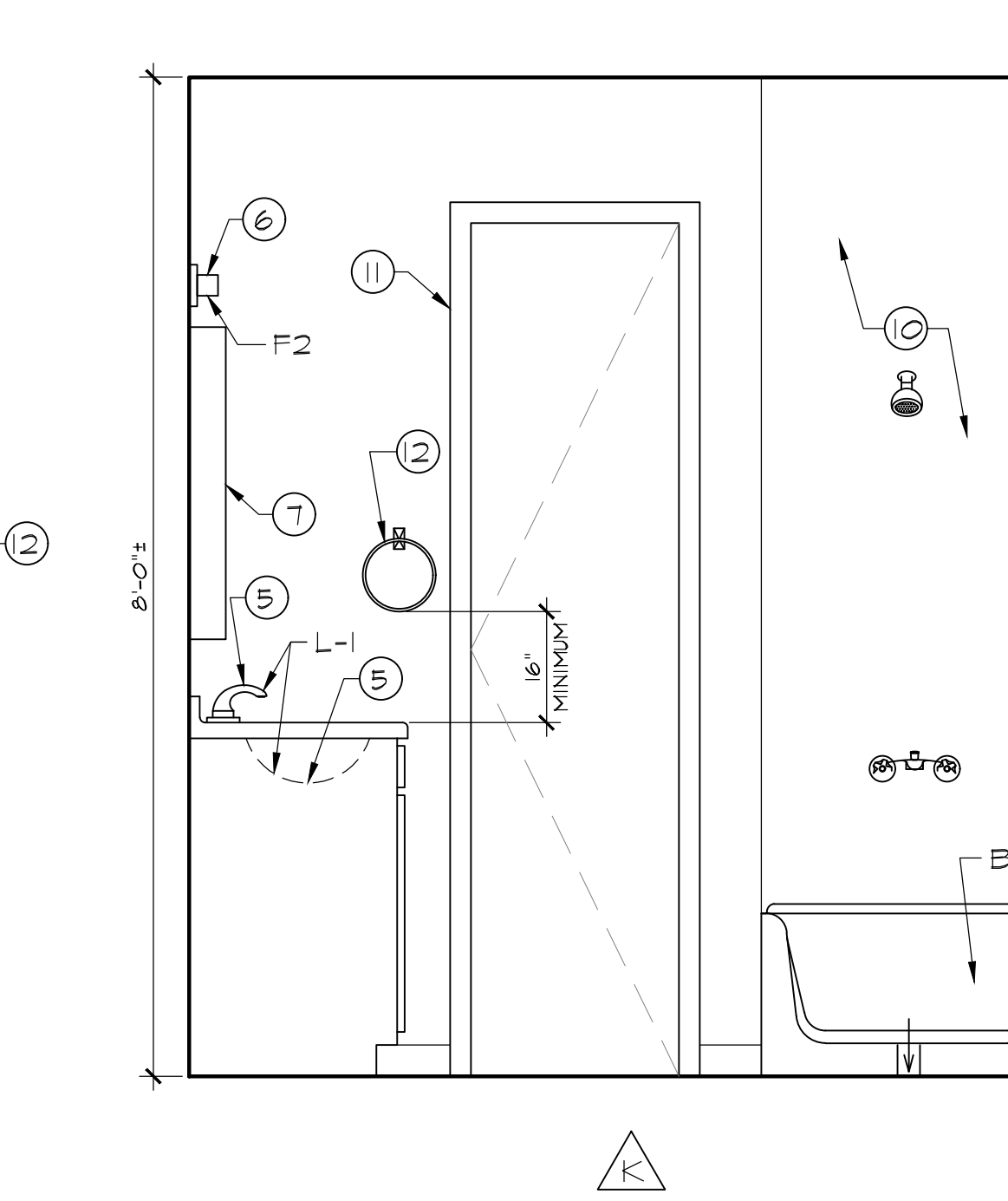
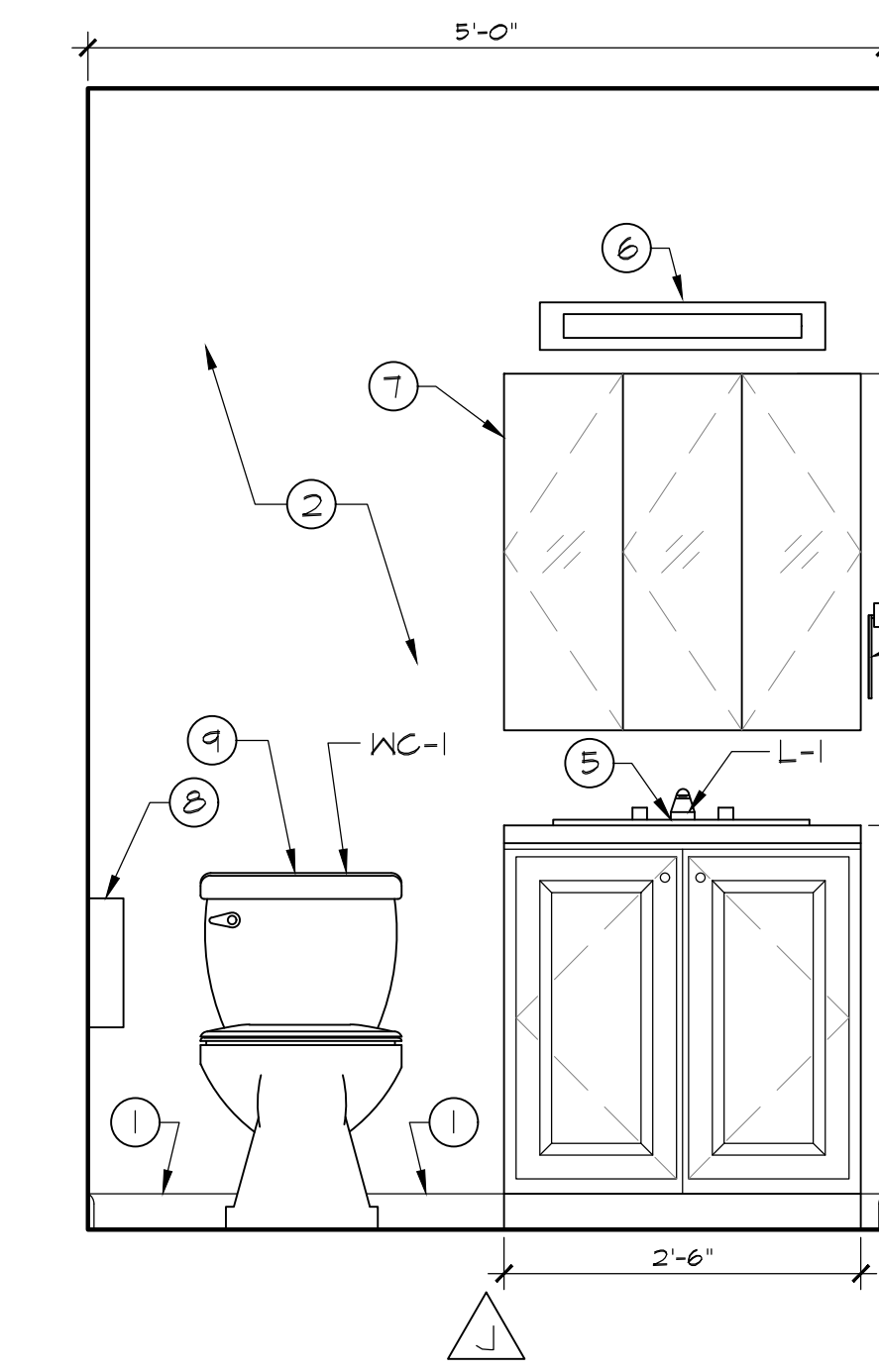
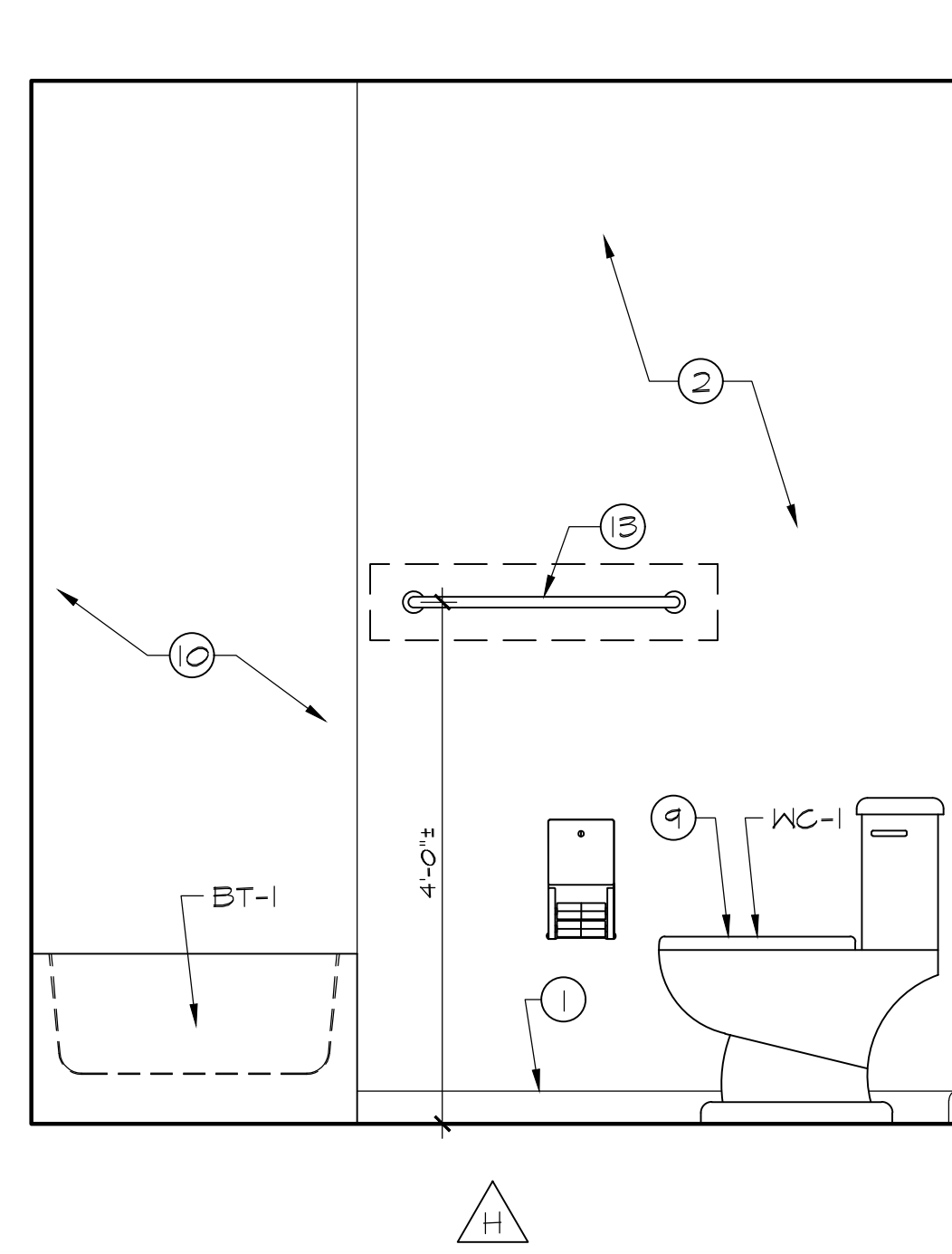
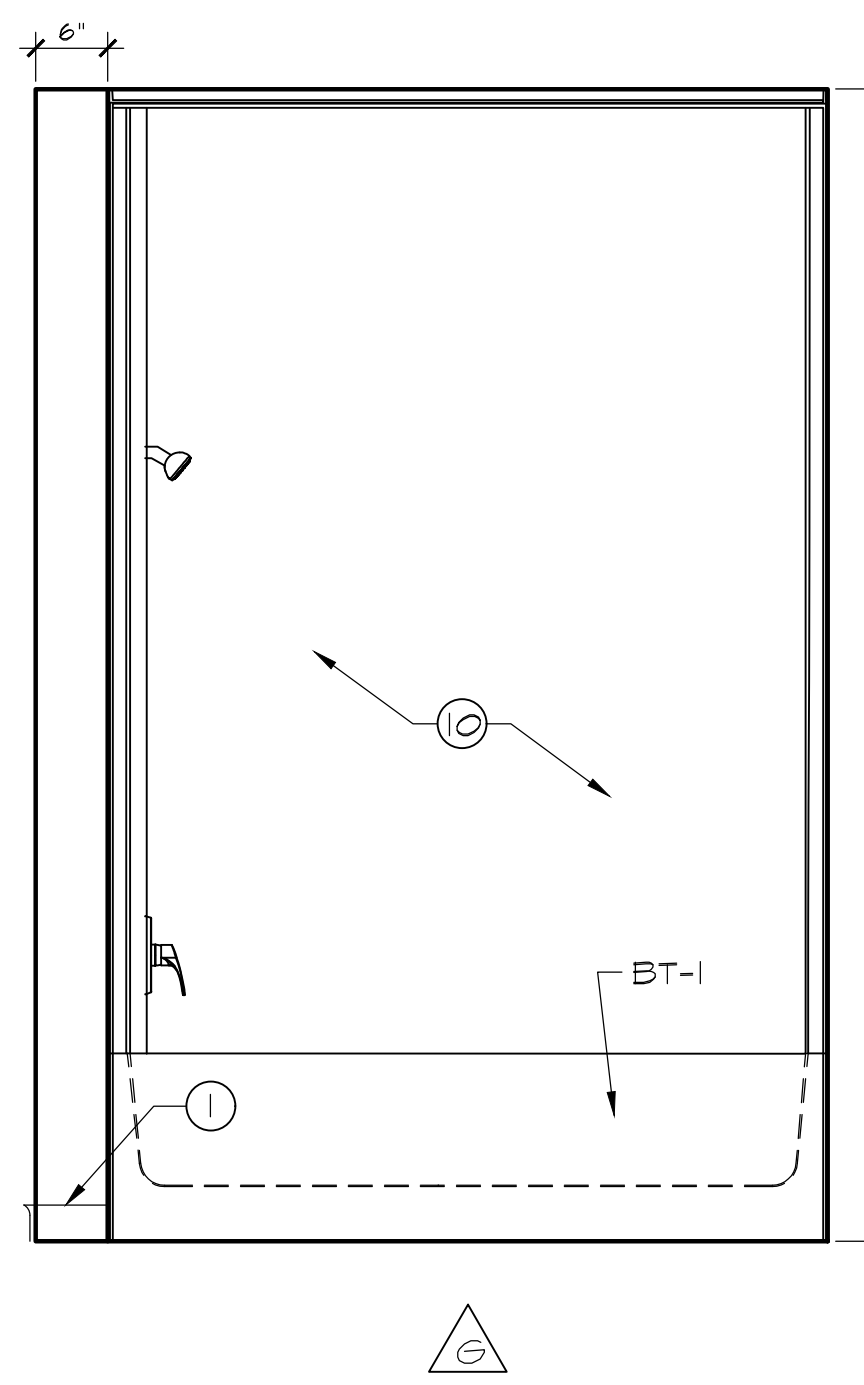
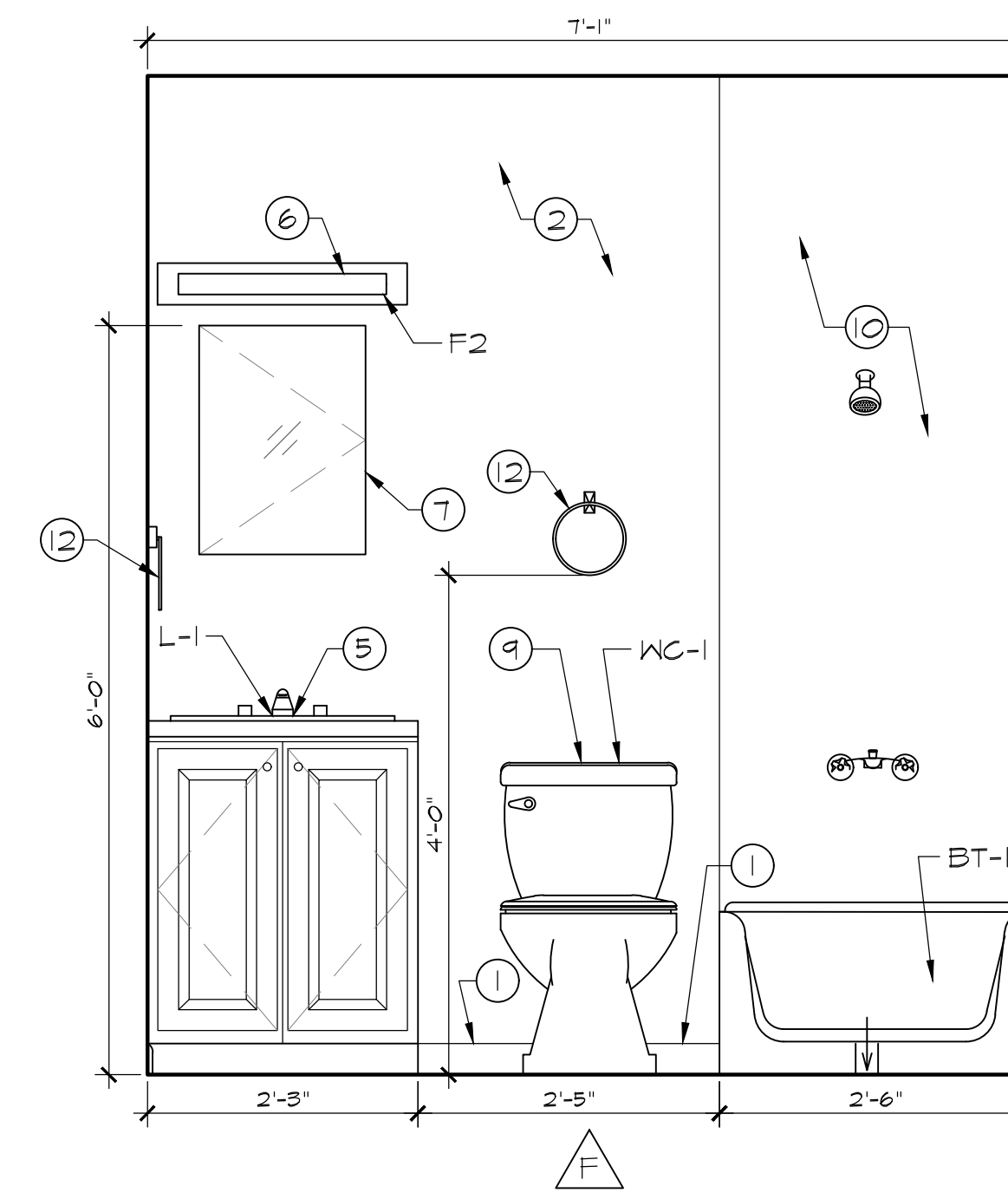
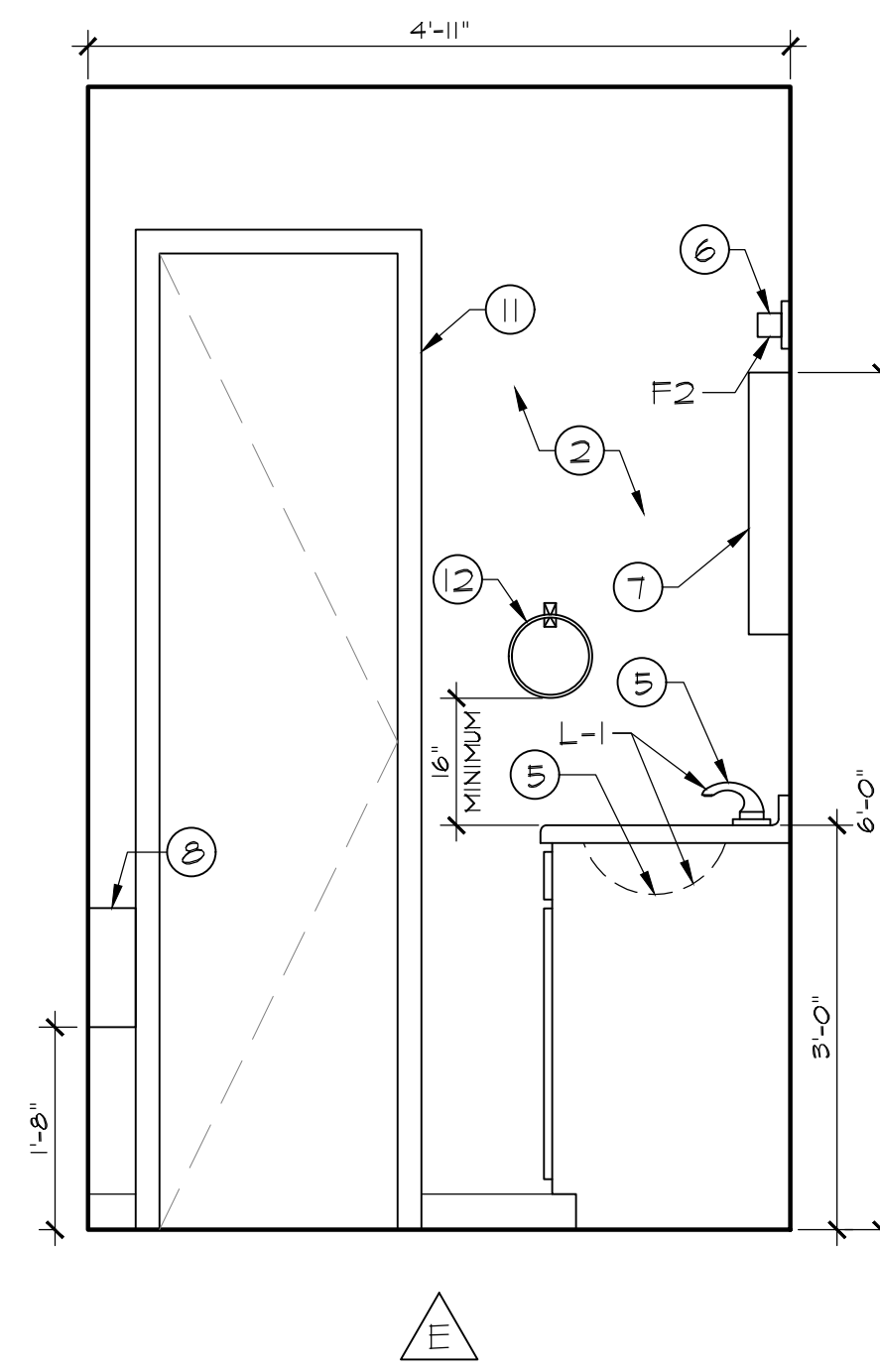
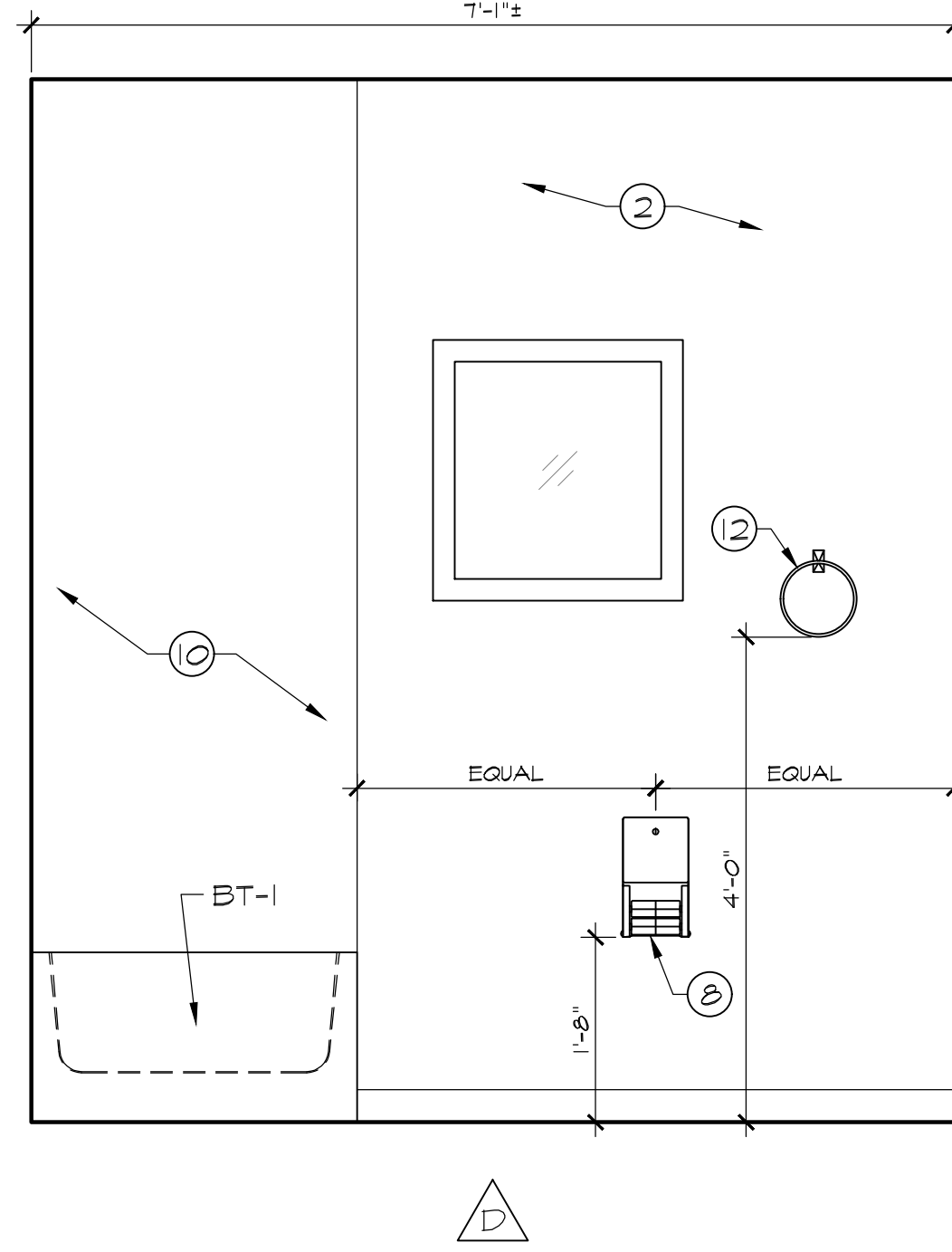
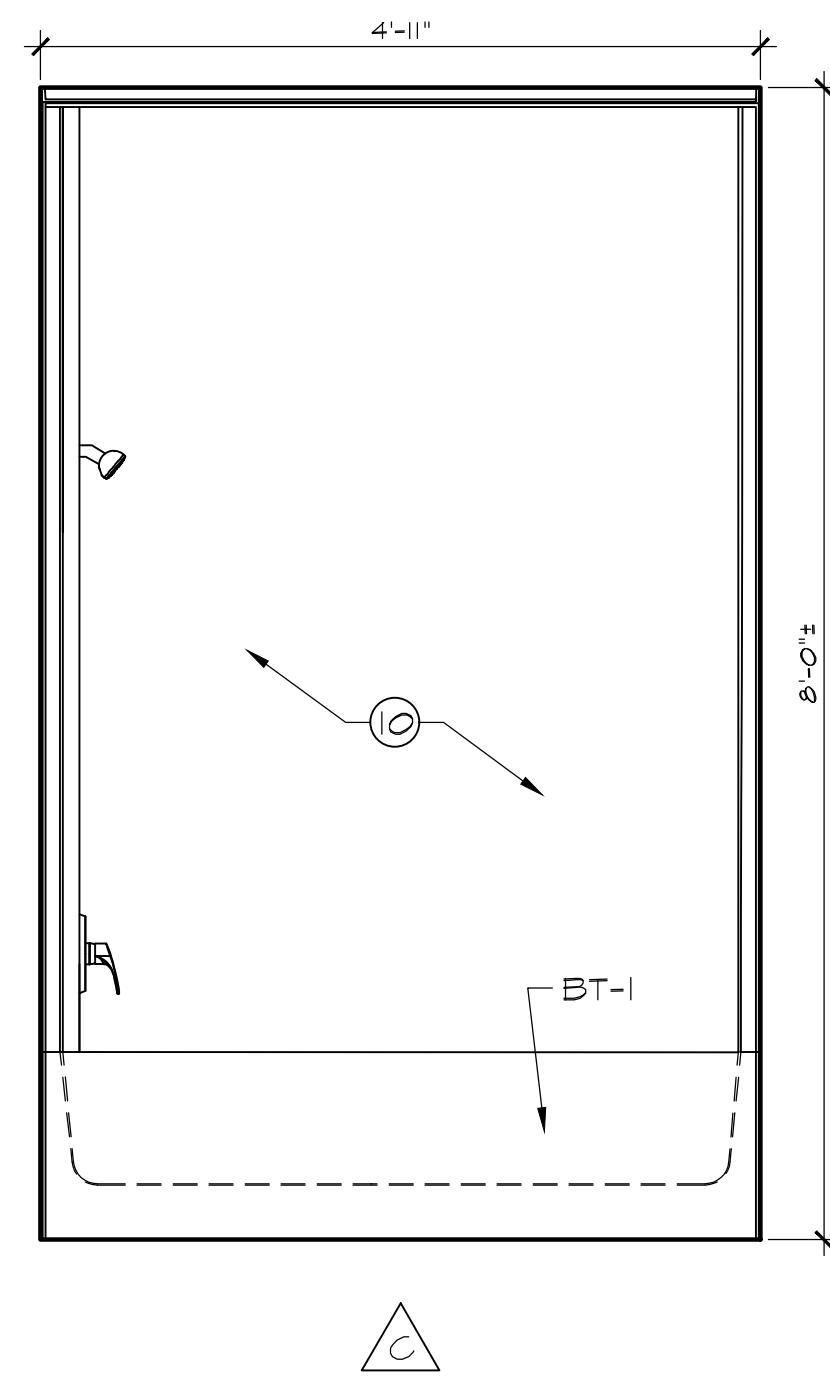
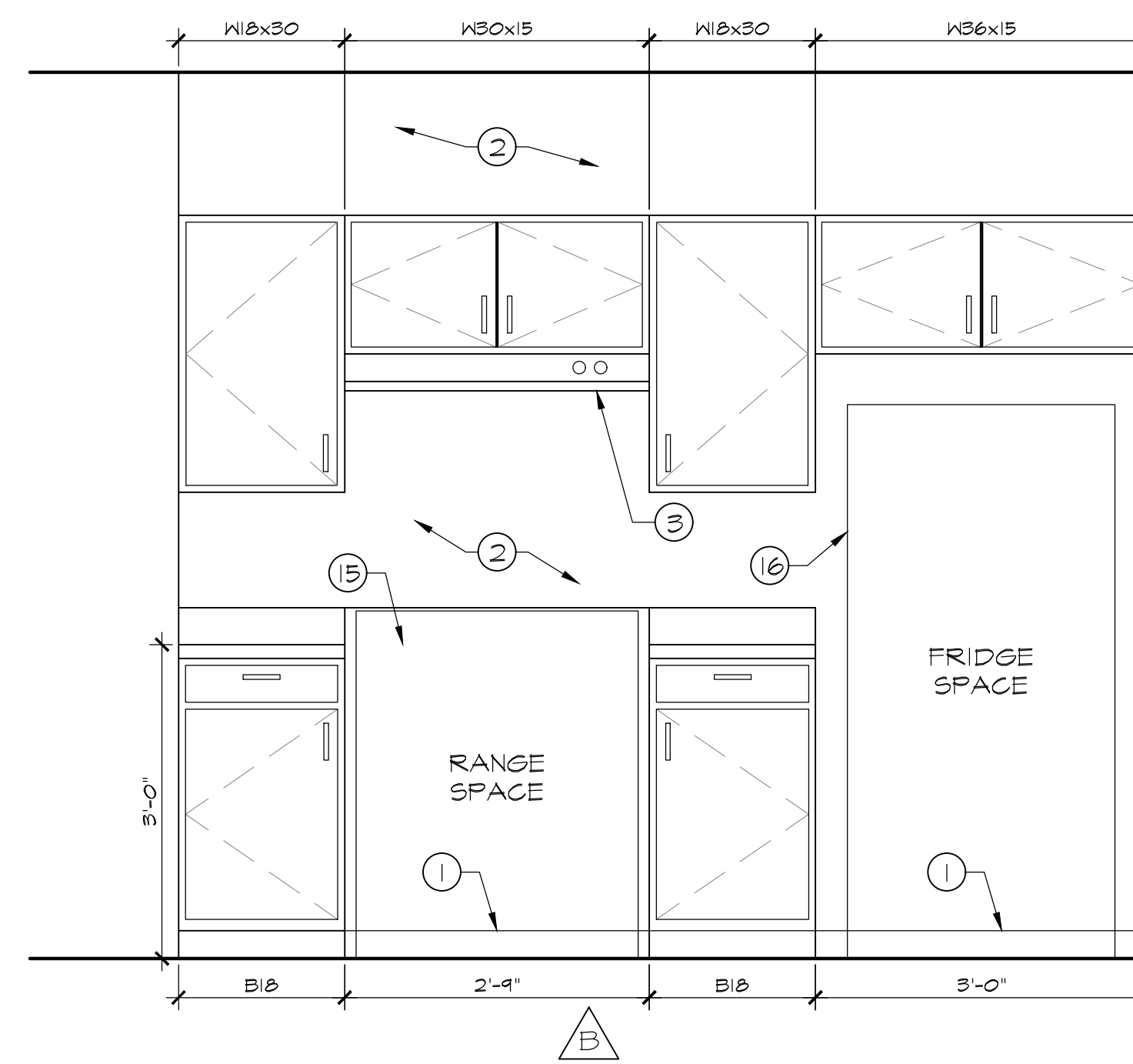
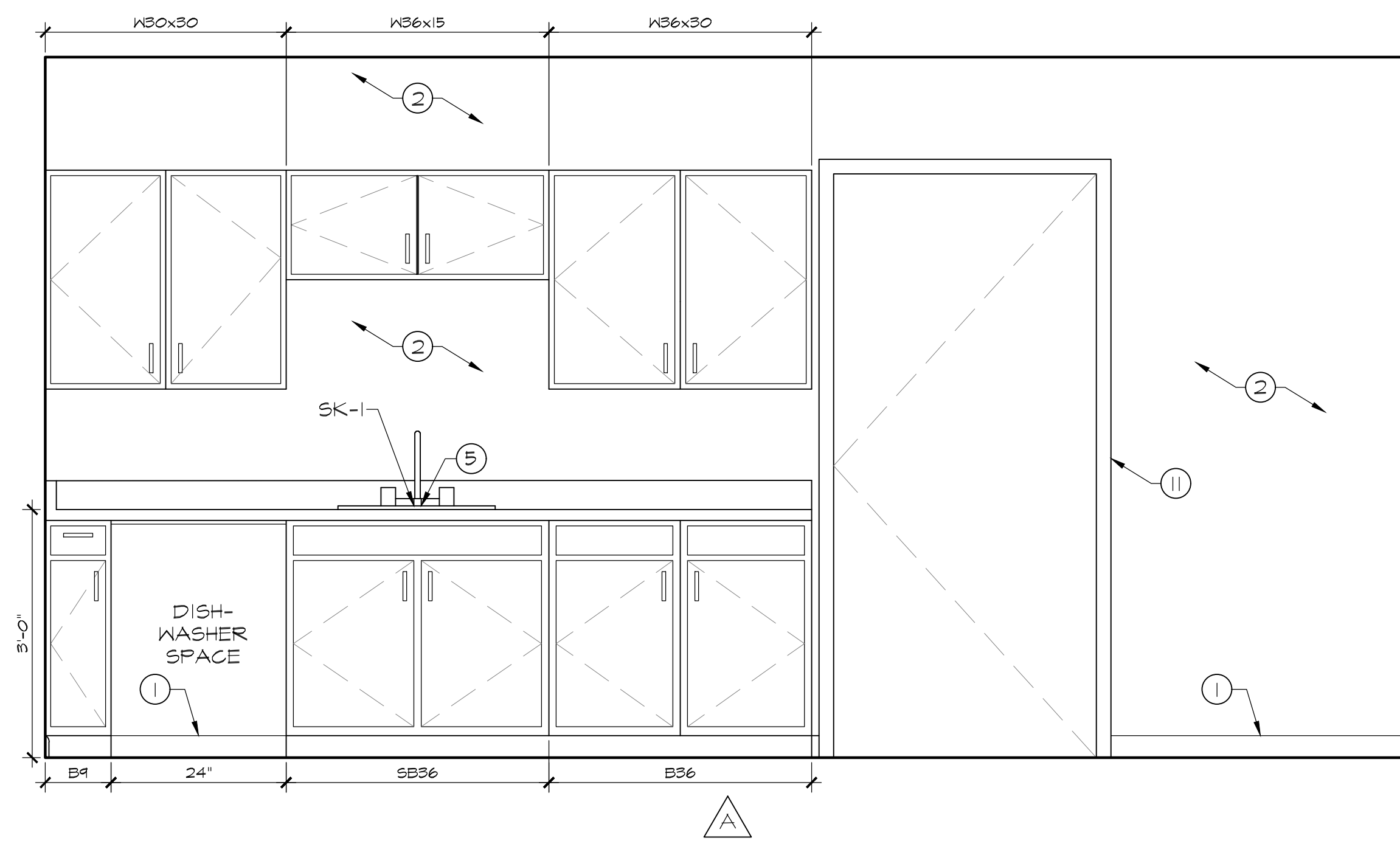
**COLUMBIA H.A. SCATTERED SITE REHAB**

OWNER: COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)  
 109 PEACHTREE DR., COLUMBIA, SC.  
 PROJECT NUMBER: 20-12740  
 DATE: 06-06-2022  
 ARCHITECT: JMK  
 CONTRACTOR: JMK  
 REB: JMK  
 DATE: 06-06-2022

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Rev. Date: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Sheet No: **A102**



**GENERAL NOTES** (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

INTERIOR ELEVATIONS

- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.1.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

**INTERIOR ELEVATIONS**  
SCALE: 3/4" = 1'-0"

ARCHITECT	BINDING CO.
OWNER	CONTRACTOR

PROJECT NUMBER	DATE	APP'D
20-12740	06-06-2023	JMK

INTERIOR ELEVATIONS	Rev. Date
Sheet No.	A102.1

COLUMBIA H.A. SCATTERED SITE REHAB  
(ZONE 1)  
109 PEACHTREE DR. COLUMBIA, SC.

KEYNOTES (THIS SHEET ONLY)

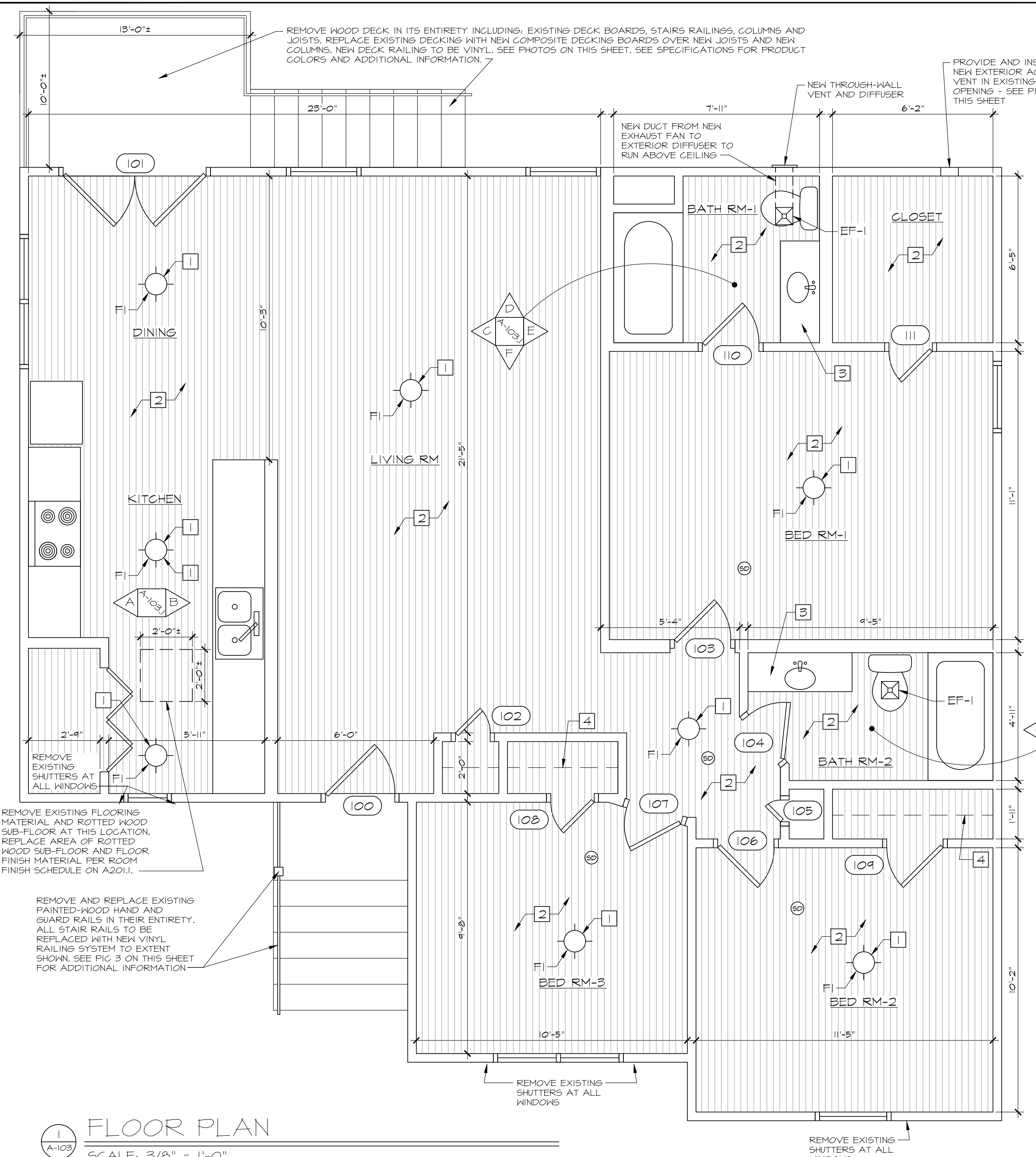
- FLOOR PLAN:
1. SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  2. EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  3. SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOWL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  4. REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  5. REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- [Hatched Box] NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- [Cross-hatched Box] NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- [Solid Grey Box] AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- [Circle with 'S'] SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- [Circle with 'X'] CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

GENERAL NOTES (THIS SHEET ONLY)

1. SEE PROJECT GENERAL NOTES ON 6100.
2. ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
3. ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
4. ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2X4 STUDS AND GYP BD.
5. ALL GYP. BOARD CEILING IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILING ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
6. ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
7. ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
8. ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
9. ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
10. ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
11. ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
12. ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
13. ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
14. ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
15. SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
16. REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
17. ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.



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

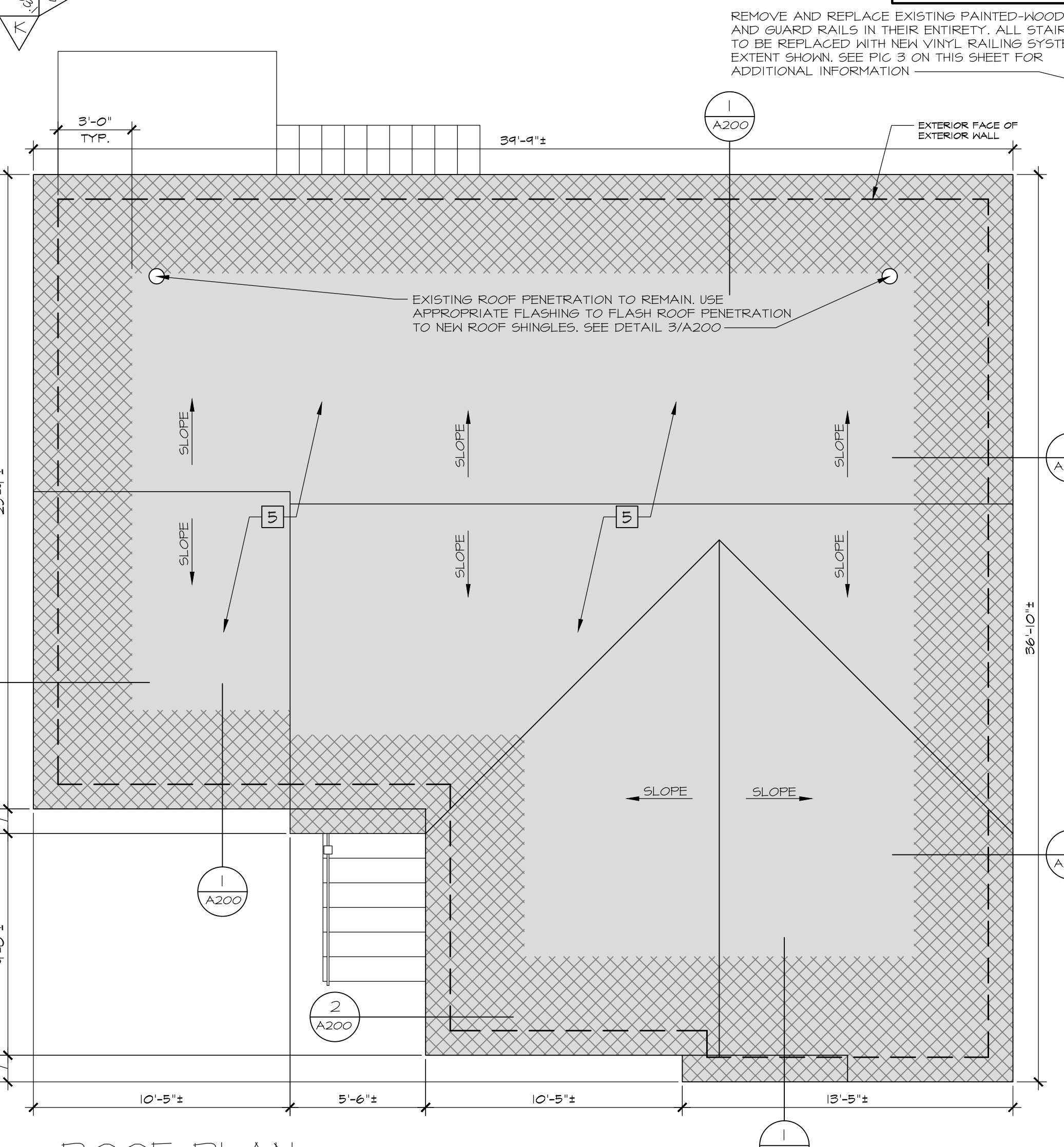


PIC 1  
SCALE: N.T.S.

REMOVE WOOD DECK IN ITS ENTIRETY INCLUDING: EXISTING DECK BOARDS, STAIRS RAILINGS, COLUMNS AND JOISTS. REPLACE EXISTING DECKING WITH NEW COMPOSITE DECKING BOARDS OVER NEW JOISTS AND NEW COLUMNS. NEW DECK RAILING TO BE VINYL. SEE PHOTOS ON THIS SHEET. SEE SPECIFICATIONS FOR PRODUCT COLORS AND ADDITIONAL INFORMATION.



PIC 2  
SCALE: N.T.S.



2 A-103 ROOF PLAN  
SCALE: 1/4" = 1'-0"

REMOVE AND REPLACE EXISTING PAINTED-WOOD HAND AND GUARD RAILS IN THEIR ENTIRETY. ALL STAIR RAILS TO BE REPLACED WITH NEW VINYL RAILING SYSTEM TO EXTENT SHOWN. SEE PIC 3 ON THIS SHEET FOR ADDITIONAL INFORMATION.

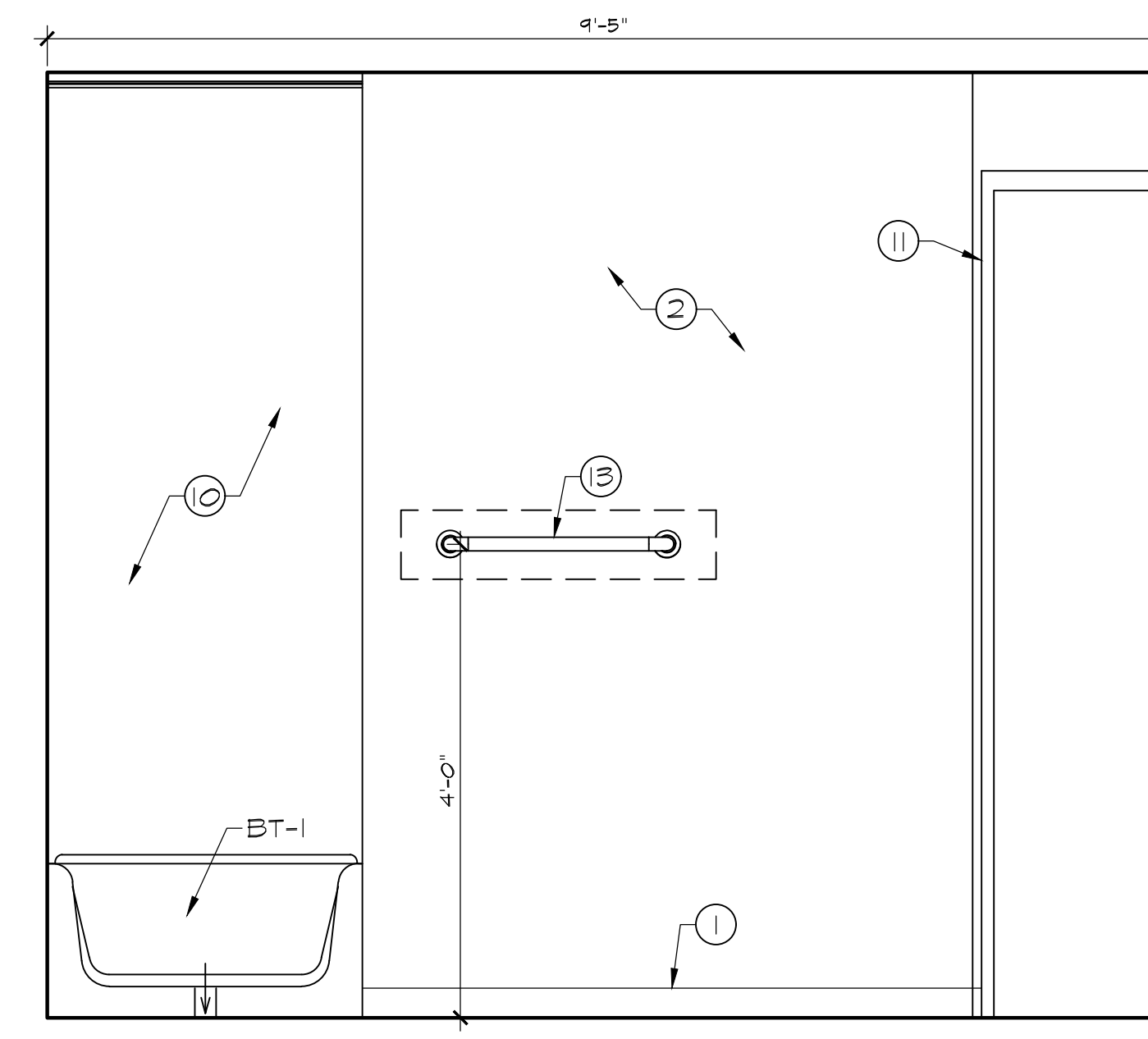
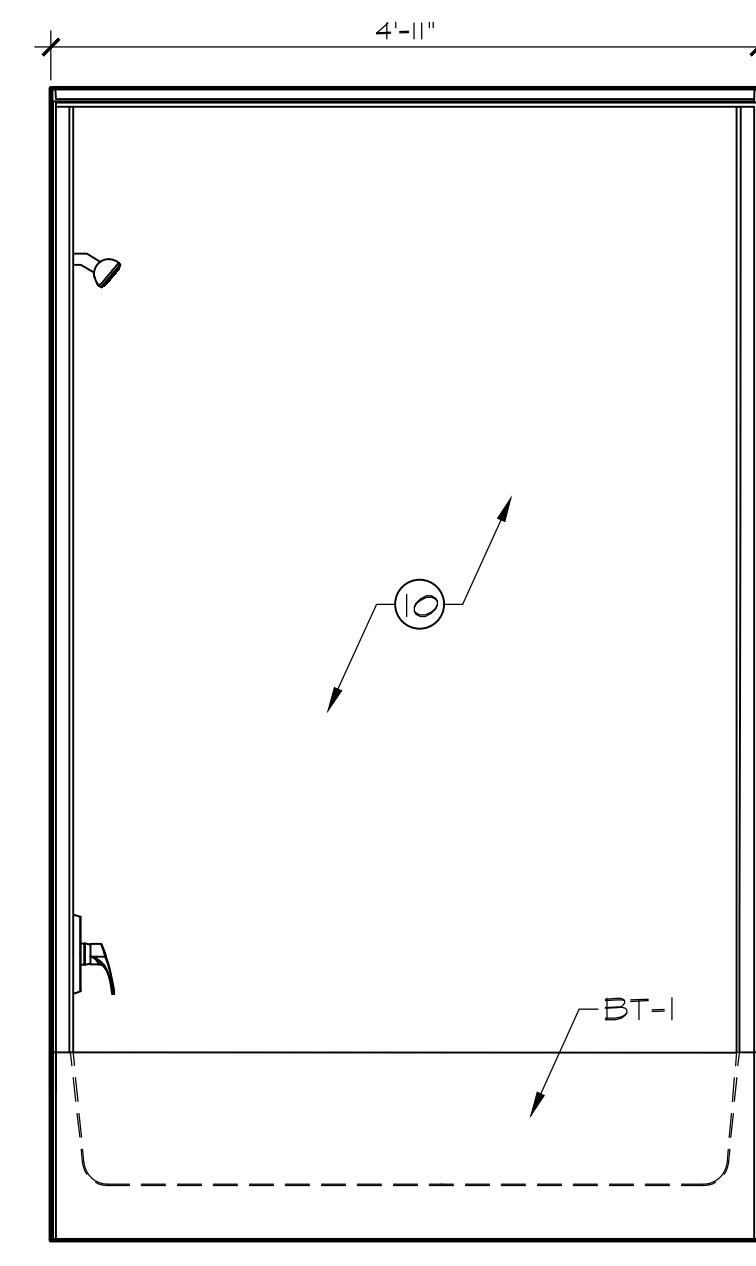
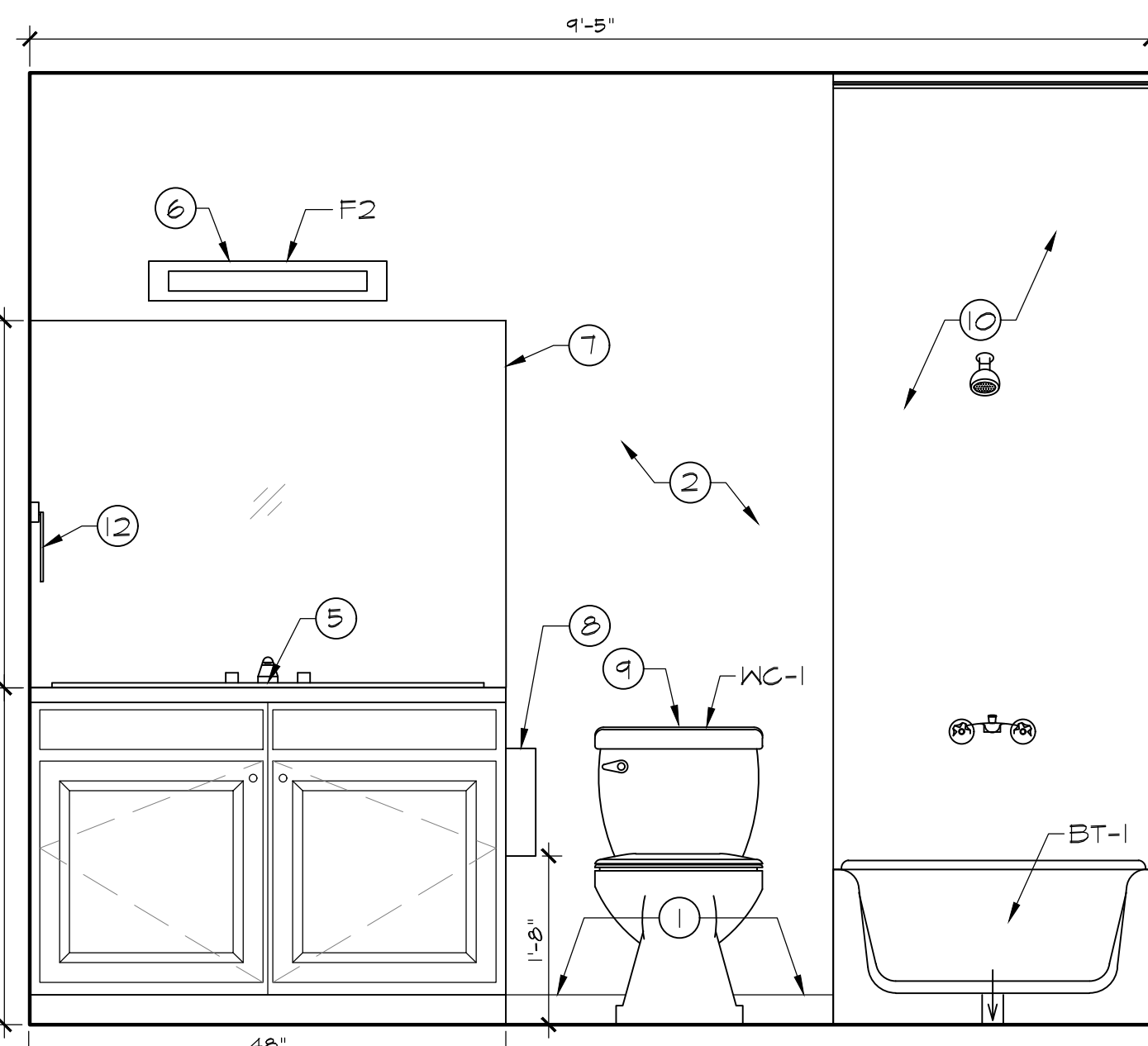
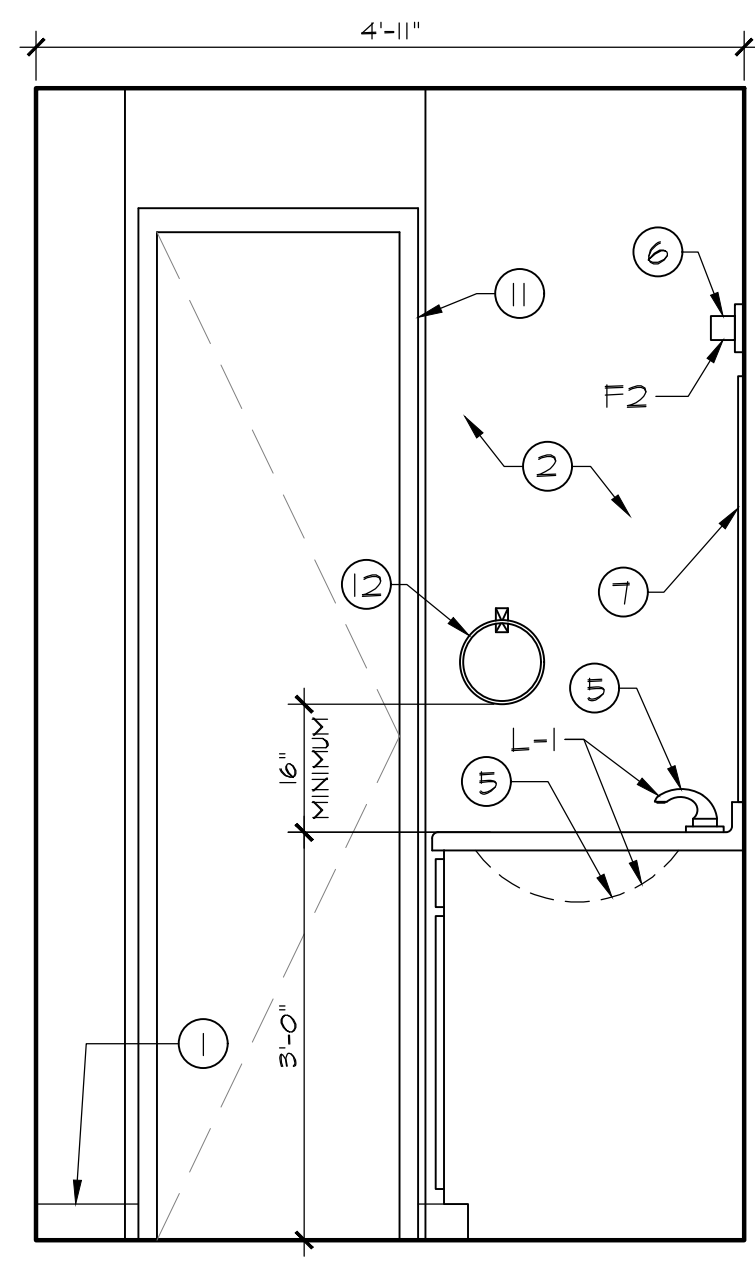
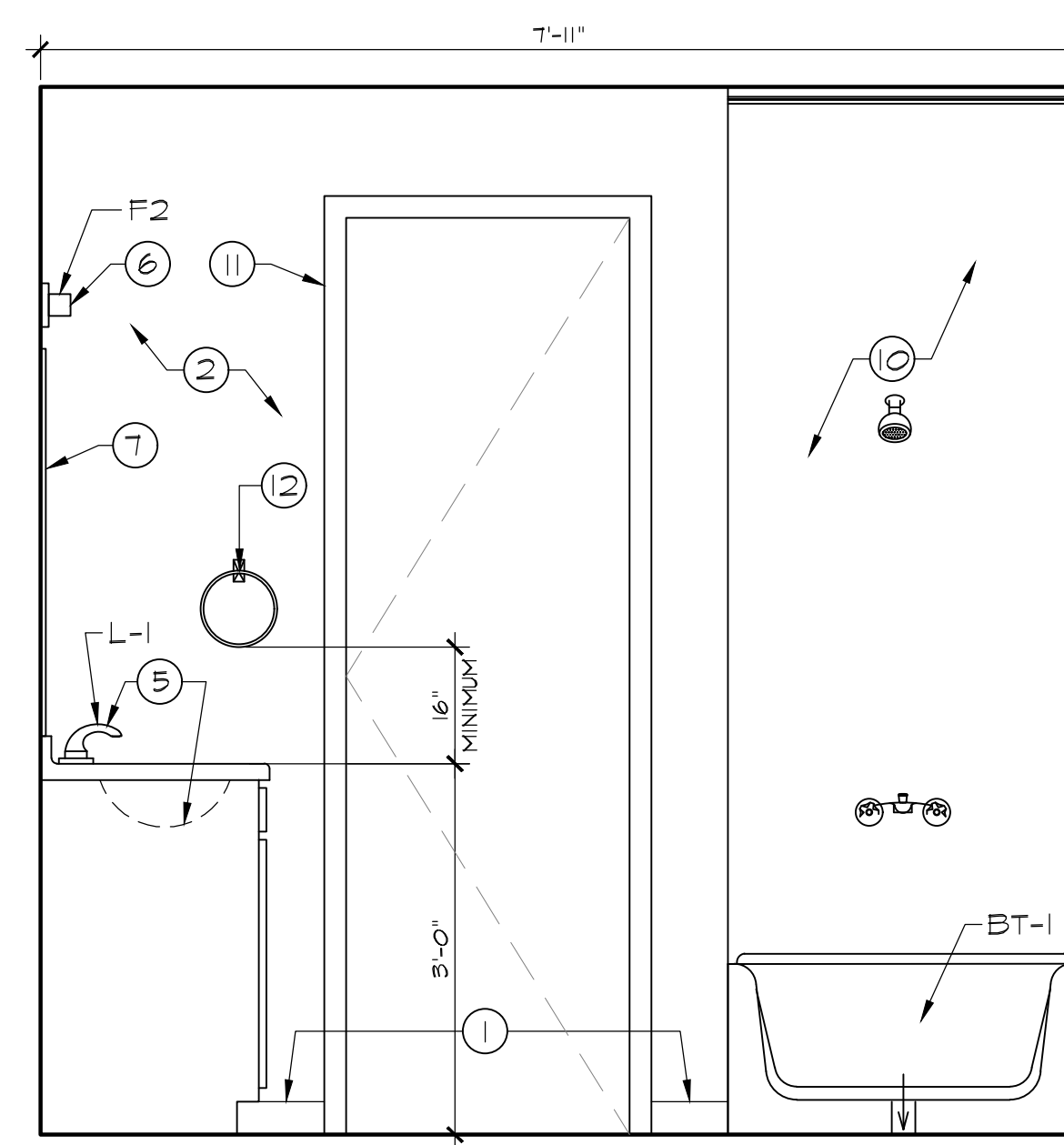
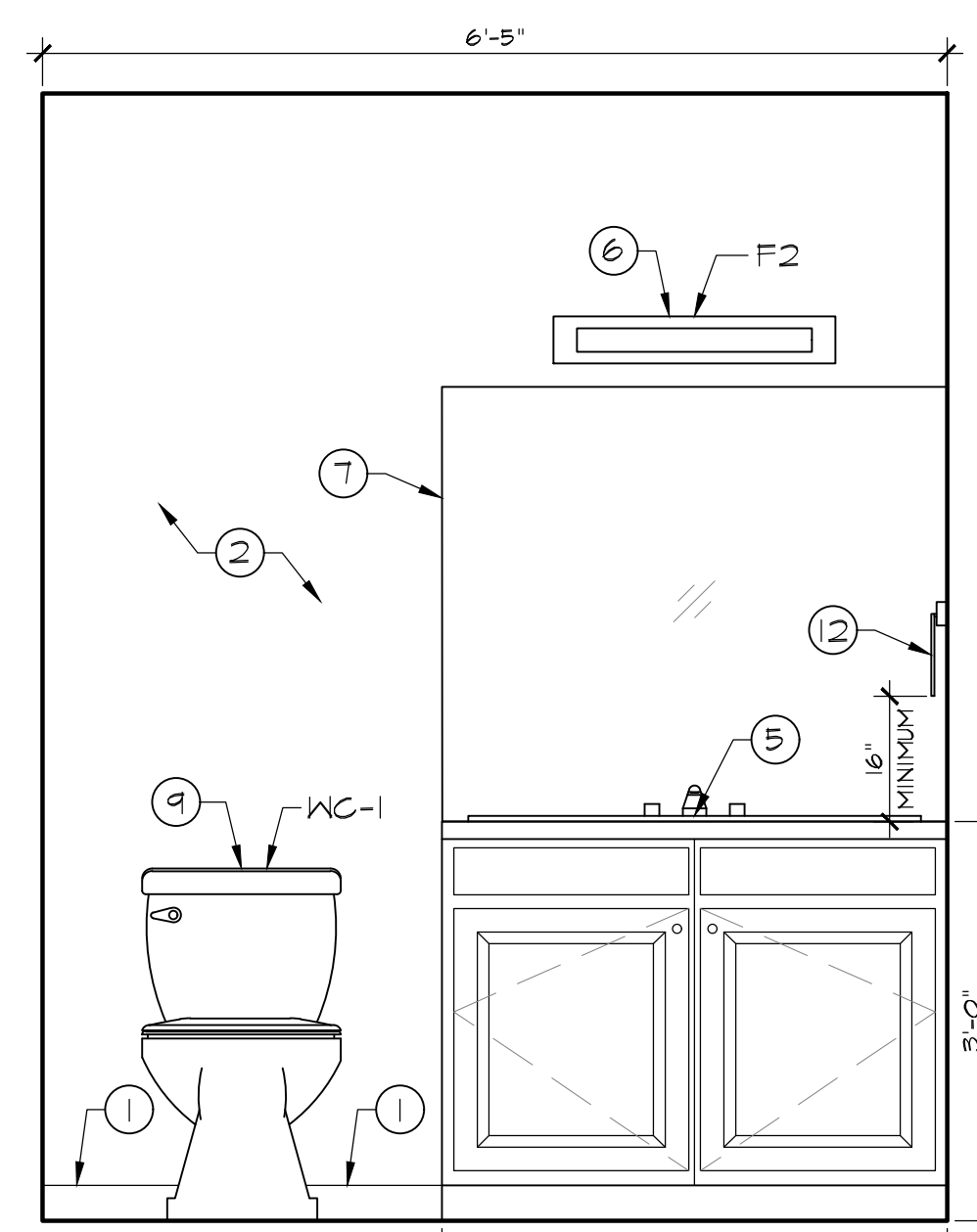
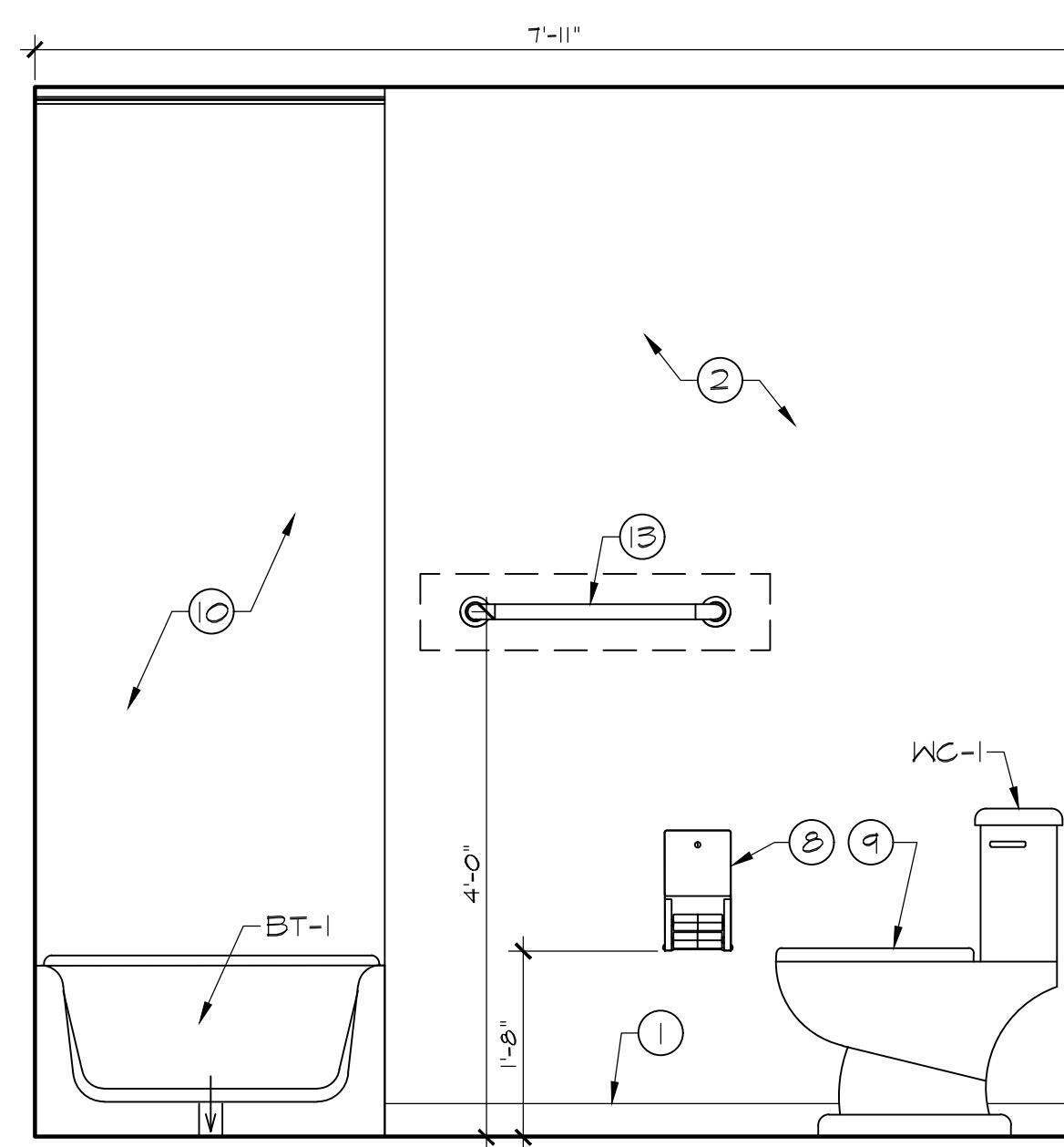
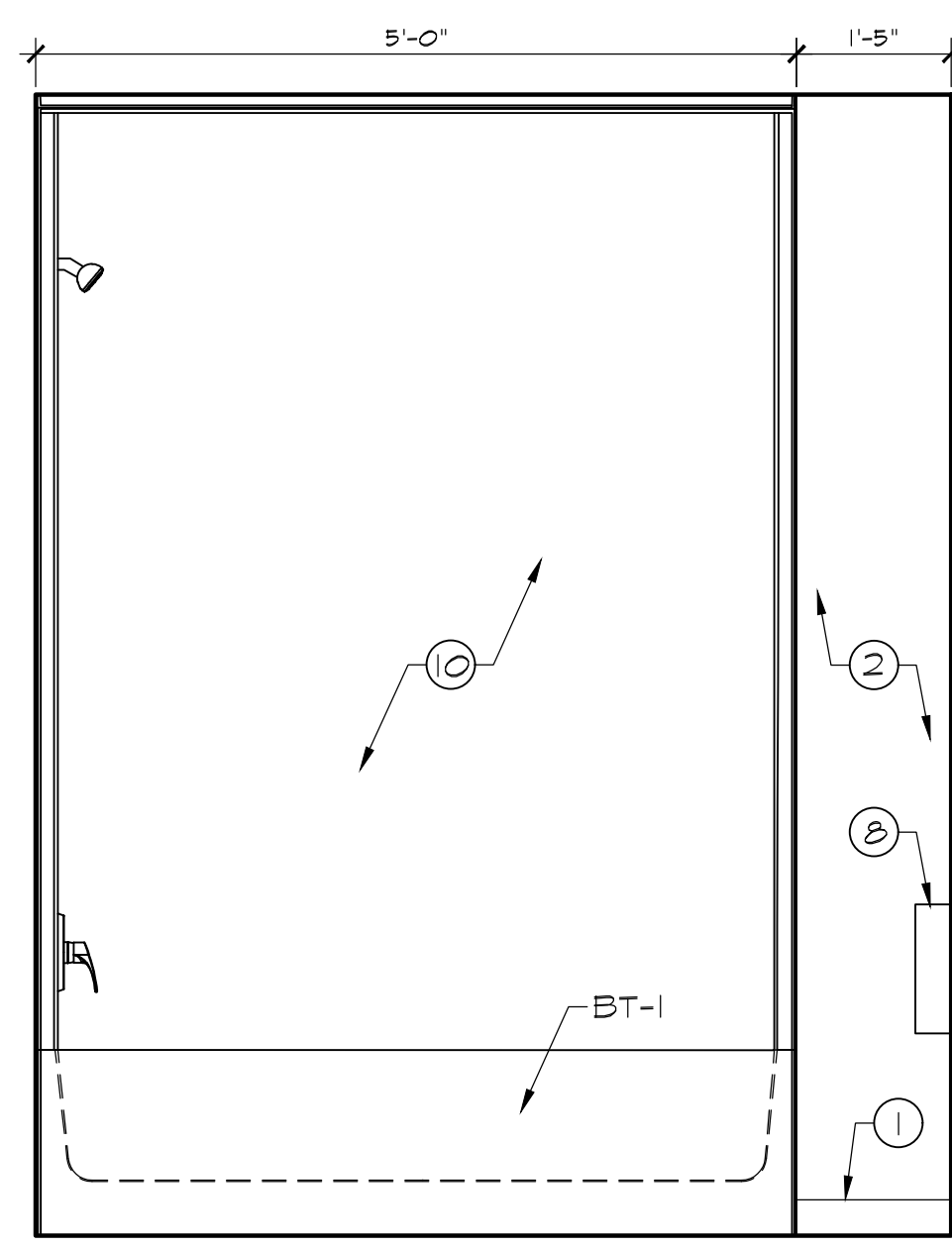
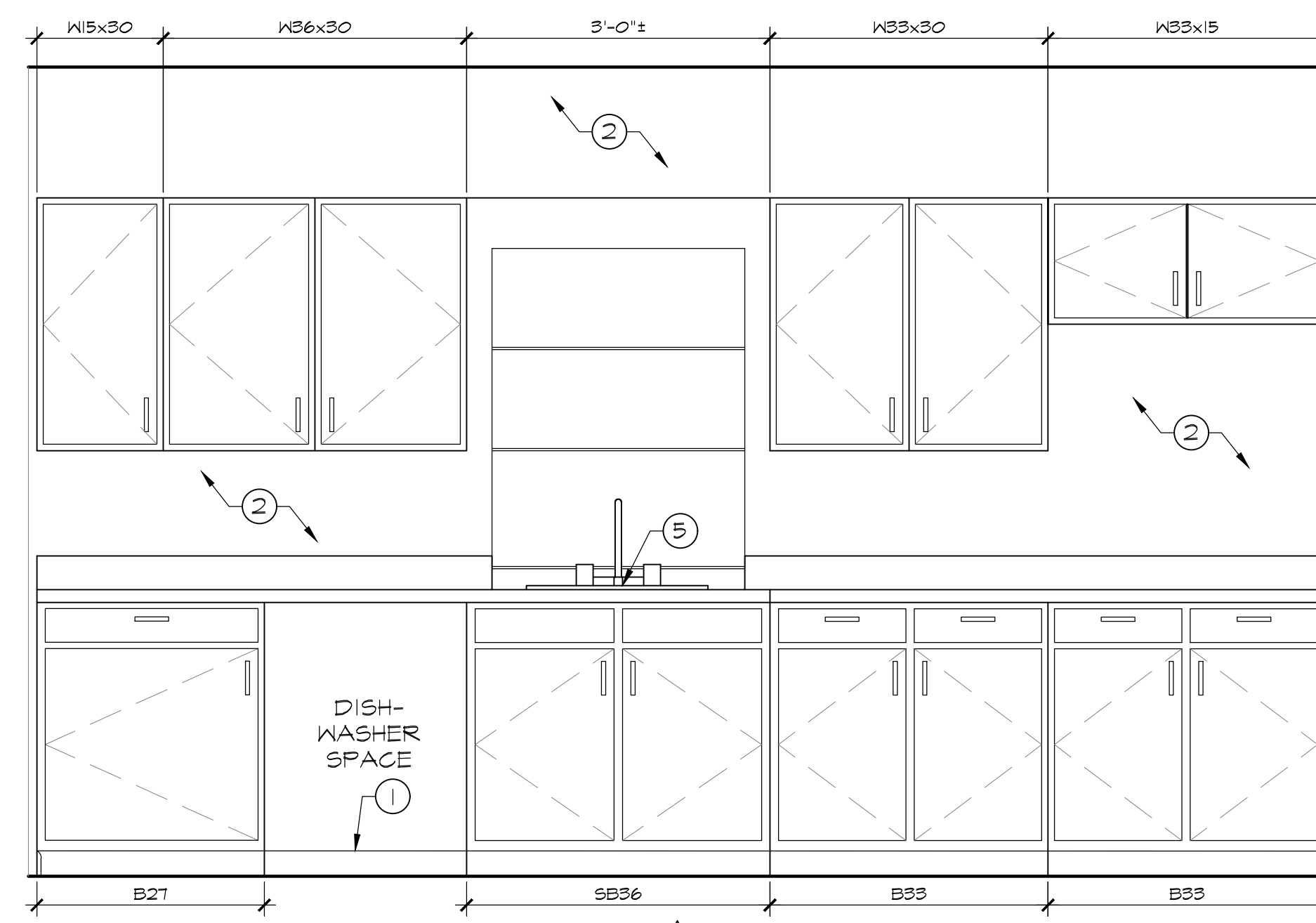
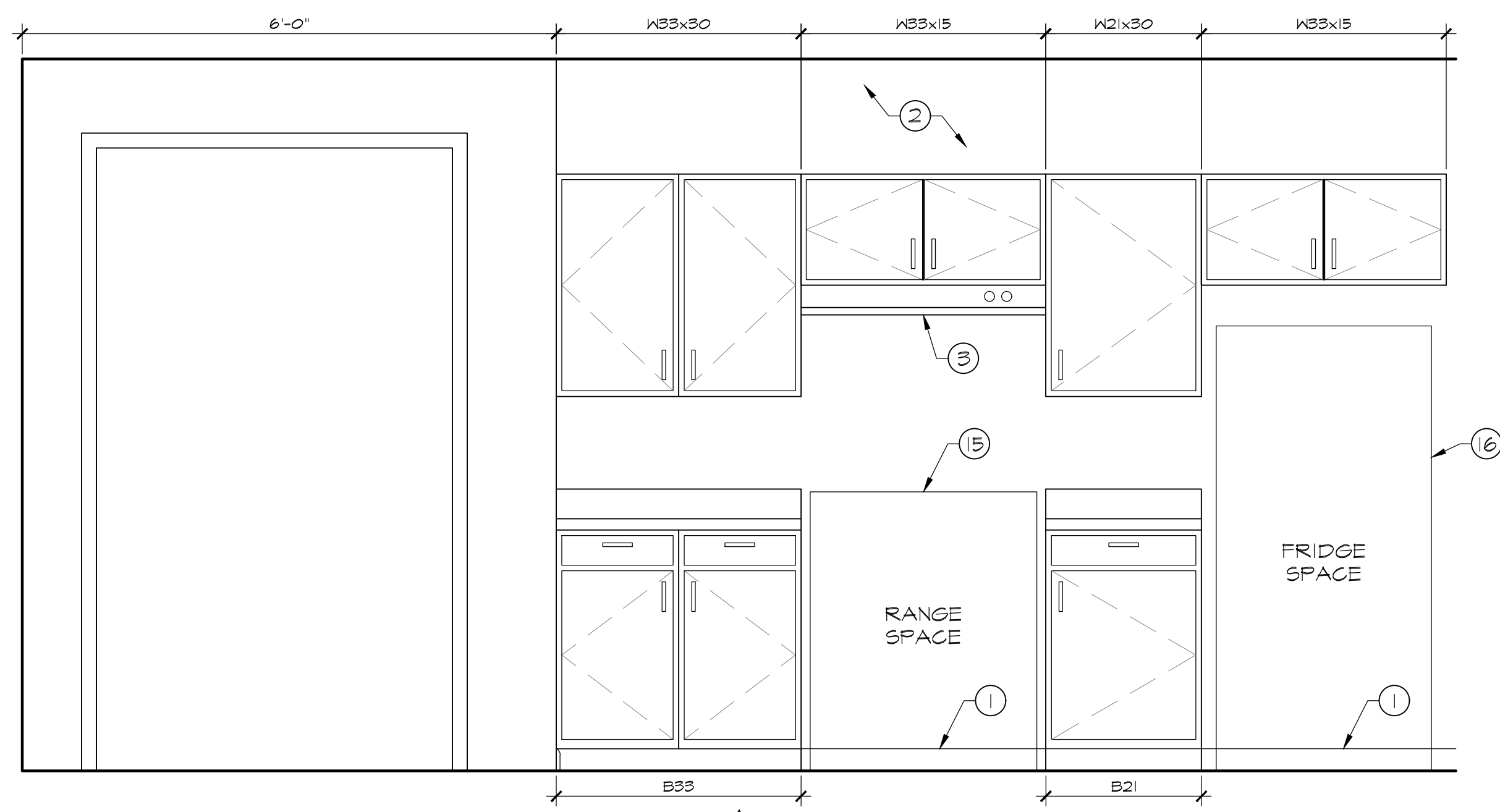


PIC 3  
SCALE: N.T.S.



PIC 4  
SCALE: N.T.S.

\*CRAWL SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:  
- 1 3/8" CELLULAR PVC DOOR WITH NEW DEADBOLT  
- BRICK MOLD  
- STAINLESS STEEL HARDWARE  
- 3 1/2" JAMB AND HEAD DEPTH  
- OVERLAY CONFIGURATION  
- SIZE TO BE FIELD VERIFIED  
AS MANUFACTURED BY CURB APPEAL PRODUCTS  
W: (919) 466-8088  
P: (919) 466-8088



**GENERAL NOTES** (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

**INTERIOR ELEVATIONS**

- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.1.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

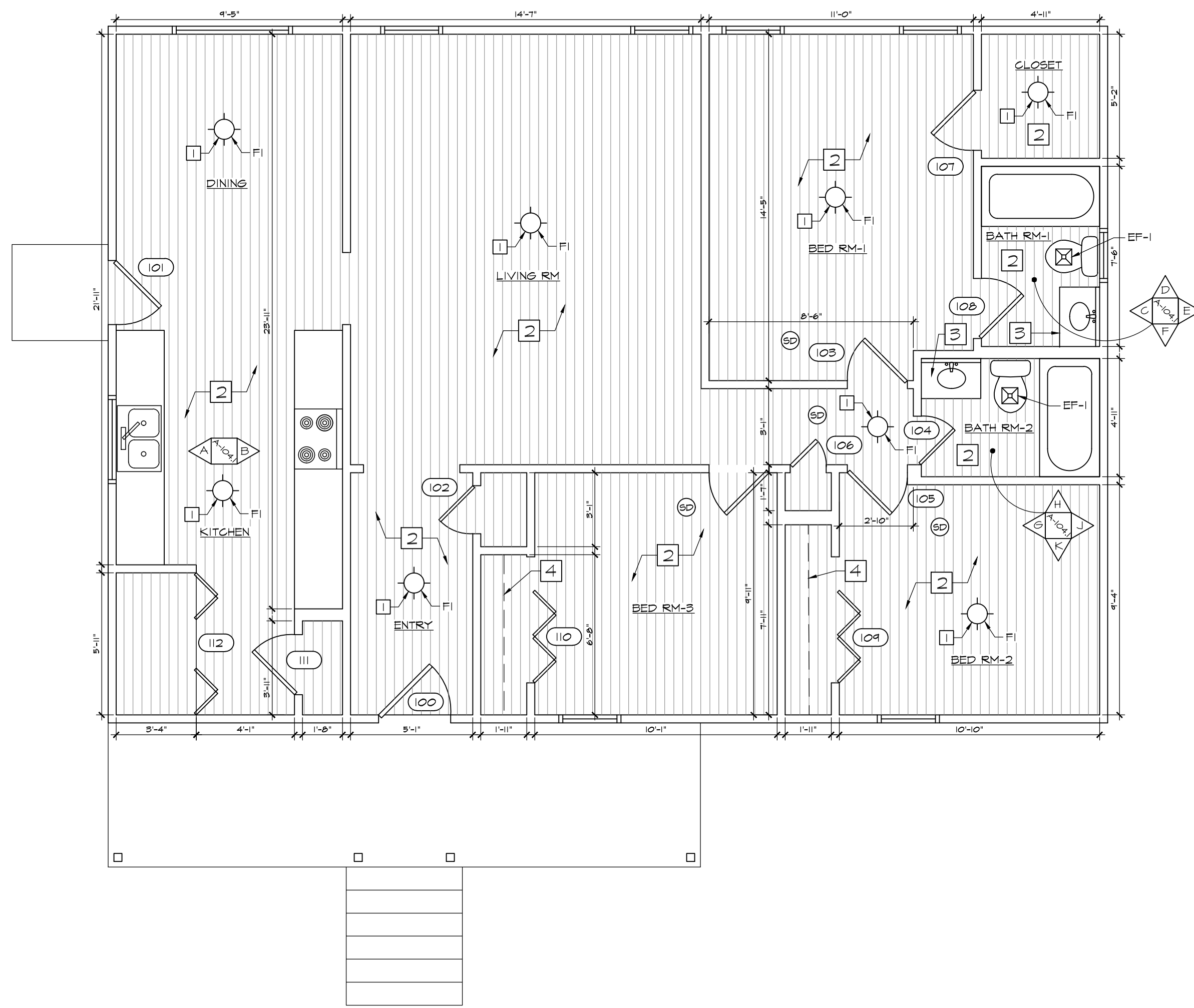
1-1031 INTERIOR ELEVATIONS  
SCALE: 3/4" = 1'-0"

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
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PROJECT NUMBER	DATE	REVISED	APPROVAL
20-12740	06-06-2023	JMK	

INTERIOR ELEVATIONS	Rev. Date	Sheet No.
		A103.1

COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)  
218 BARGER CIR. COLUMBIA, SC.

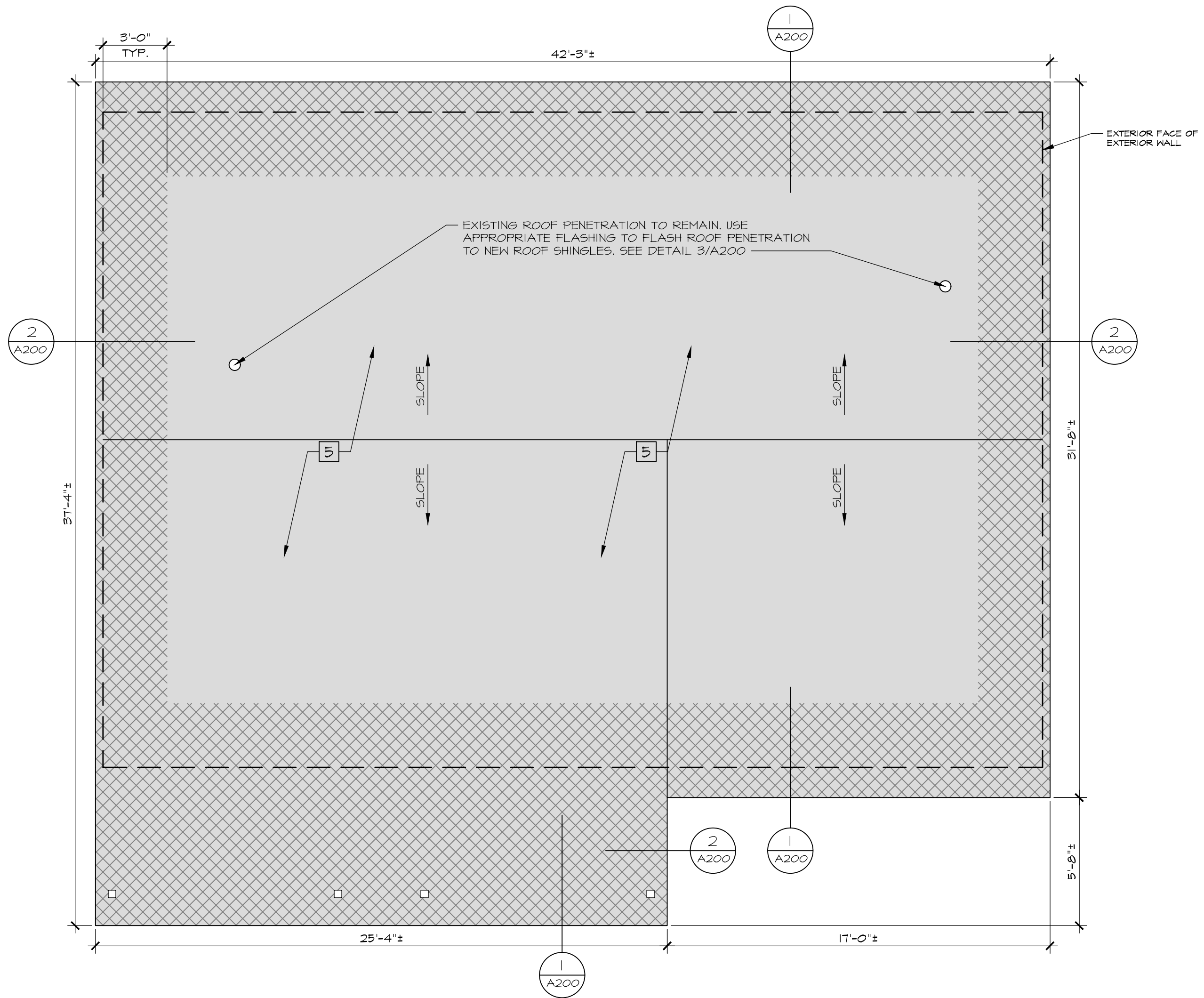


\*GRAHLSPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:

- 1 3/4" CELLULAR PVC DOOR WITH NEW DEADBOLT
- BRICKMOLD
- STAINLESS STEEL HARDWARE
- 3/2" JAMB AND HEAD DEPTH
- OVERLAY CONFIGURATION
- SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 W: (WWW.CURBAPPEALPRODUCTS.COM/GRHL-SPACE-DOORS/)  
 P: (919)846-8088

1 LEVEL 1 FLOOR PLAN  
 SCALE: 3/8" = 1'-0"



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

GENERAL NOTES (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
- ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
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- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
- ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
- ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
- ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- ALL UNIT CLOSET SHELIVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELIVING (U.N.O.).
- ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
- REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
- ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

KEYNOTES (THIS SHEET ONLY)

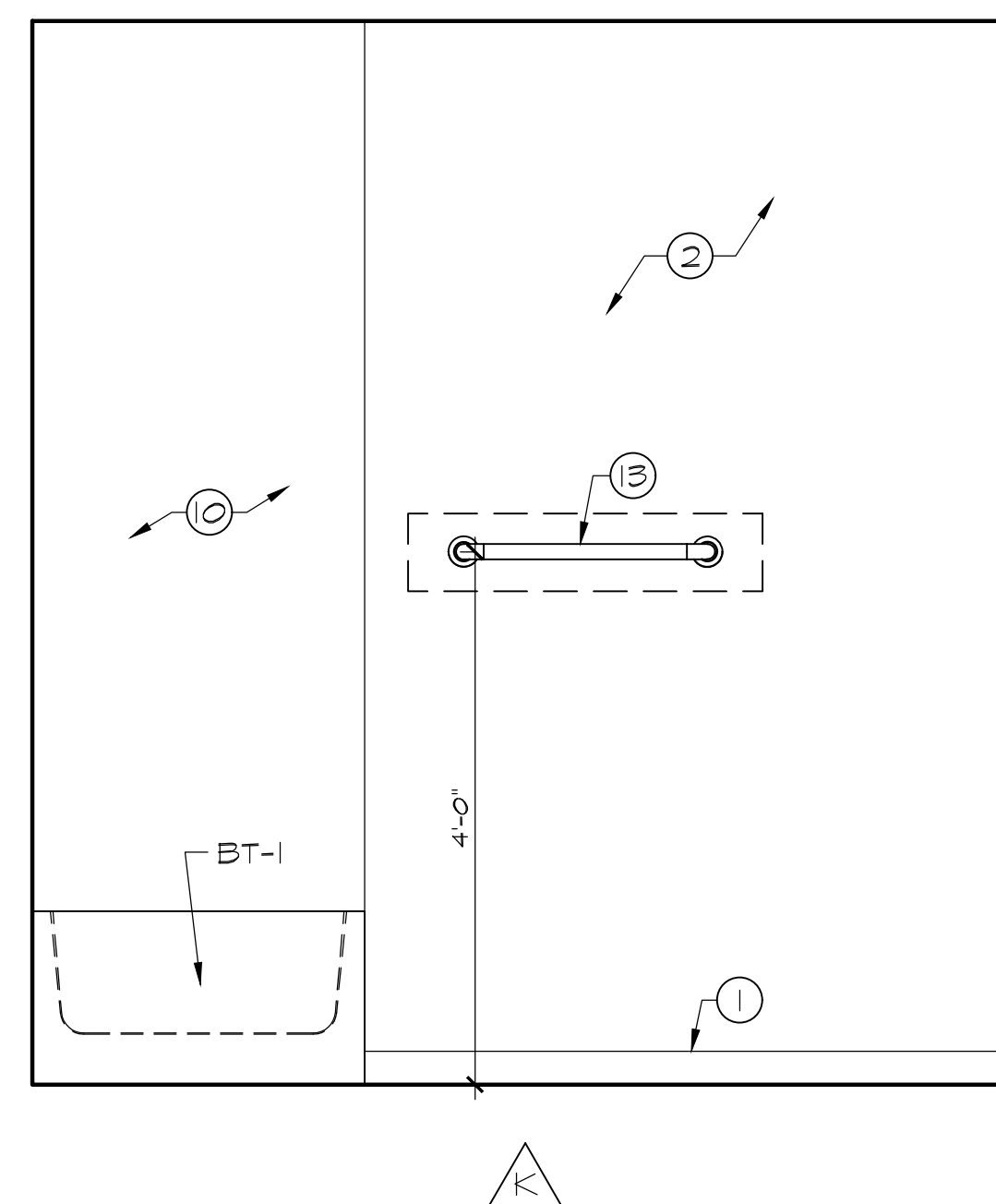
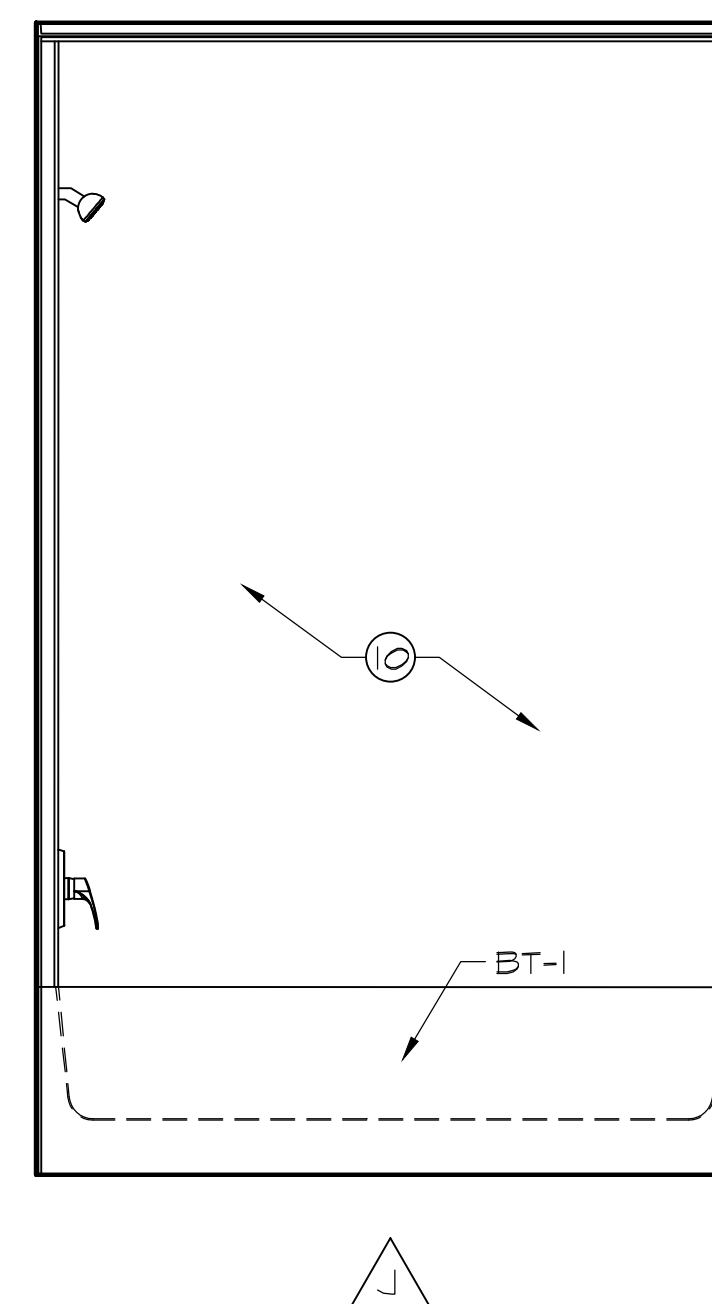
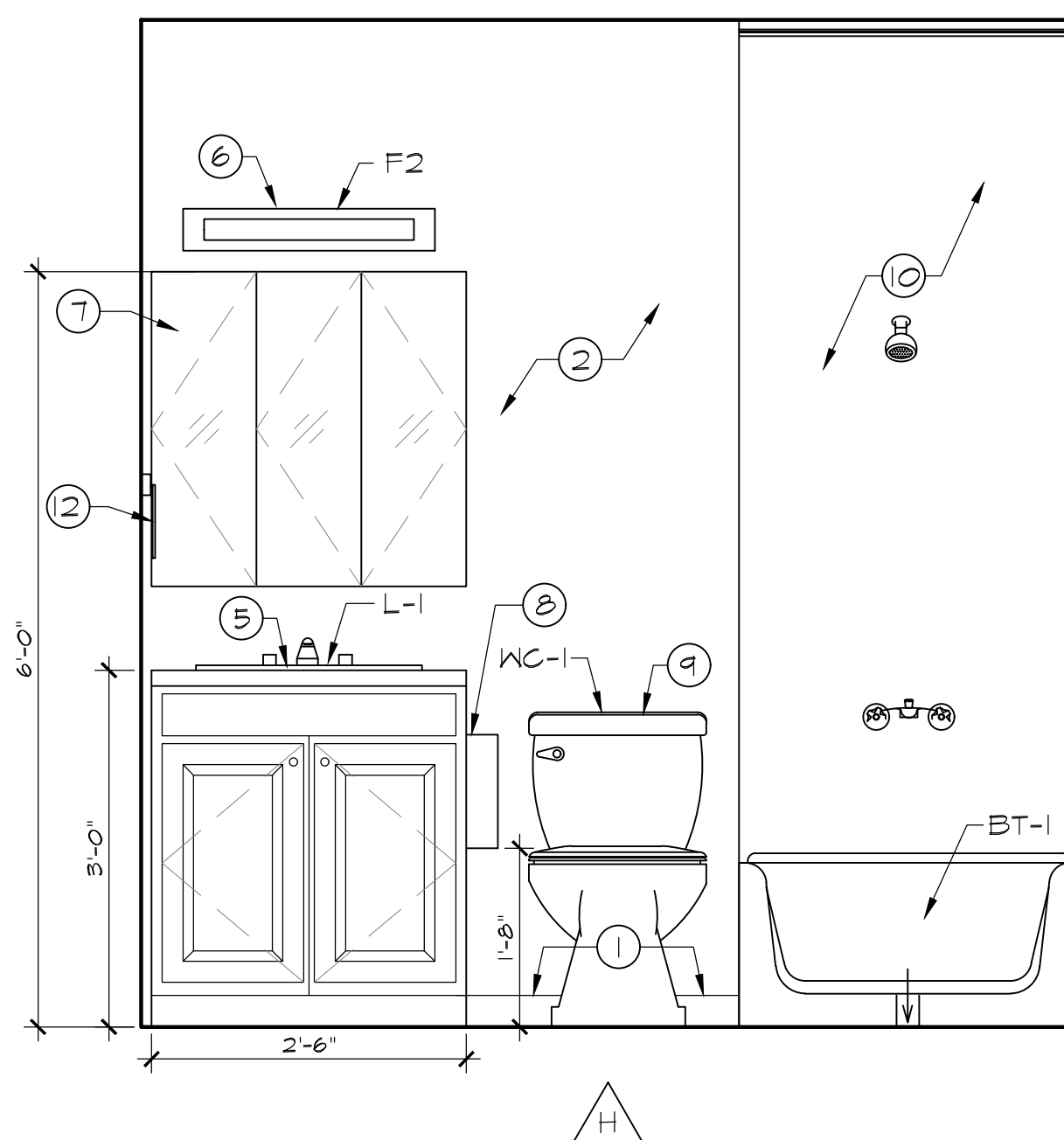
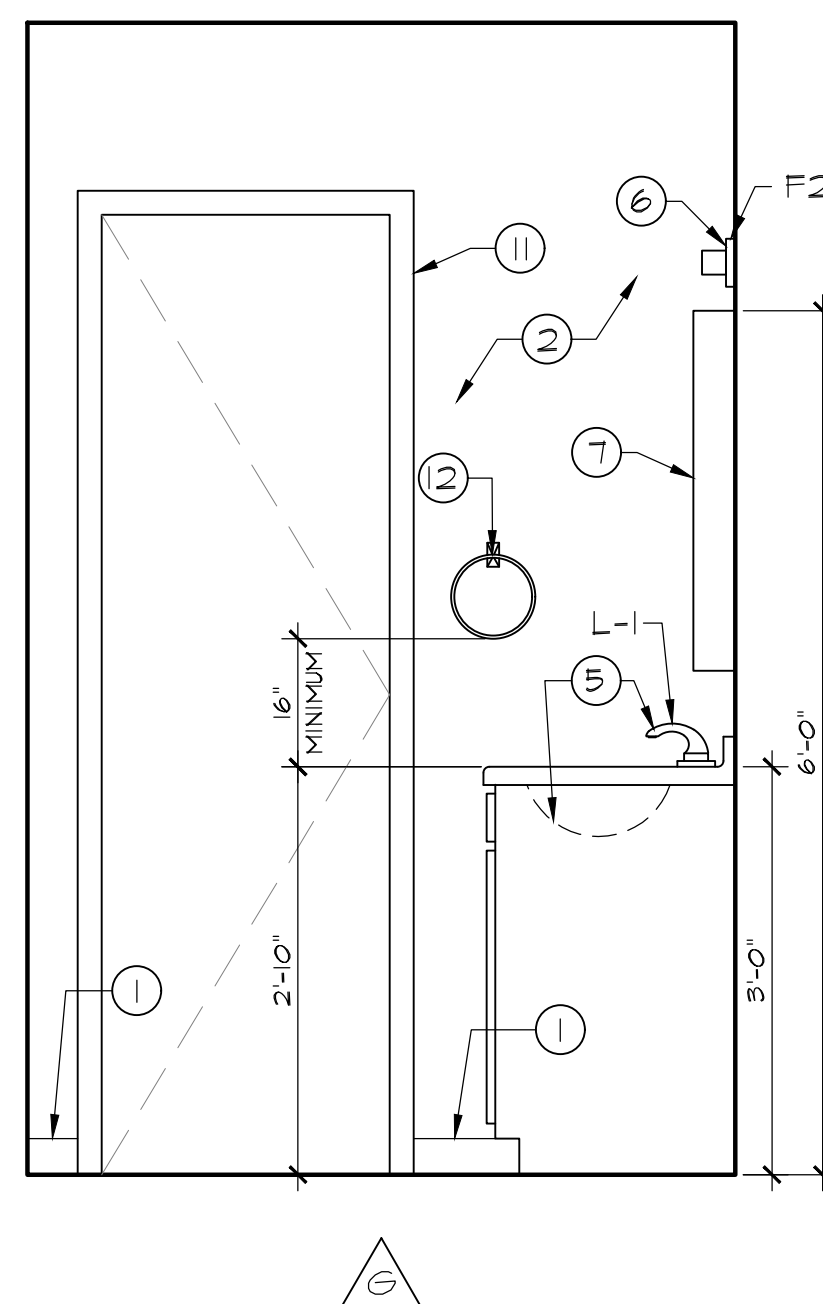
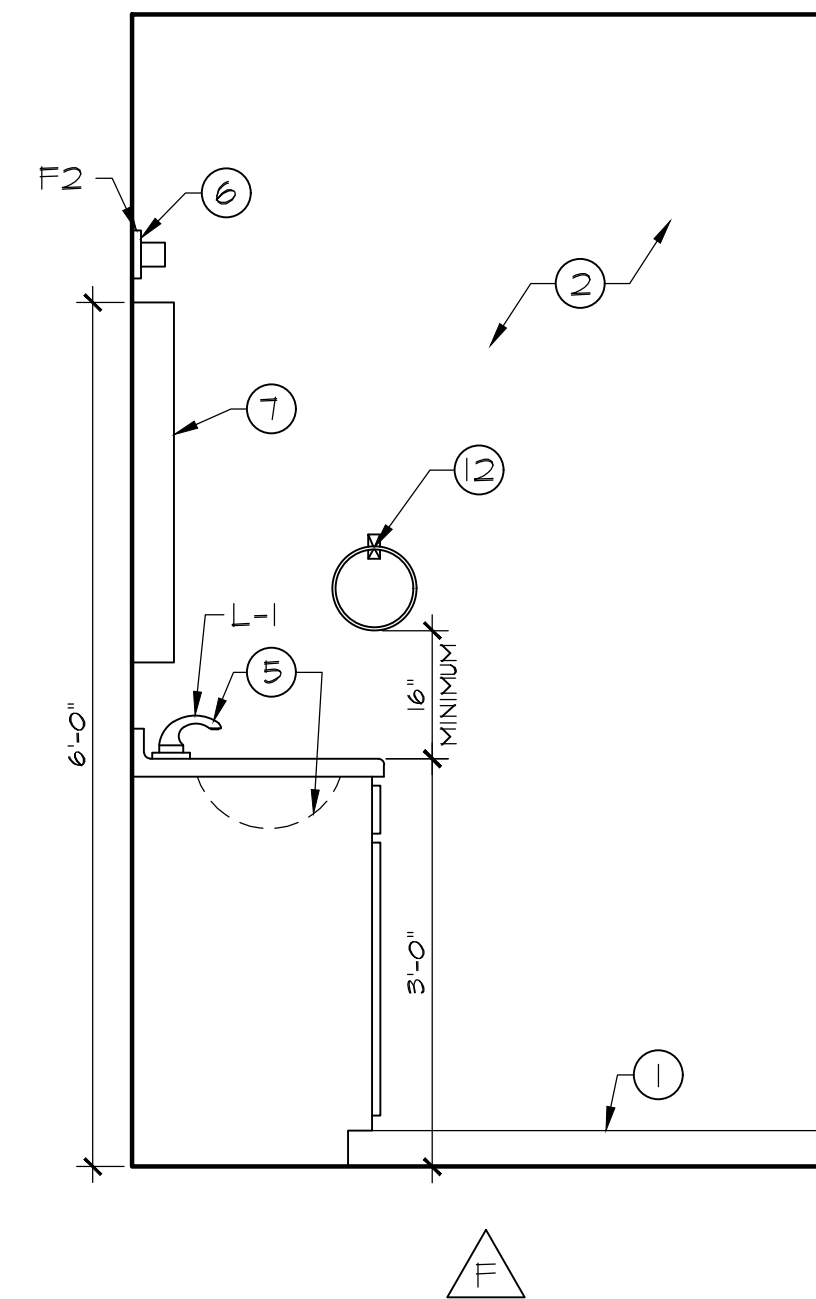
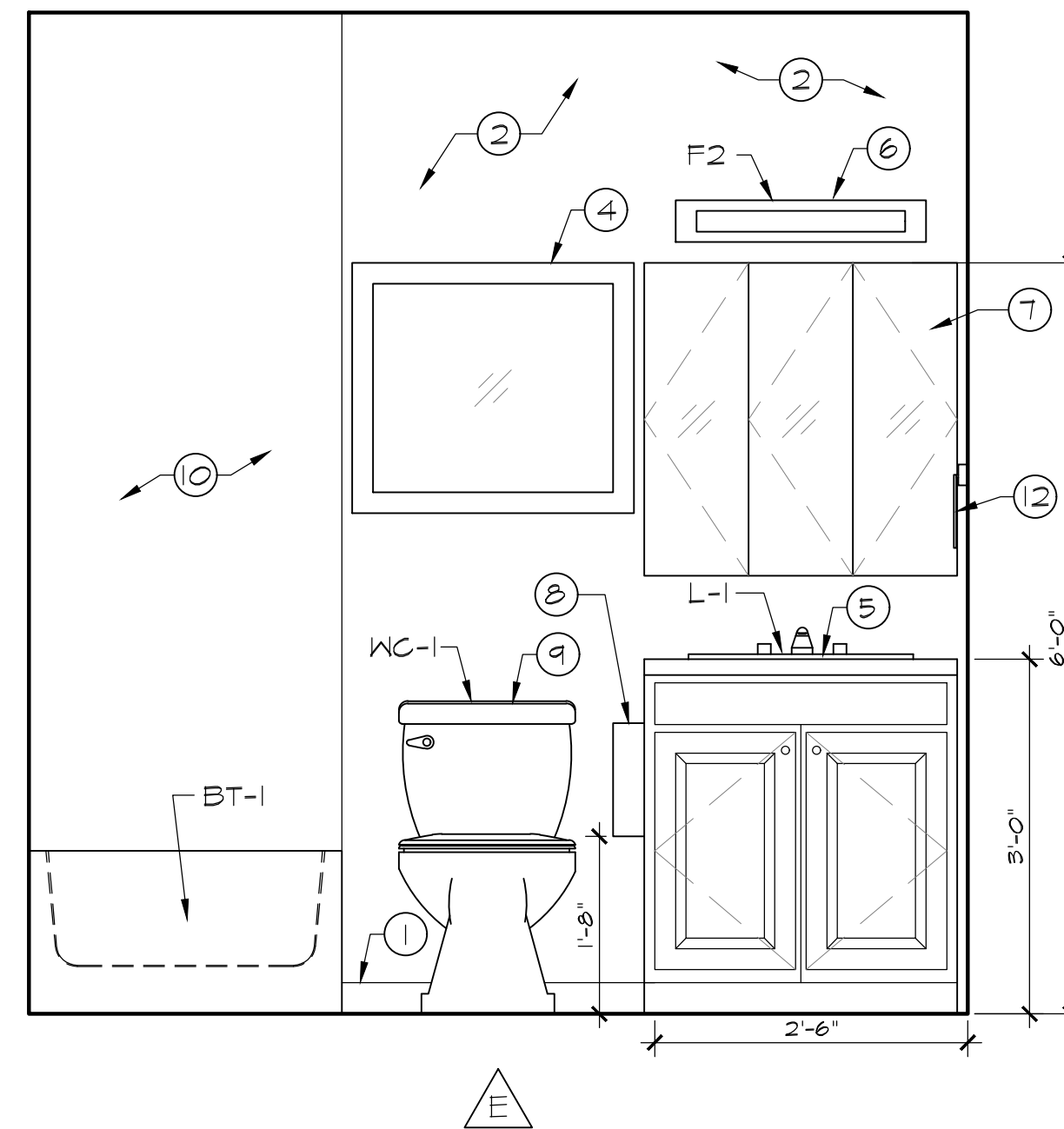
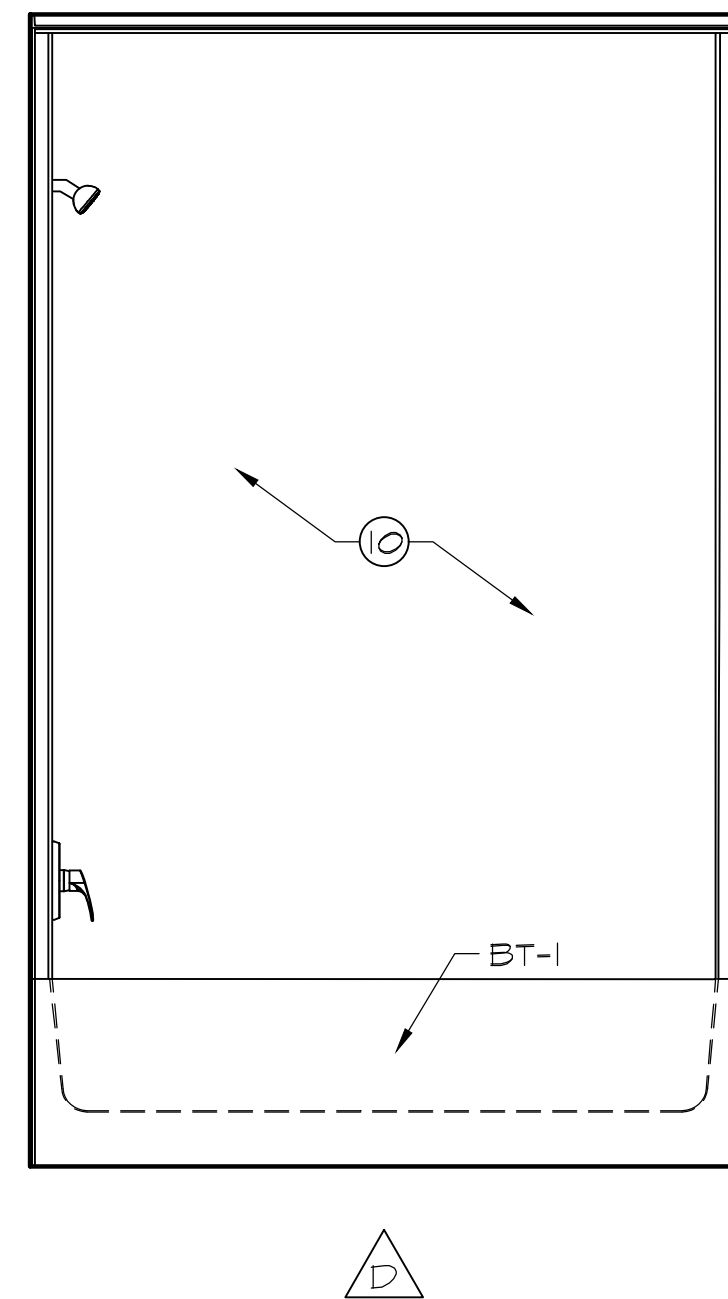
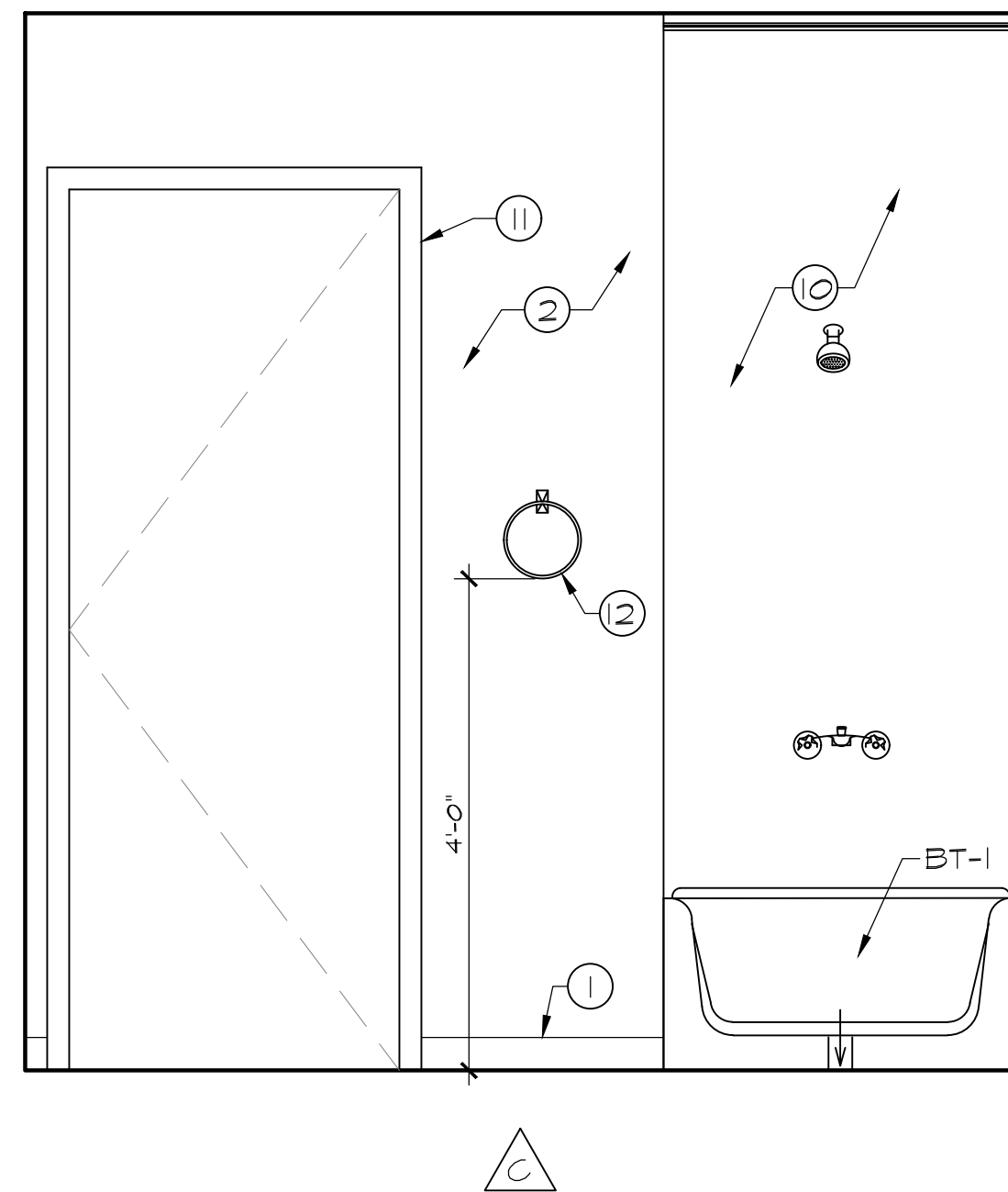
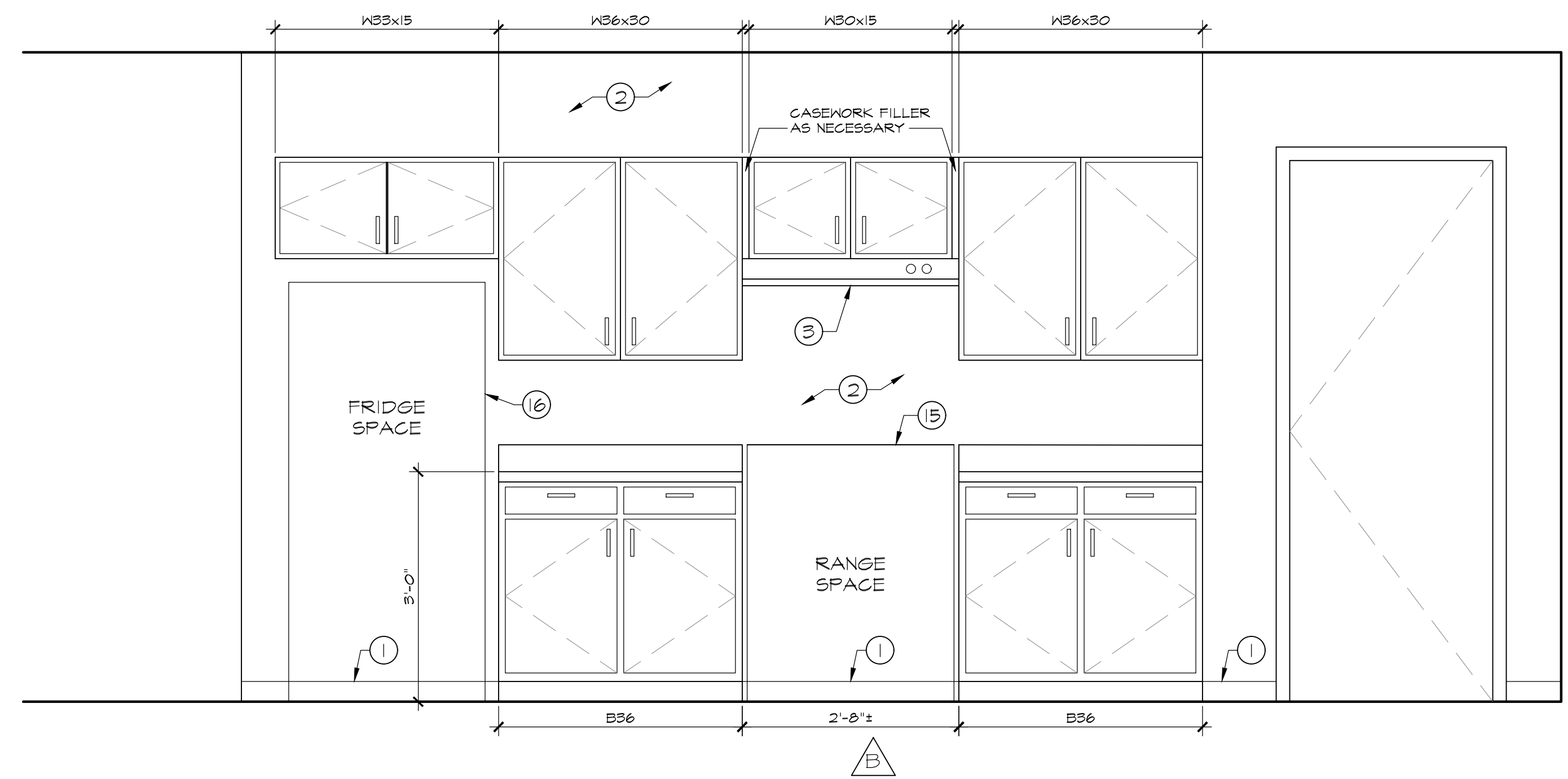
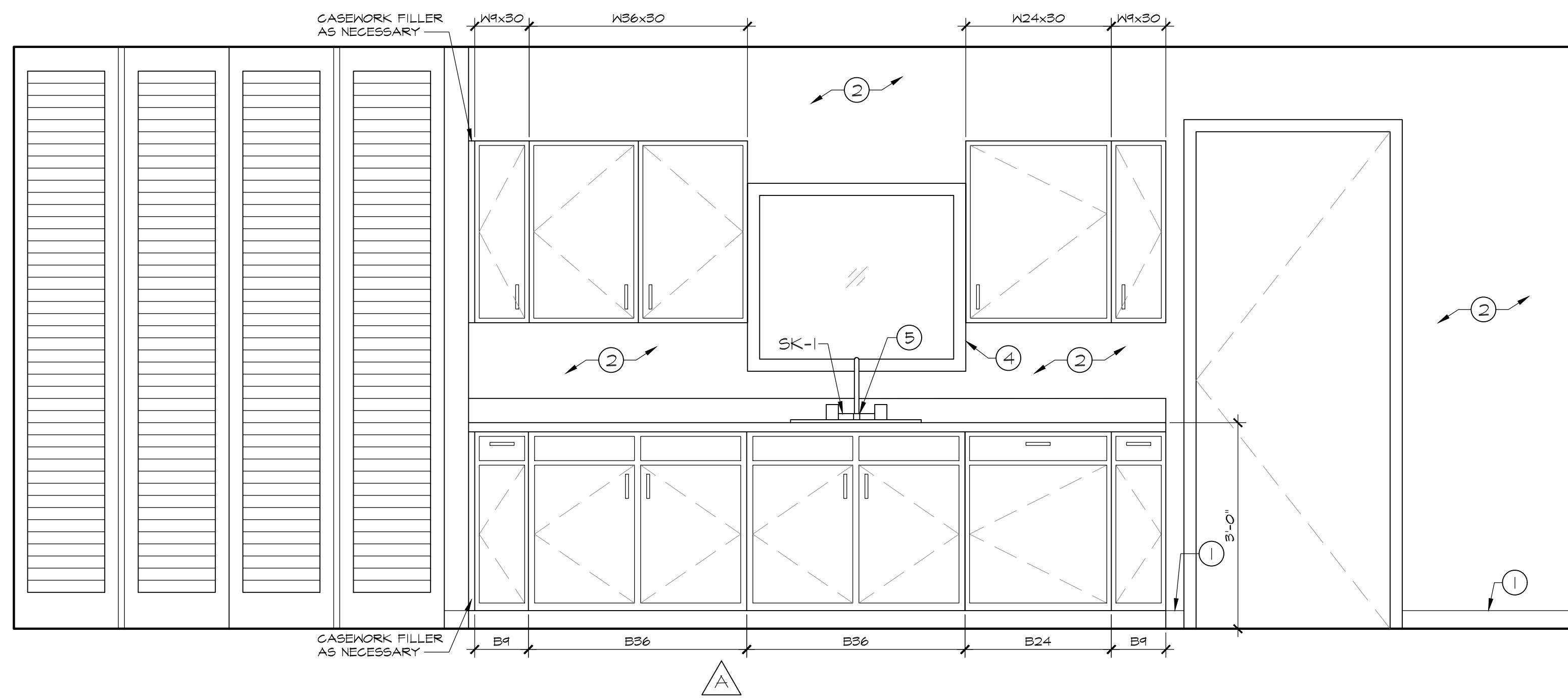
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELIVING (ONE SHELF) AND REPLACE WITH NEW SHELIVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

1919 Architects  
 4000 Mesary Drive  
 Rockford, IL 61107  
 (815) 228-8222  
 www.1919architects.com

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		RGE	JMK
817 RIVERWALK WAY COLUMBIA, SC.		06-06-2023	JMK
20-12740	Date	06-06-2023	Dr.
Rev. Date			
Sheet No.			
A104			



- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON 6100.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
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  - ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

- ### KEYNOTES (THIS SHEET ONLY)
- #### INTERIOR ELEVATIONS
- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
  - PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
  - REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
  - EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
  - REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
  - NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
  - REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
  - NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
  - NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
  - NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
  - RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
  - FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		DATE	APP'D
817 RIVERWALK WAY COLUMBIA, SC.		20-12740	JMK
Rev. Date	Project Number	Date	
		06-06-2022	
Sheet No.	A104.1		

GENERAL NOTES (THIS SHEET ONLY)

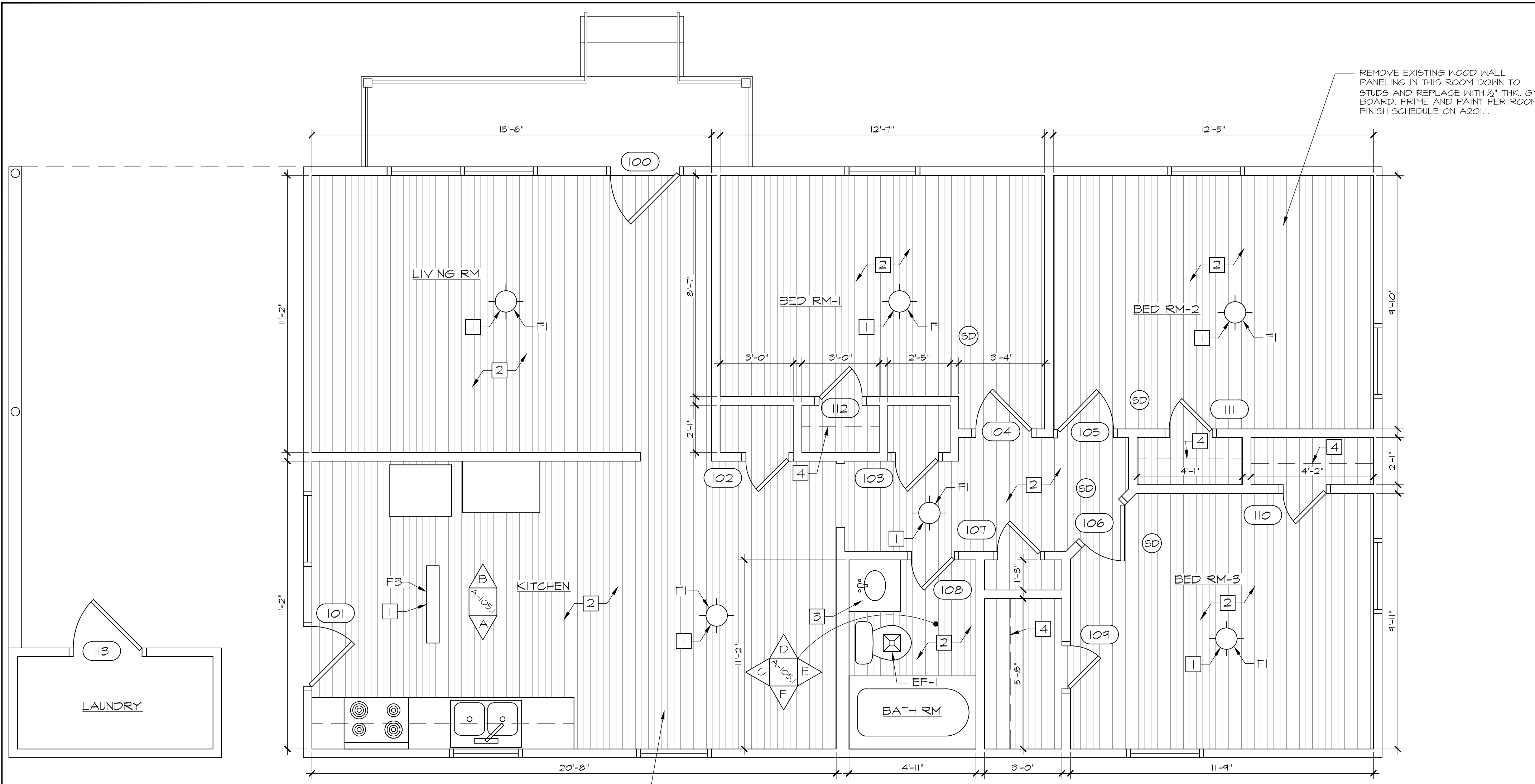
- SEE PROJECT GENERAL NOTES ON 6100.
- ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
- ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
- ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
- ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
- ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
- ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
- REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
- ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

KEYNOTES (THIS SHEET ONLY)

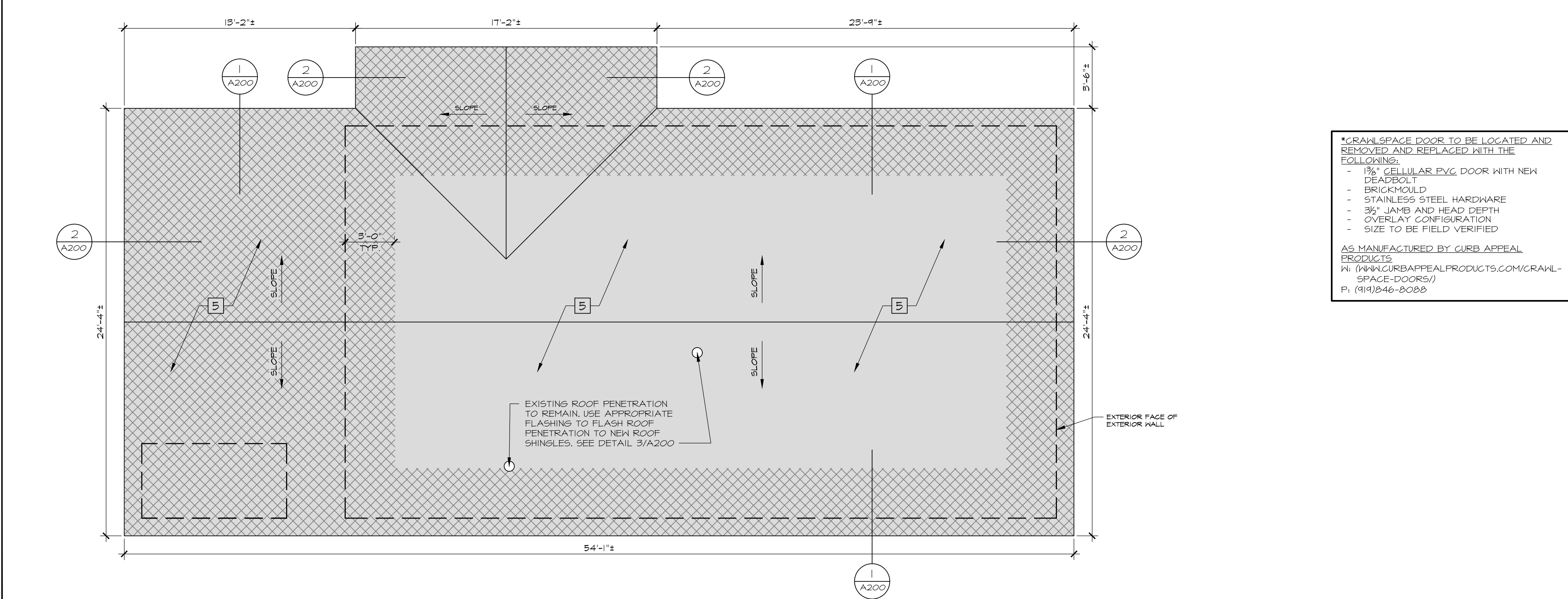
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

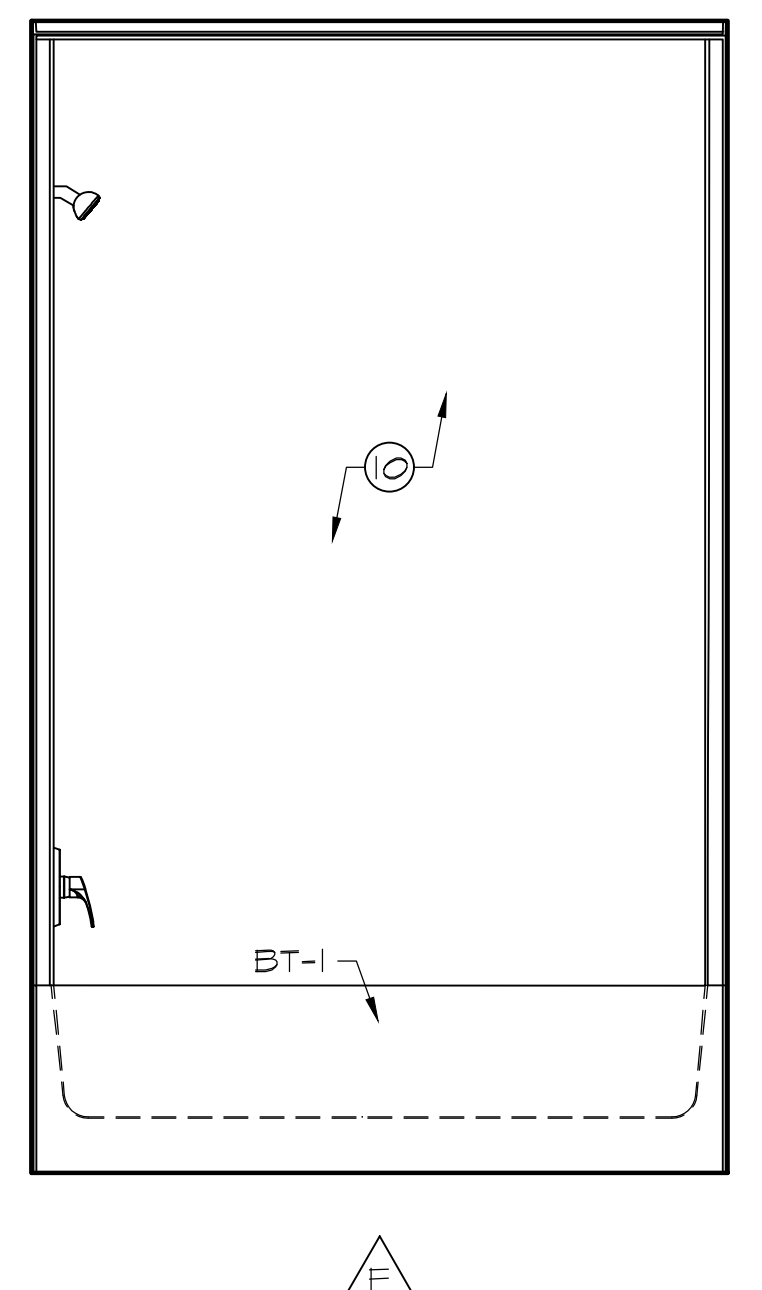
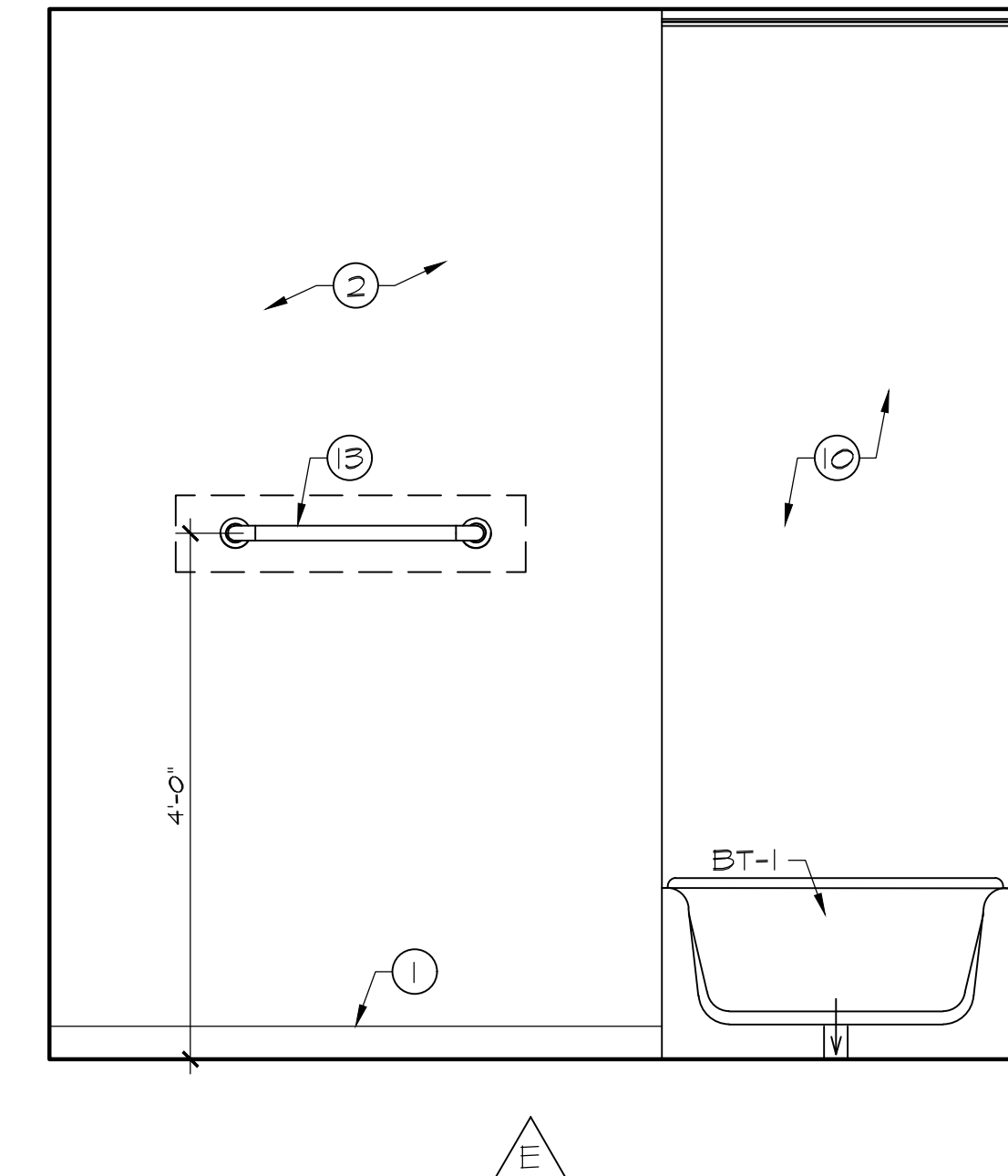
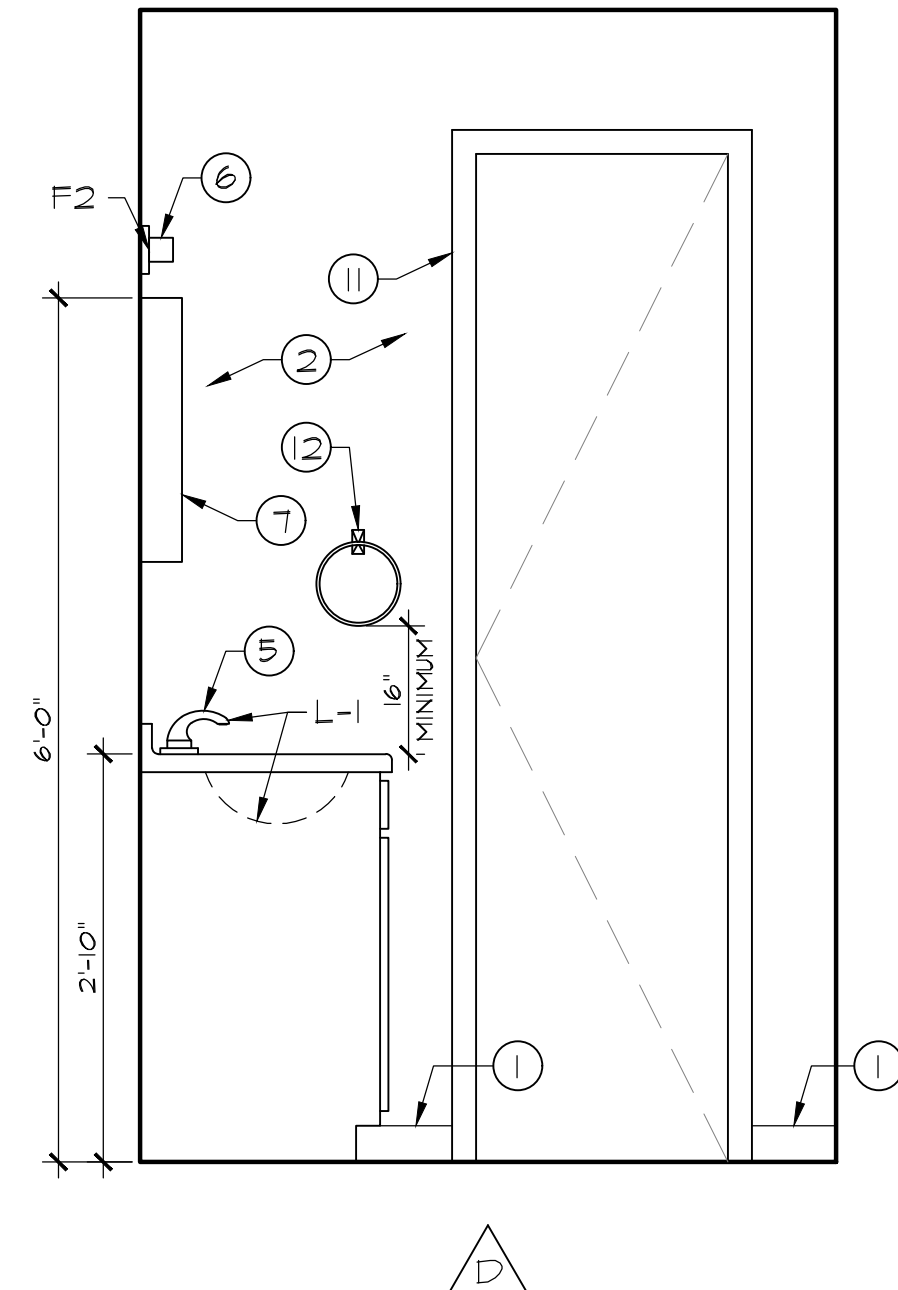
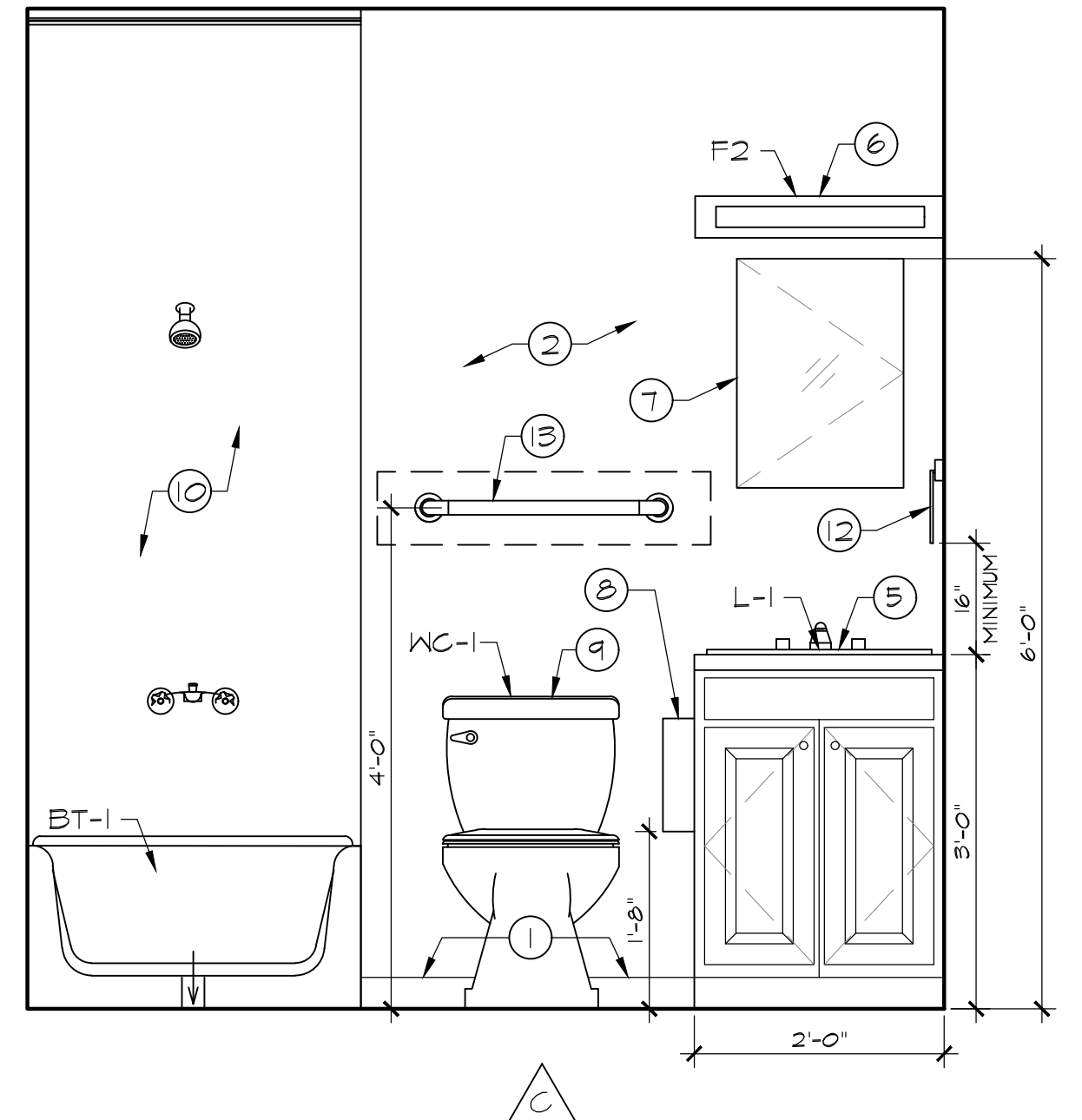
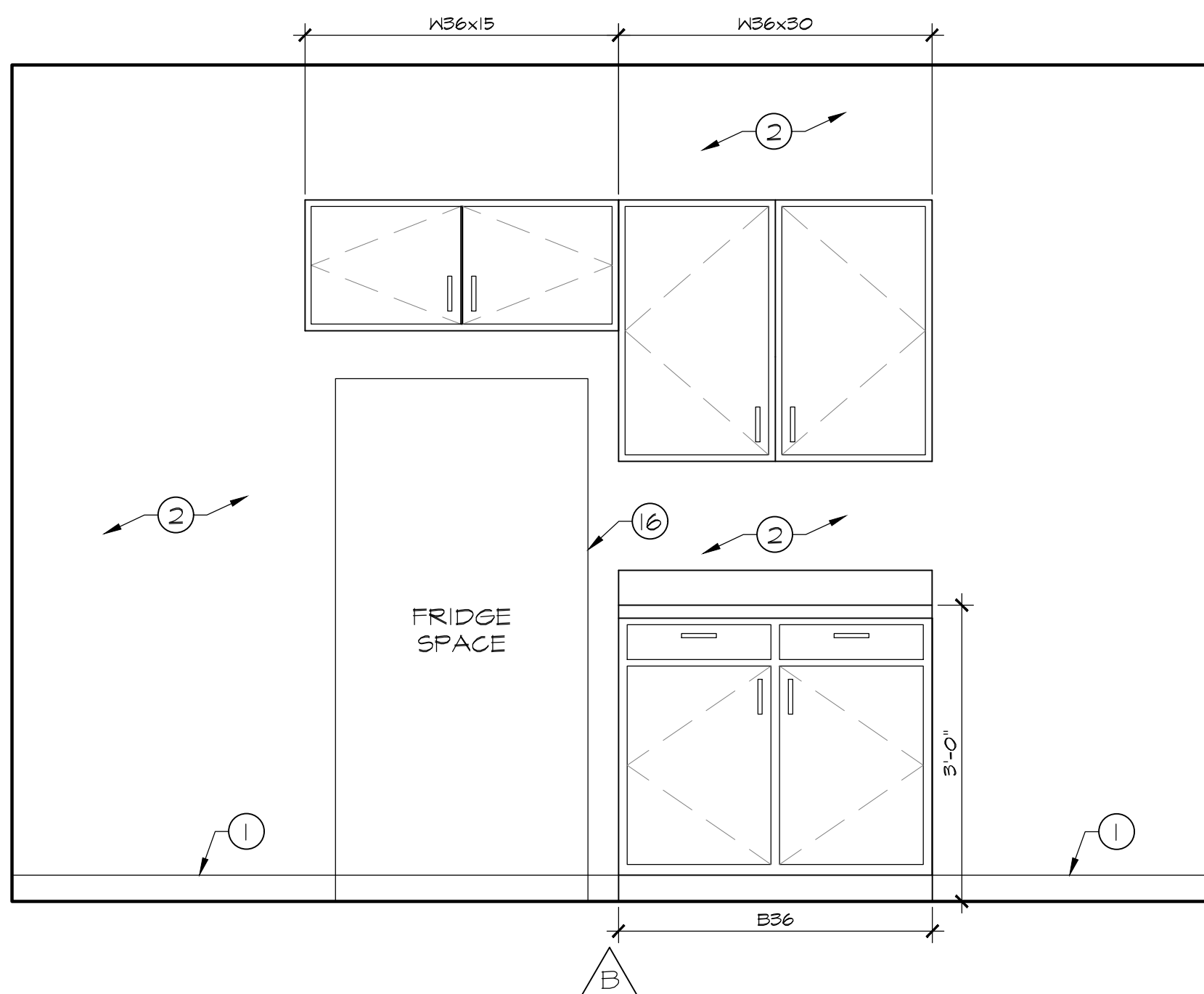
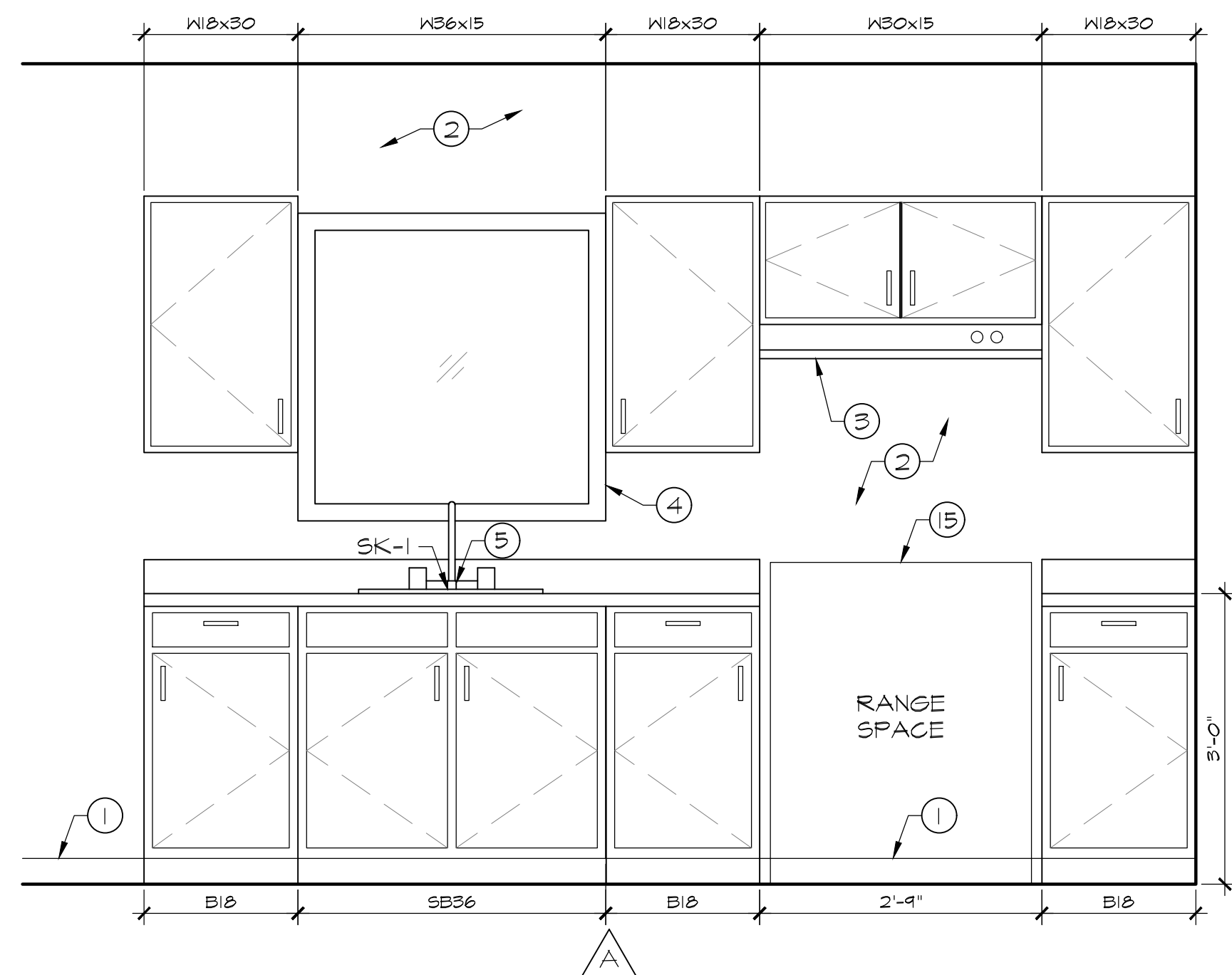


1 FLOOR PLAN  
SCALE: 3/8" = 1'-0"



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





**GENERAL NOTES** (THIS SHEET ONLY)

1. SEE PROJECT GENERAL NOTES ON G100.
2. ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
3. ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
4. ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
5. ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
6. ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

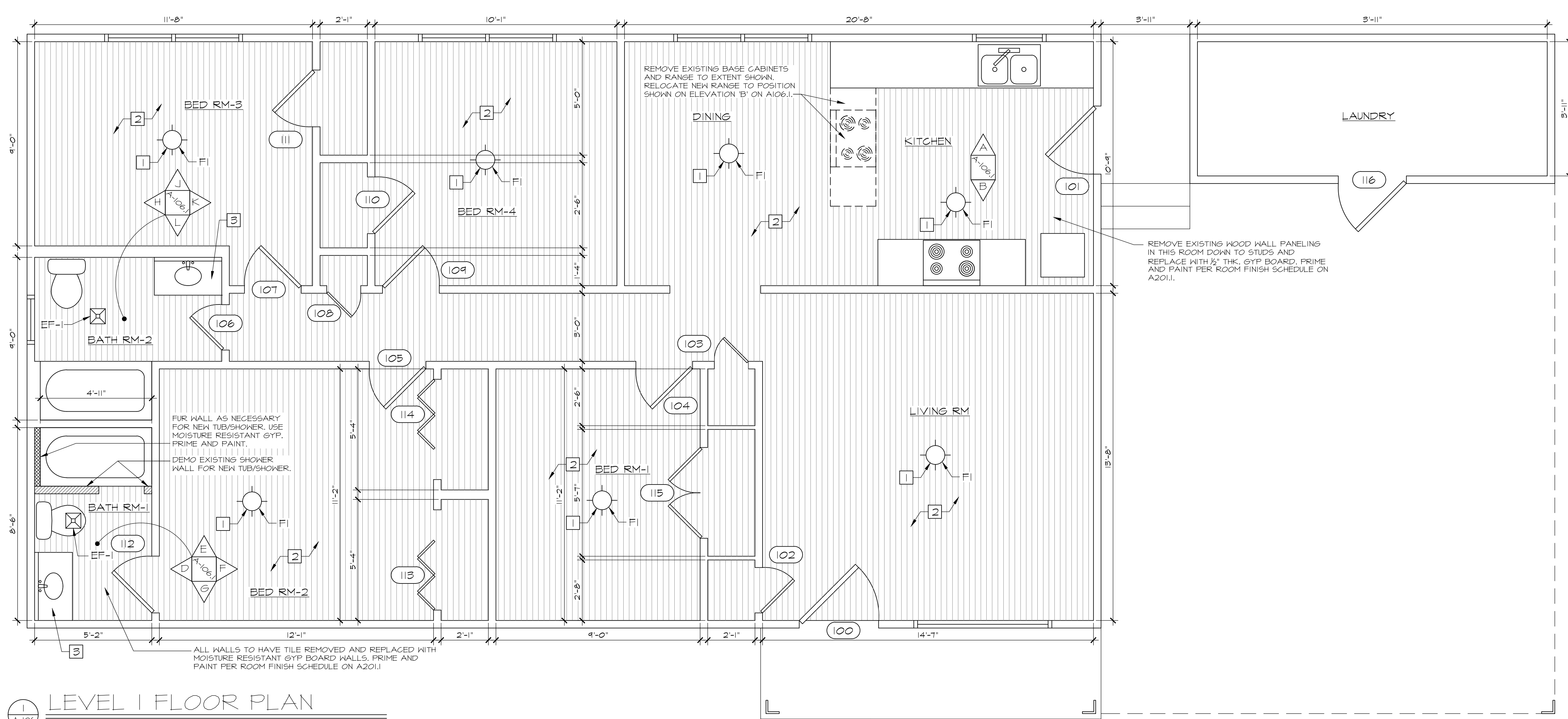
INTERIOR ELEVATIONS

- ① EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- ② PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
- ③ REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- ④ EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- ⑤ REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑥ REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- ⑦ REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- ⑧ NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- ⑨ REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑩ REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- ⑪ EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- ⑫ NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- ⑬ NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- ⑭ NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- ⑮ RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- ⑯ FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

**INTERIOR ELEVATIONS**

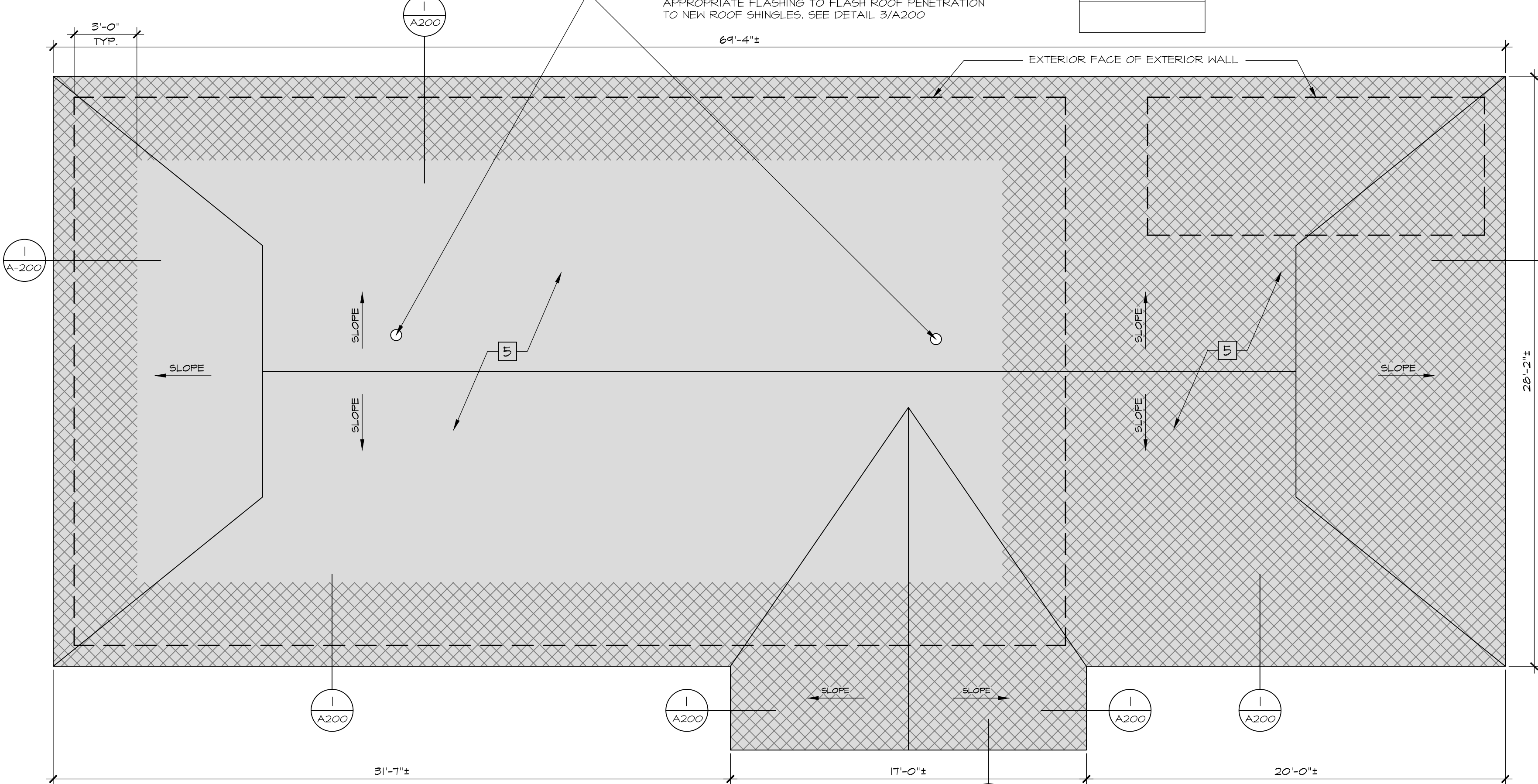
SCALE: 3/4" = 1'-0"

		1919 Architects 4000 Mesary Drive Rockford, IL 61107 (815) 228-8222		www.1919architects.com
		ARCHITECT	BIDDING CO.	
INTERIOR ELEVATIONS	OWNER	CONTRACTOR	R/S/E	COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1) 1620 HOLLINGSWORTH RD. COLUMBIA, SC. 20-12740 Date: 06-06-2023 JMK Appr.
	Rev. Date			
	Sheet No.	A105.1		



- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON G100.
  - ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING MOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2X4 STUDS AND GYP BD.
  - ALL GYP. BOARD CEILING IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILING ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
  - ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
  - ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
  - ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
  - ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
  - REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
  - ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

1 LEVEL 1 FLOOR PLAN  
SCALE: 3/8" = 1'-0"



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

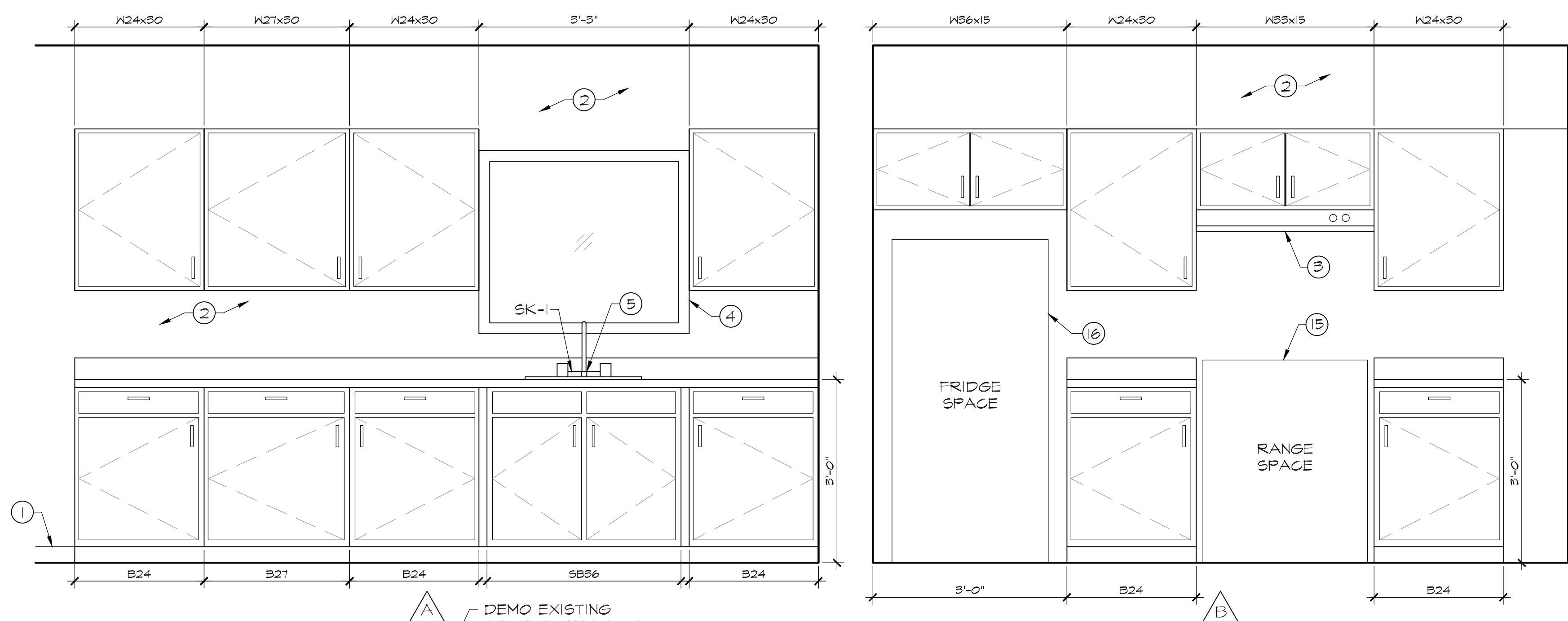
**\*THIS PROPERTY HAS FOUR (4) PINE TREES TO BE REMOVED. CONTRACTOR TO VERIFY EXACT LOCATIONS OF TREES ON SITE.**

- ### LEGEND OF SYMBOLS
- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
  - NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
  - AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR - SEE GENERAL NOTE 15
  - CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

\*CRAWLSPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:  
 - 1 1/2" CELLULAR PVC DOOR WITH NEW DEADBOLT  
 - BRICKMOULD  
 - STAINLESS STEEL HARDWARE  
 - 3/8" JAMB AND HEAD DEPTH  
 - OVERLAY CONFIGURATION  
 - SIZE TO BE FIELD VERIFIED  
 AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 IN: (WWW.CURBAPPEALPRODUCTS.COM/CRAWL-SPACE-DOORS/)  
 P: (919)846-8088

- ### KEYNOTES (THIS SHEET ONLY)
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOWL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		2017 HILLBECK RD. COLUMBIA, SC.	
2017 HILLBECK	2017 HILLBECK (ZONE 1)	06-06-2023	JMK
Sheet No:	A106	Project Number	Date



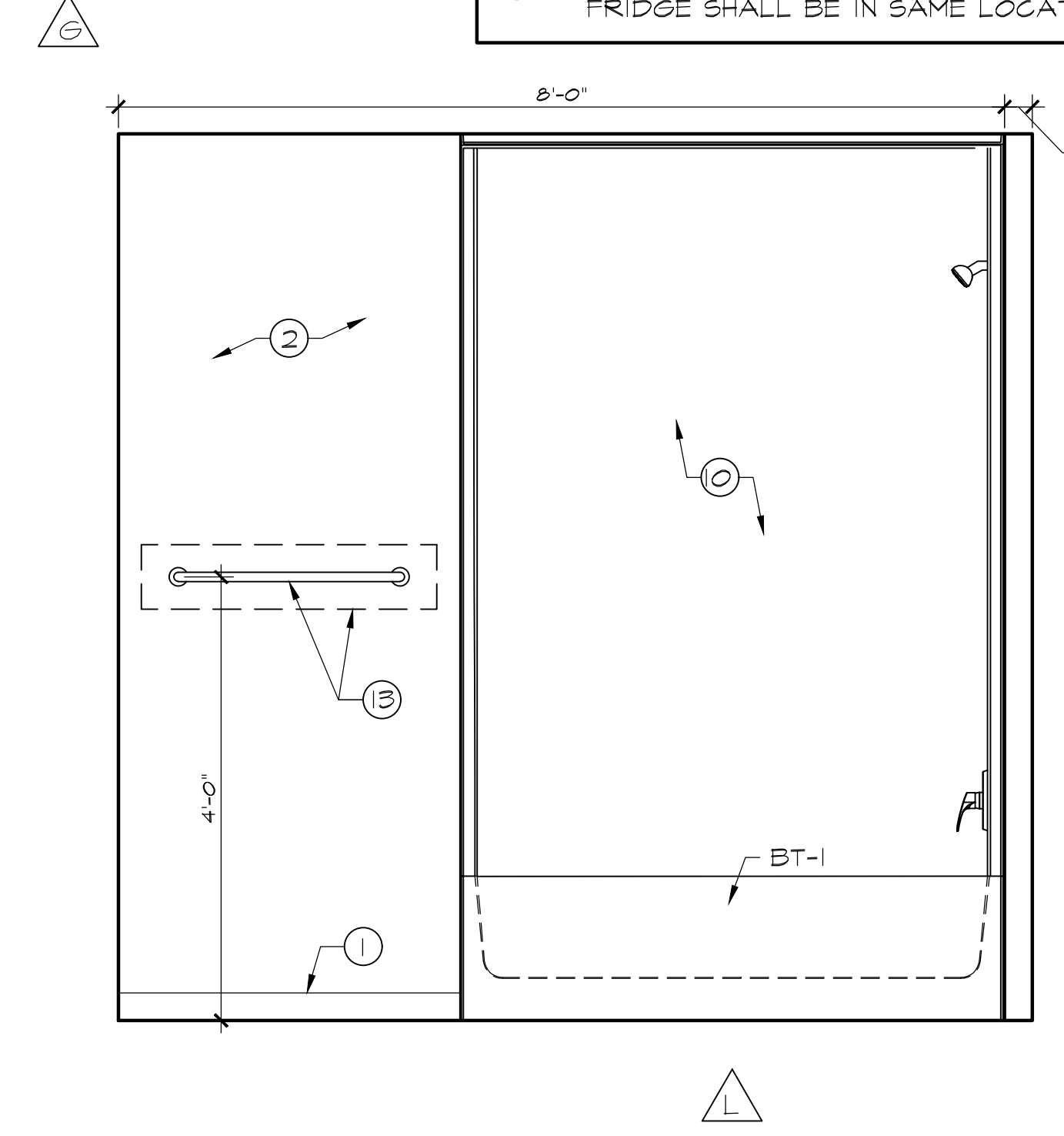
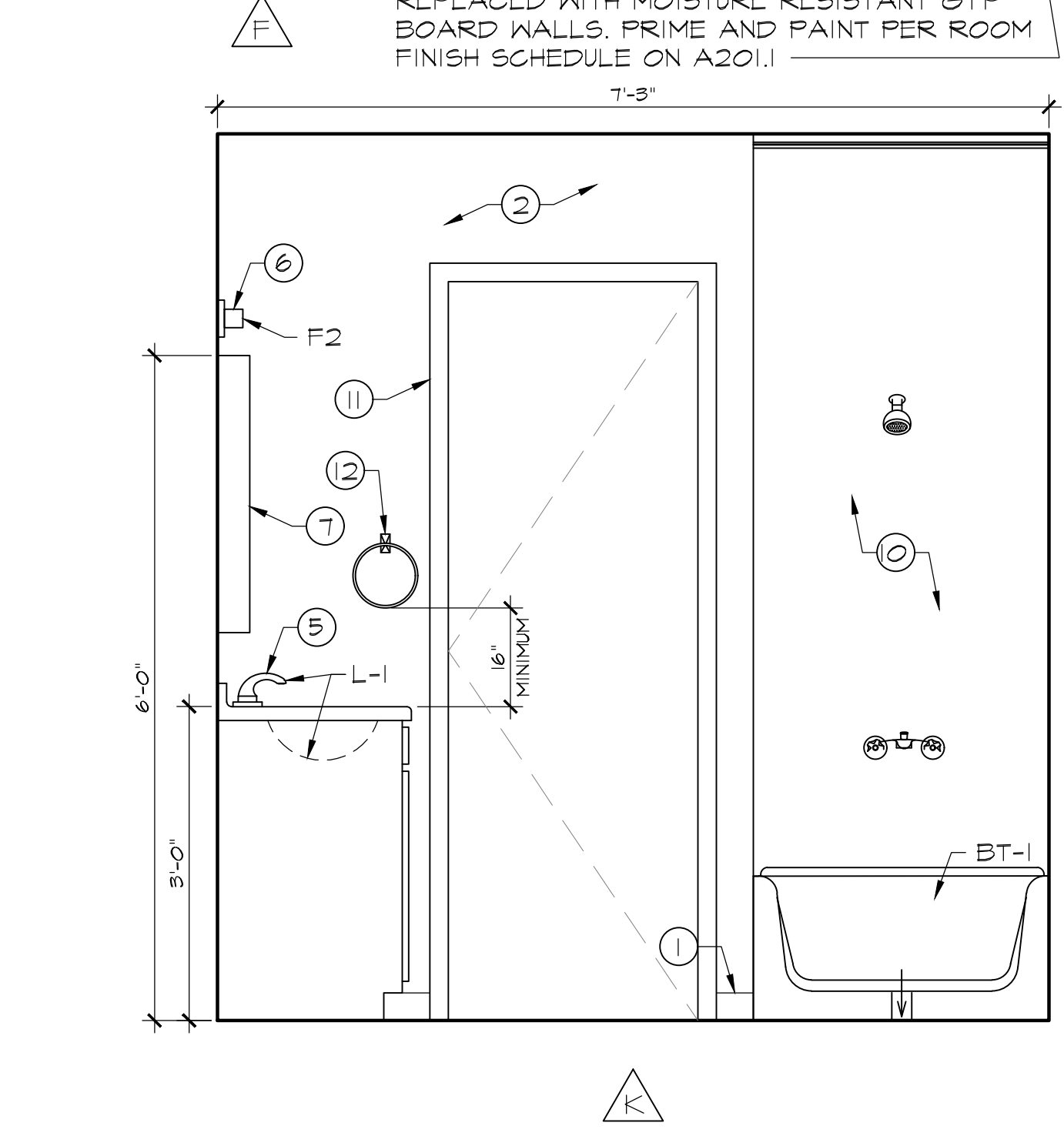
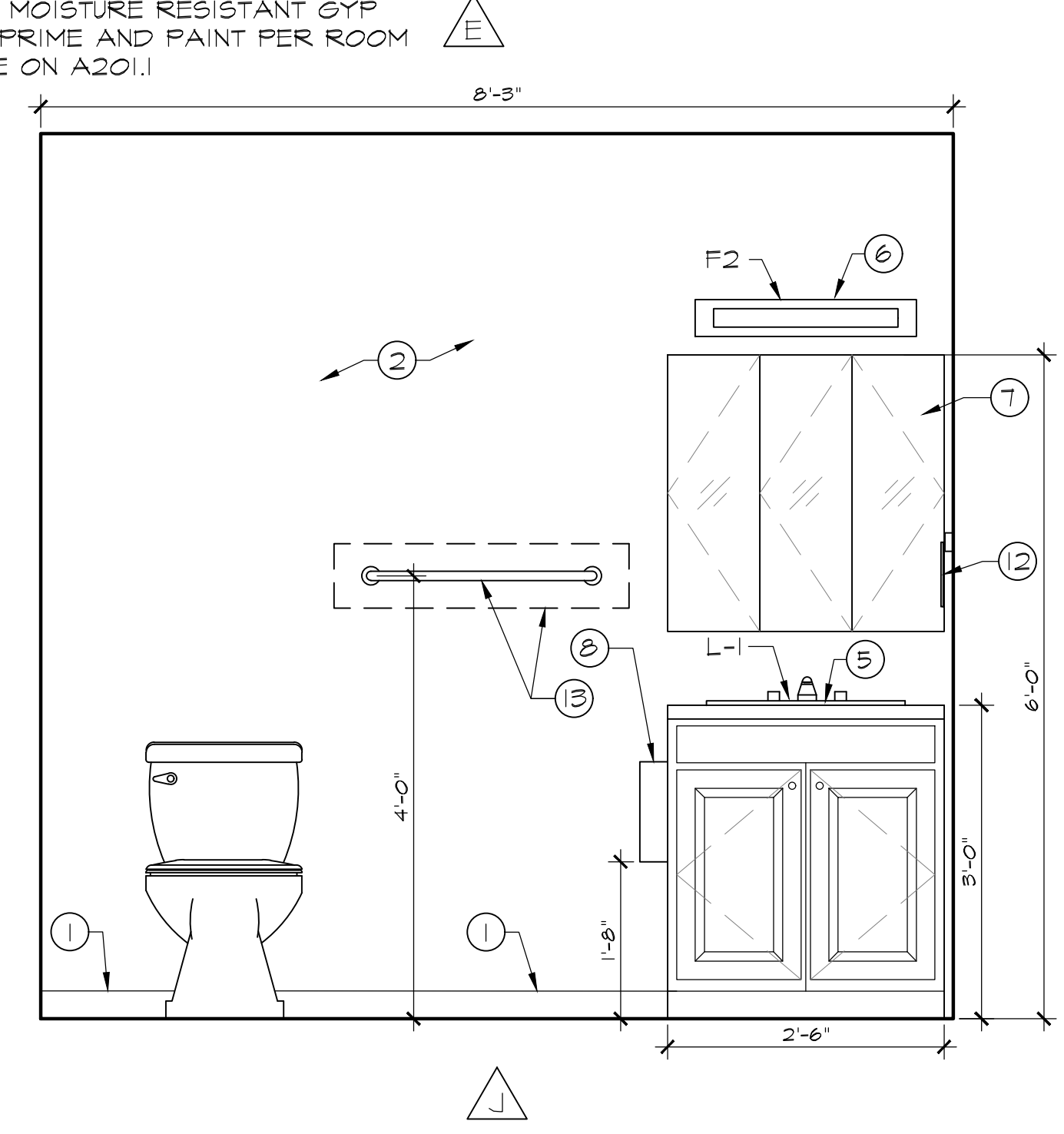
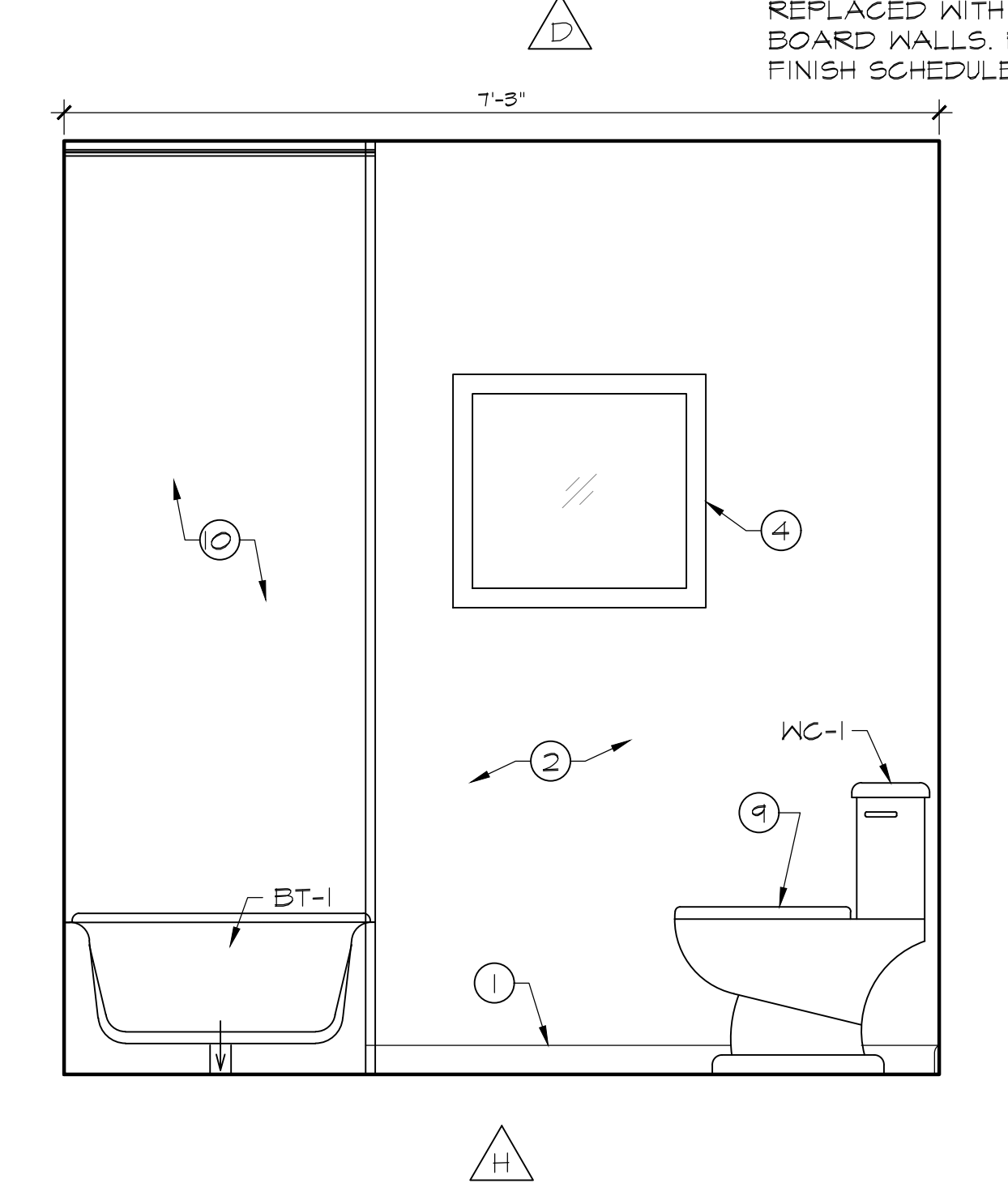
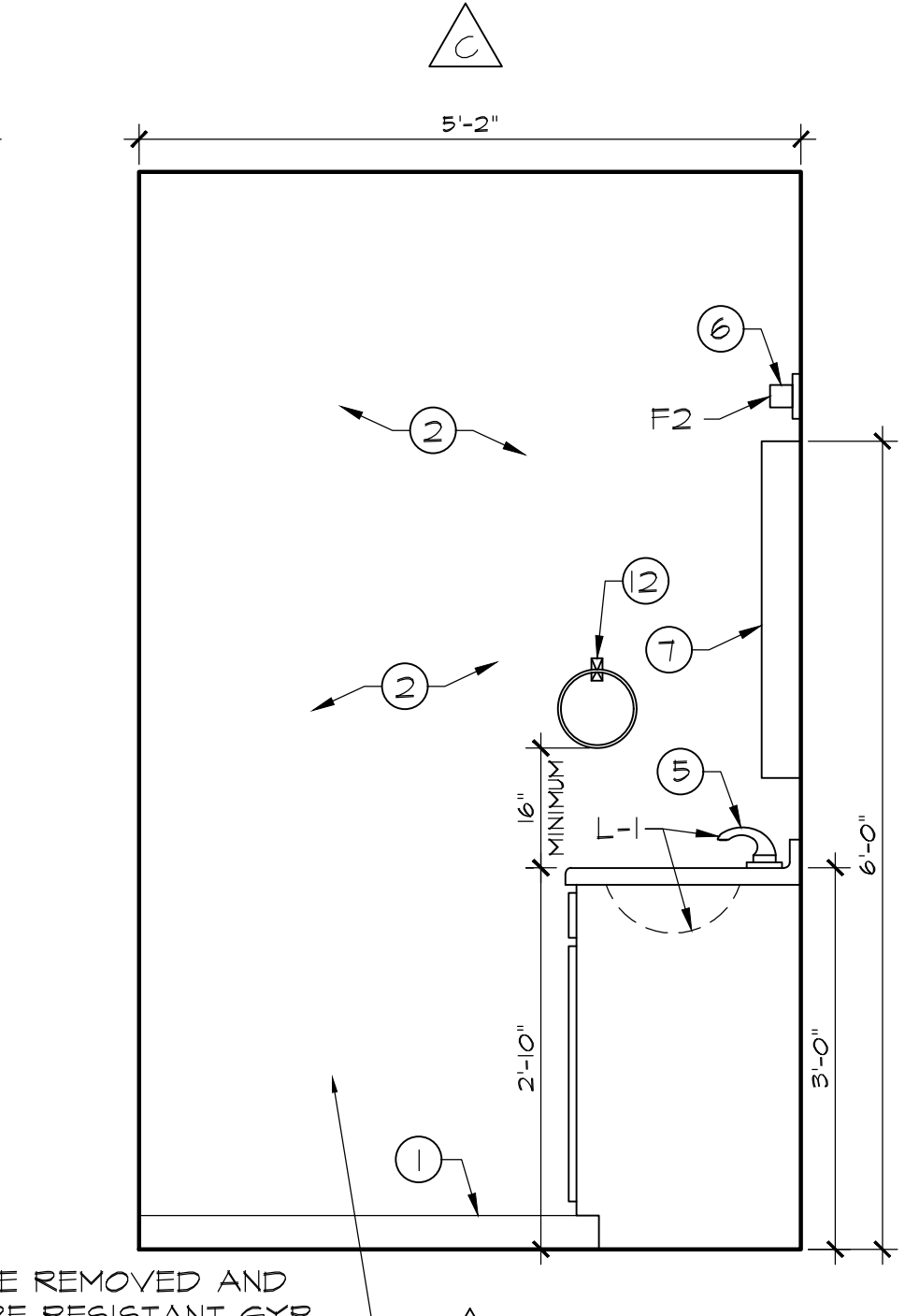
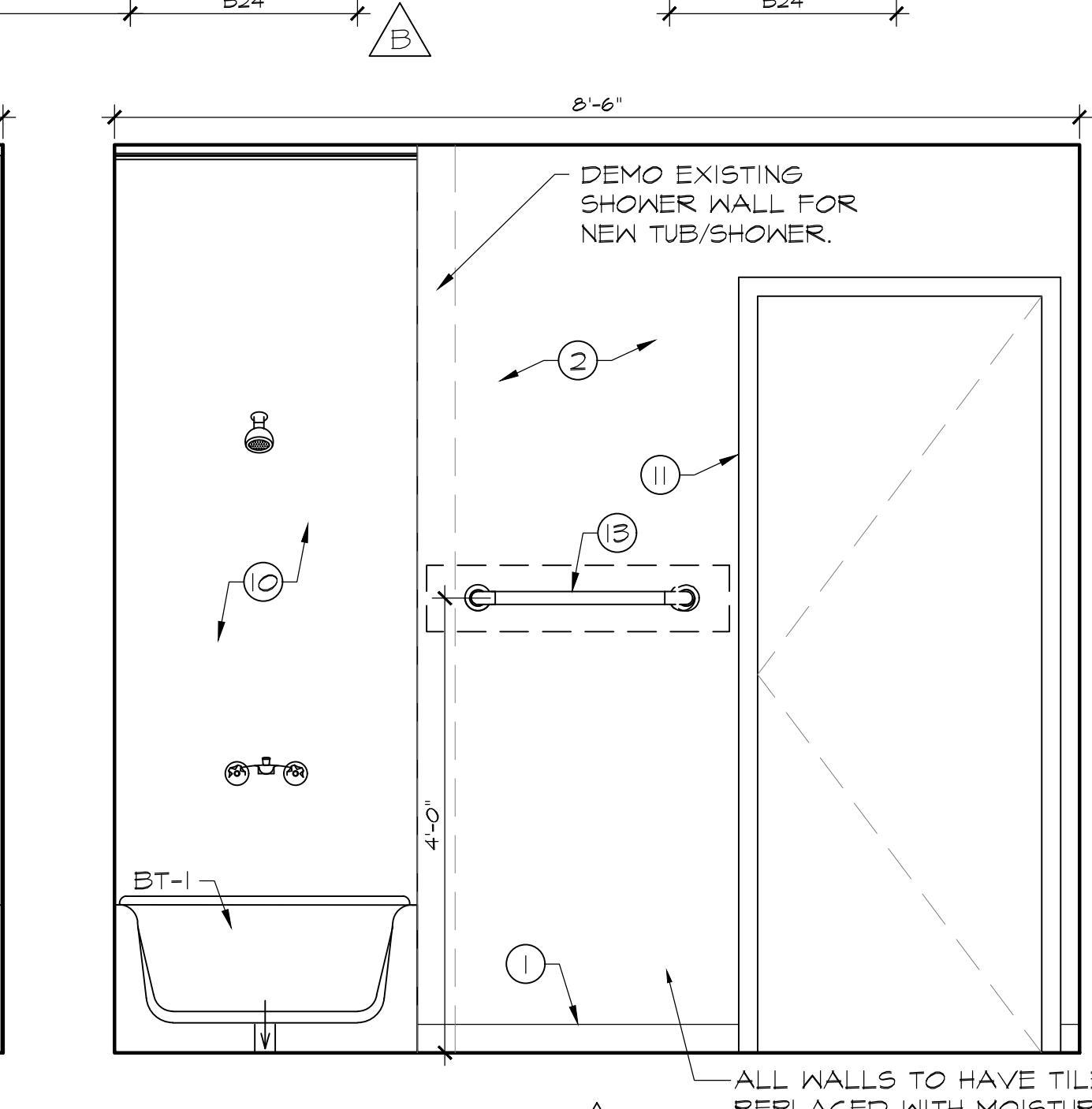
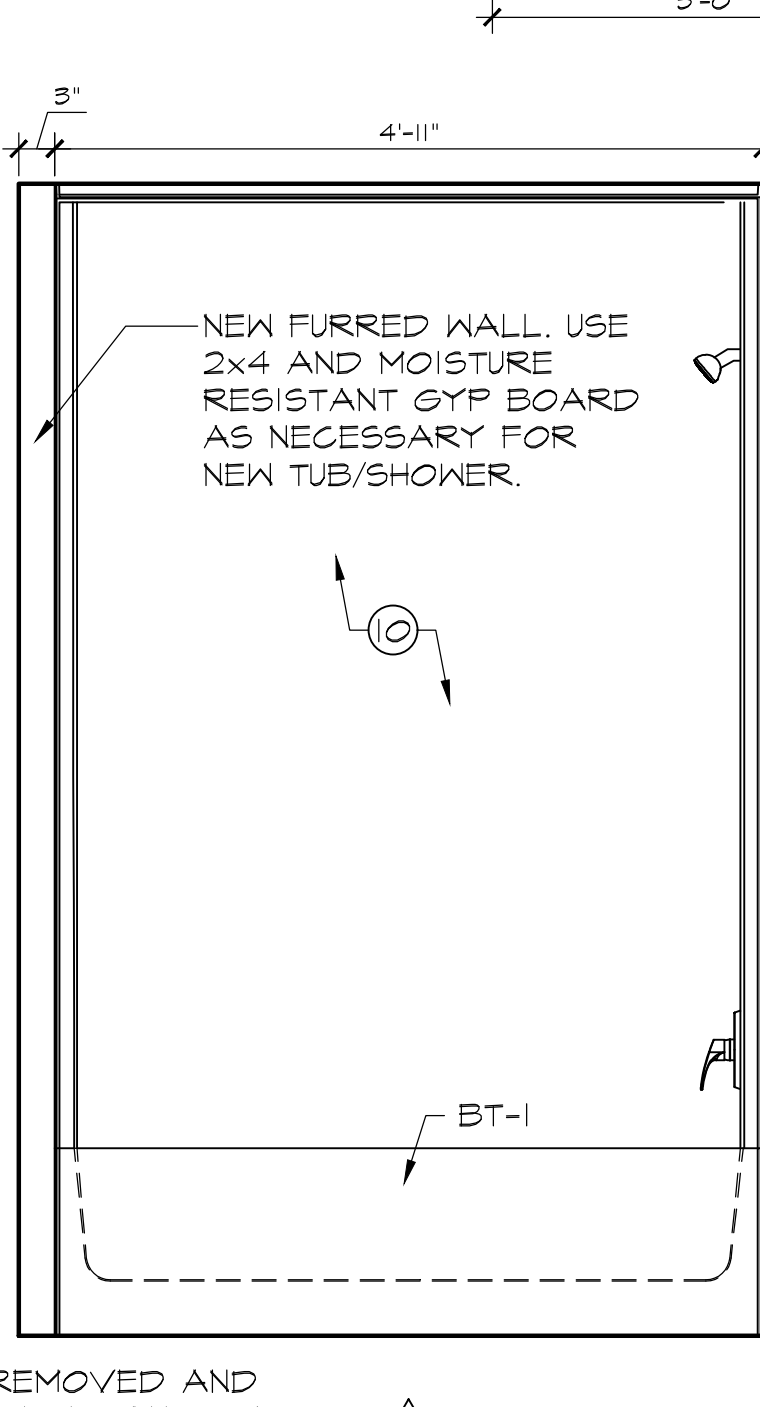
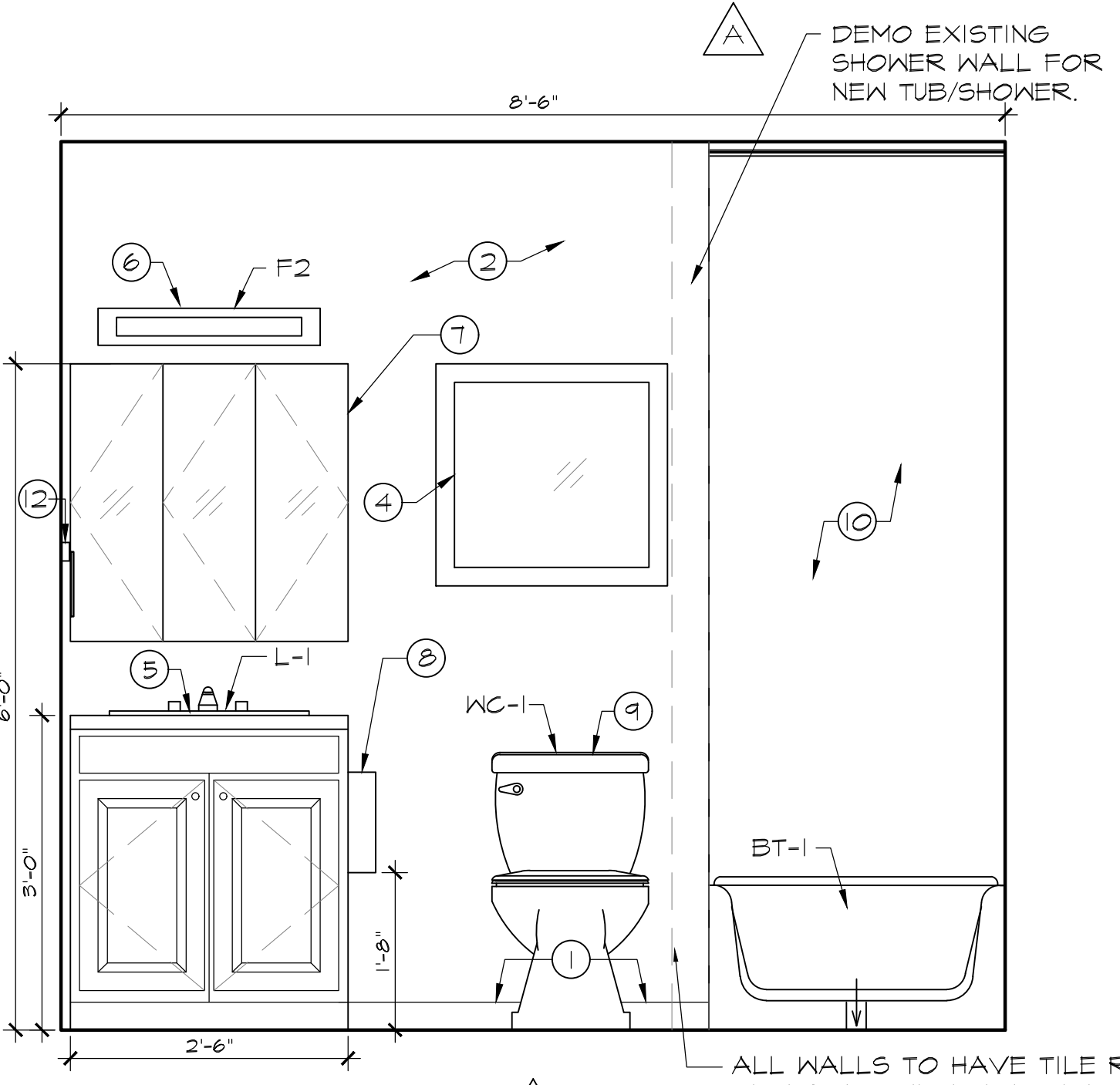
**GENERAL NOTES** (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

INTERIOR ELEVATIONS

- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.1.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.



DEMO EXISTING SHOWER WALL FOR NEW TUB/SHOWER.

ALL WALLS TO HAVE TILE REMOVED AND REPLACED WITH MOISTURE RESISTANT GYP BOARD WALLS. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.1

ALL WALLS TO HAVE TILE REMOVED AND REPLACED WITH MOISTURE RESISTANT GYP BOARD WALLS. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.1

**1919 Architects**  
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 Rockford, IL 61107  
 (815) 223-8222  
 www.1919architects.com

**INTERIOR ELEVATIONS**

COLUMBIA H.A. SCATTERED SITE REHAB

(ZONE 1)  
 2317 HILLBECK RD. COLUMBIA, SC.

Project Number: 20-12740 Date: 06-06-2023  
 Rev. Date: JMK  
 Architect: JMK  
 Owner: JMK  
 Contractor: JMK  
 Binding Co.: JMK  
 RGE  
 Appr.

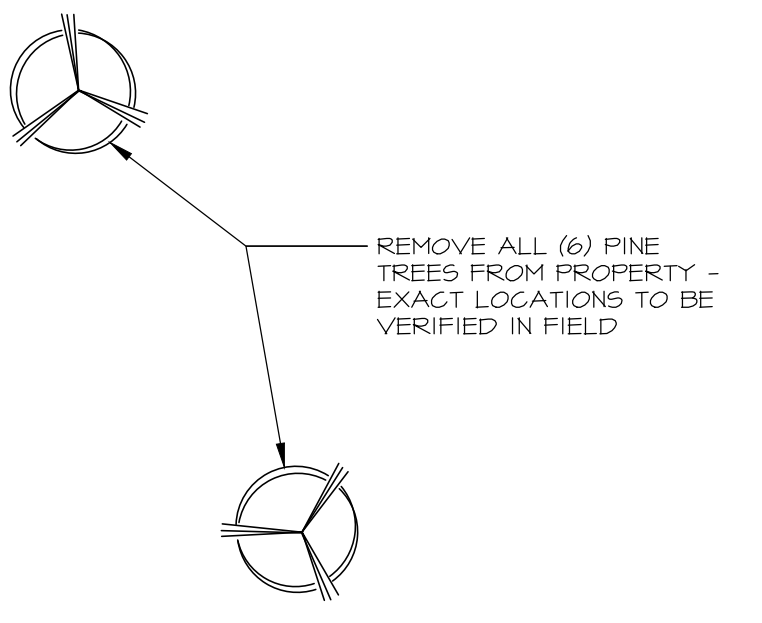
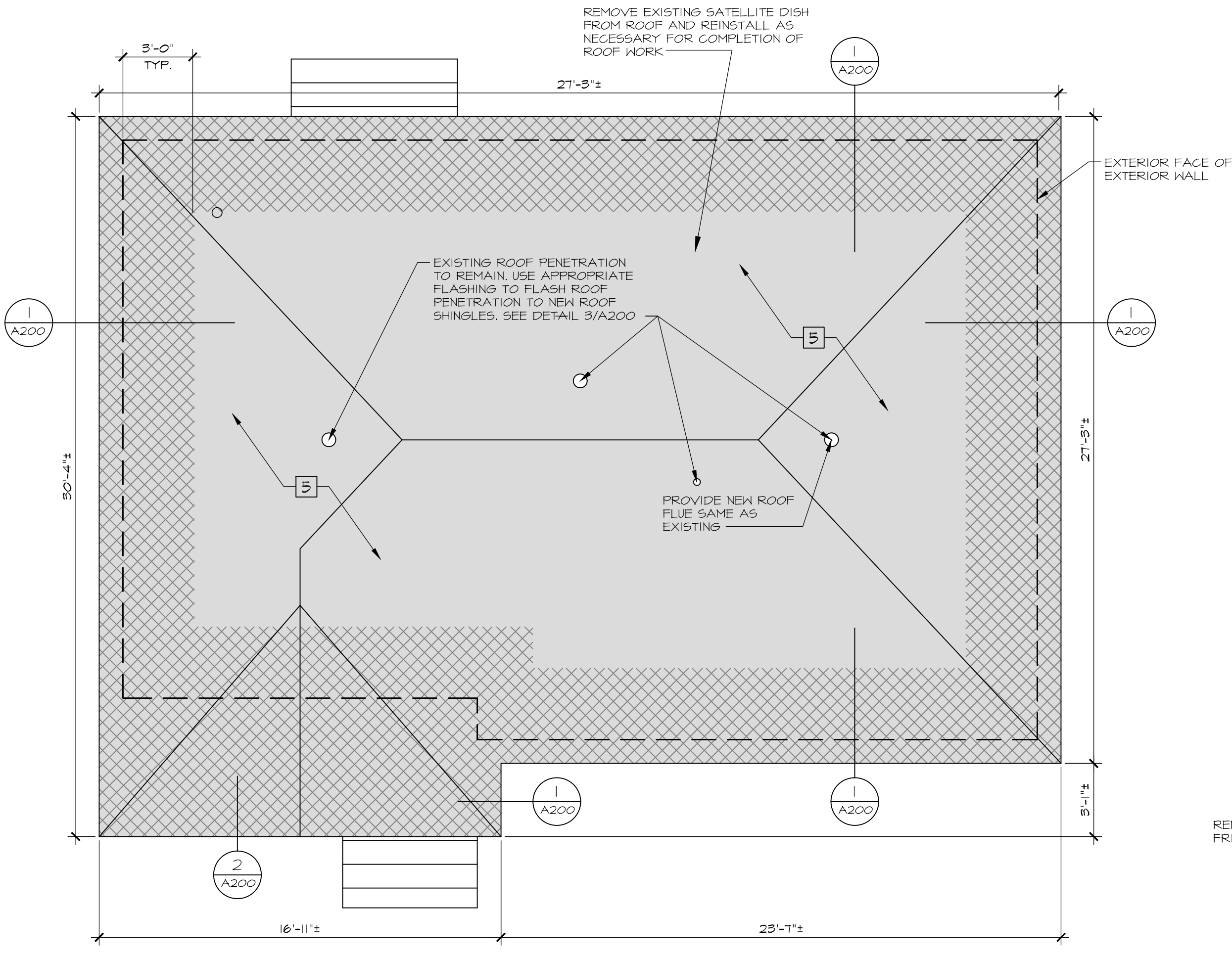
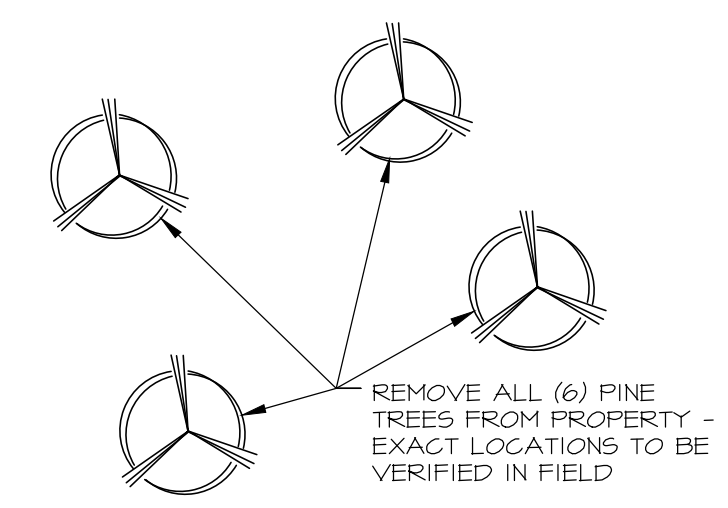
Sheet No. A106.1

### LEGEND OF SYMBOLS

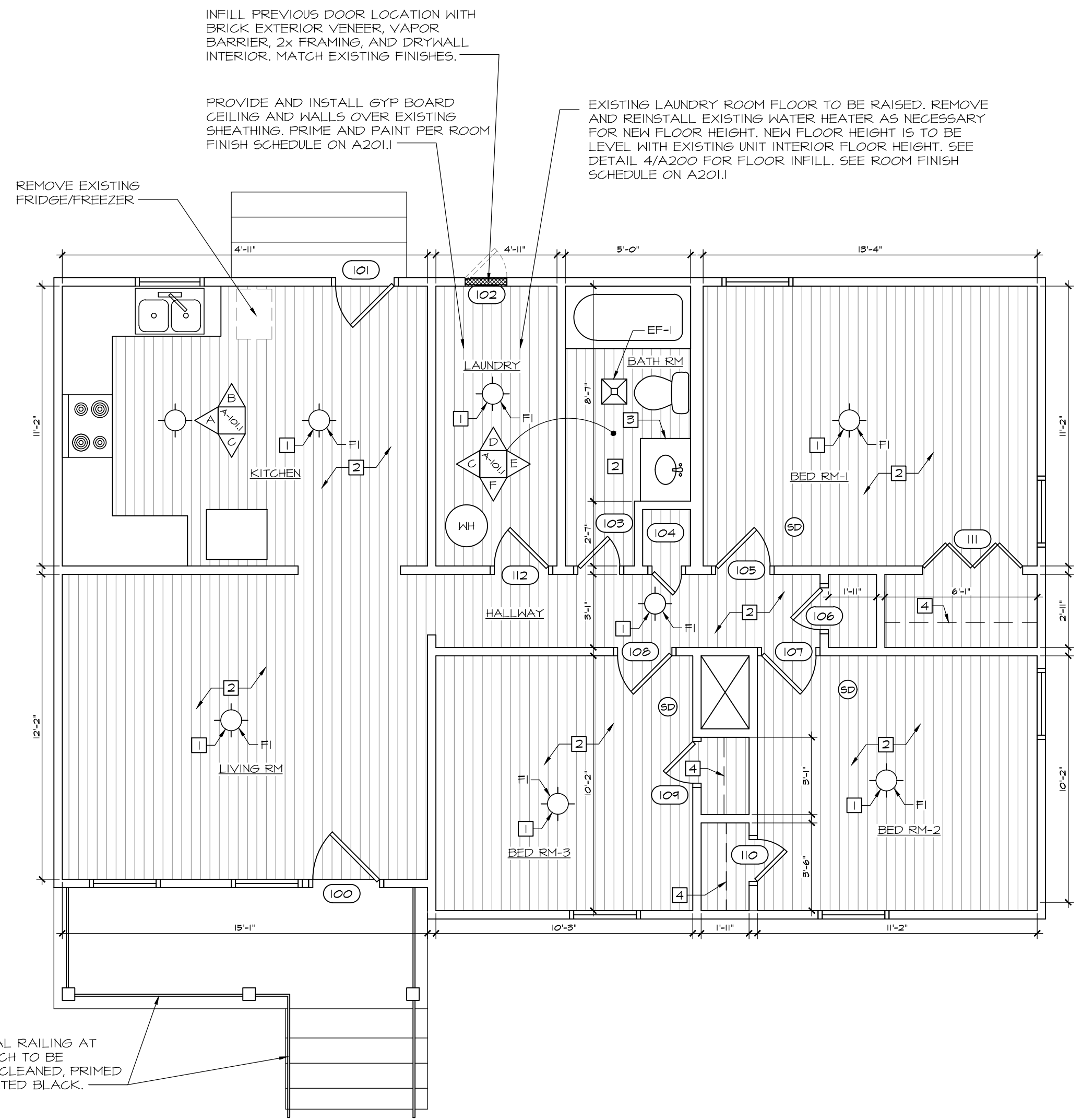
- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

- ### GENERAL NOTES (THIS SHEET ONLY)
- SEE PROJECT GENERAL NOTES ON G100.
  - ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
  - ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2X4 STUDS AND GYP BD.
  - ALL GYP. BOARD CEILING IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILING ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
  - ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
  - ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
  - ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
  - ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
  - ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
  - ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
  - ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
  - SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
  - REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
  - ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

\*GRAHL-SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:  
 - 1/2" CELLULAR PVC DOOR WITH NEW DEADBOLT  
 - BRICKMOULD  
 - STAINLESS STEEL HARDWARE  
 - 3/2" JAMB AND HEAD DEPTH  
 - OVERLAY CONFIGURATION  
 - SIZE TO BE FIELD VERIFIED  
 AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 W: (WWW.CURBAPPEALPRODUCTS.COM/GRAHL-SPACE-DOORS/)  
 P: (914)846-8088



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



**2** FLOOR PLAN  
SCALE: 1/4" = 1'-0"

- ### KEYNOTES (THIS SHEET ONLY)
- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOWL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

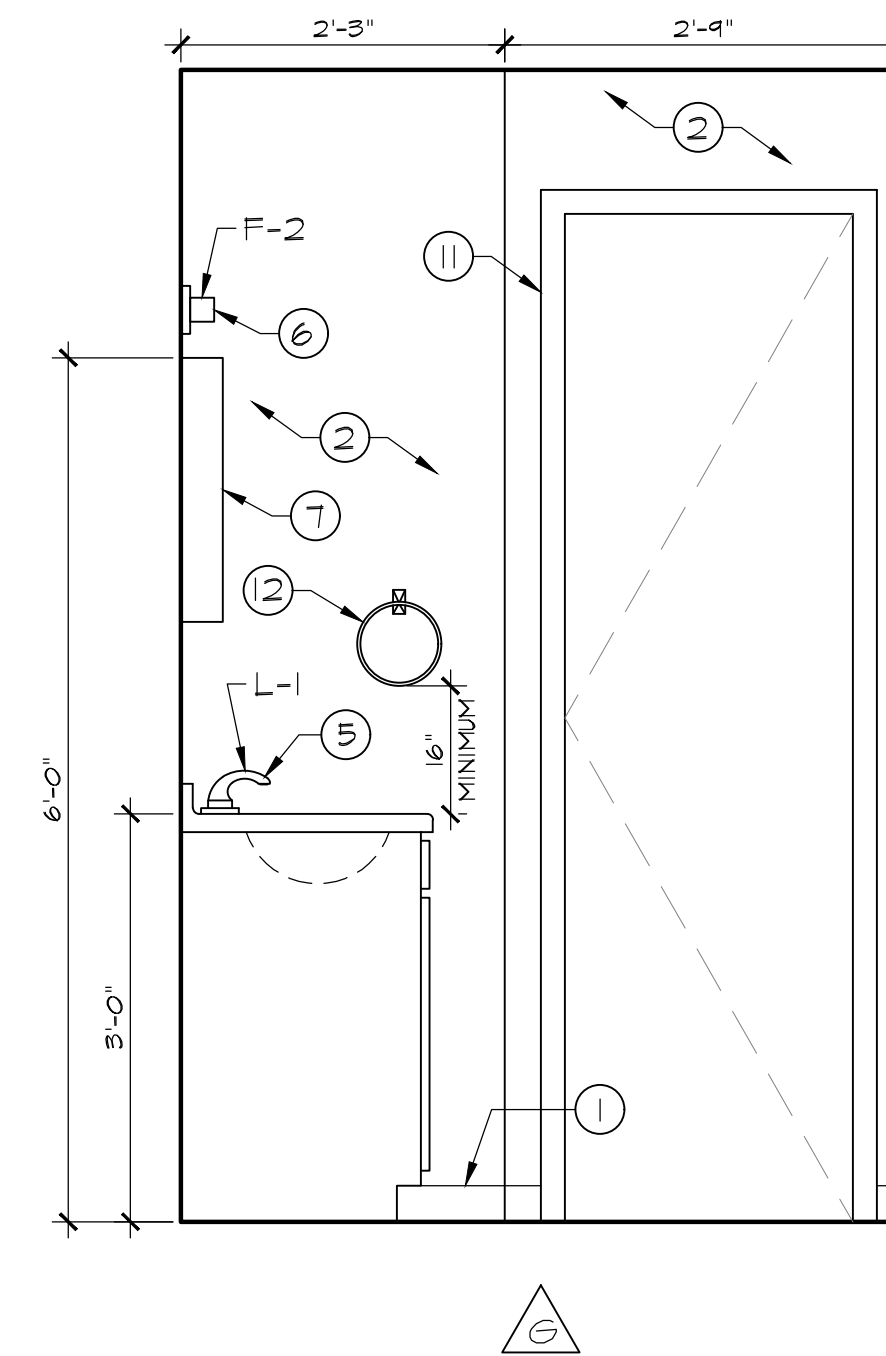
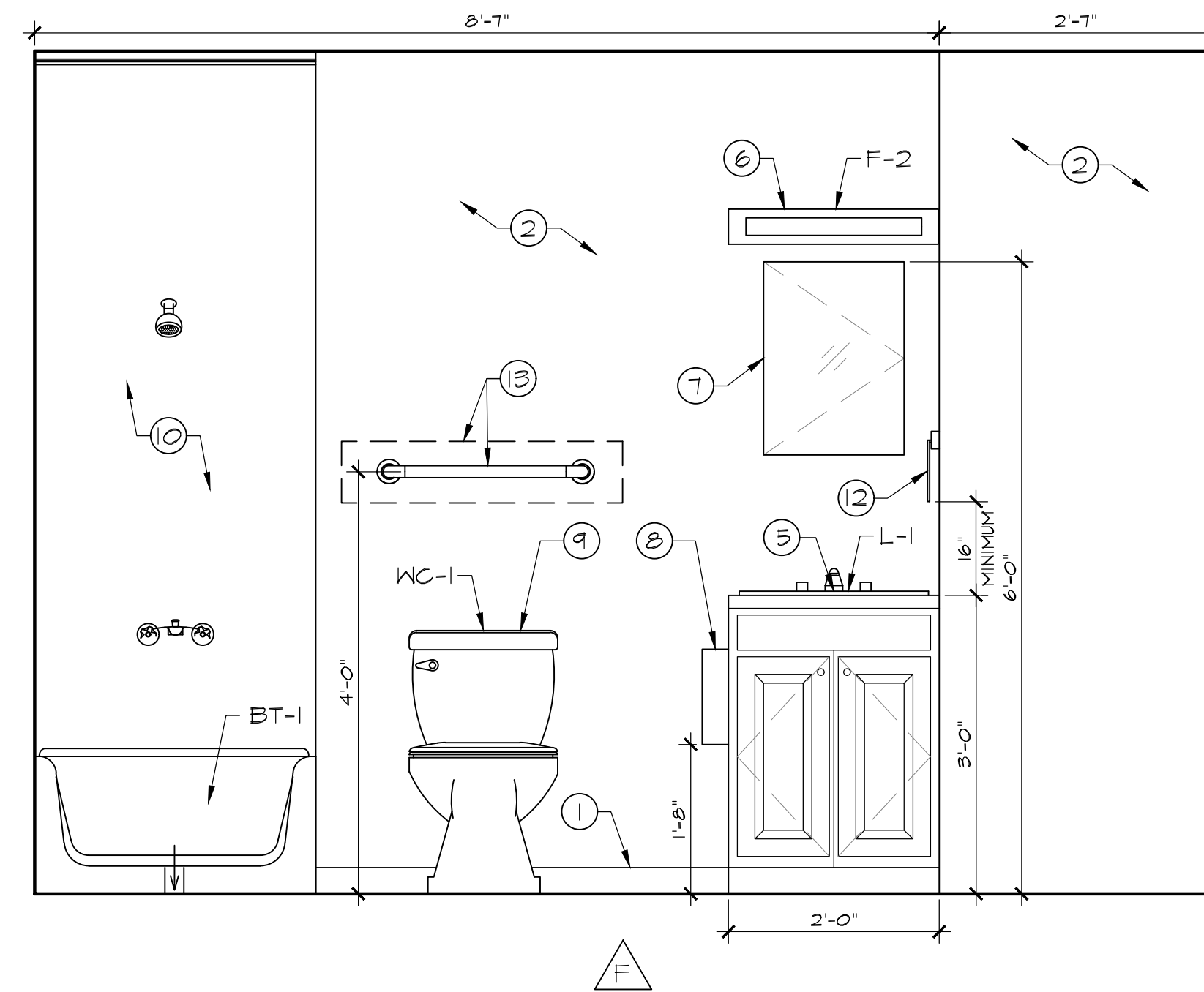
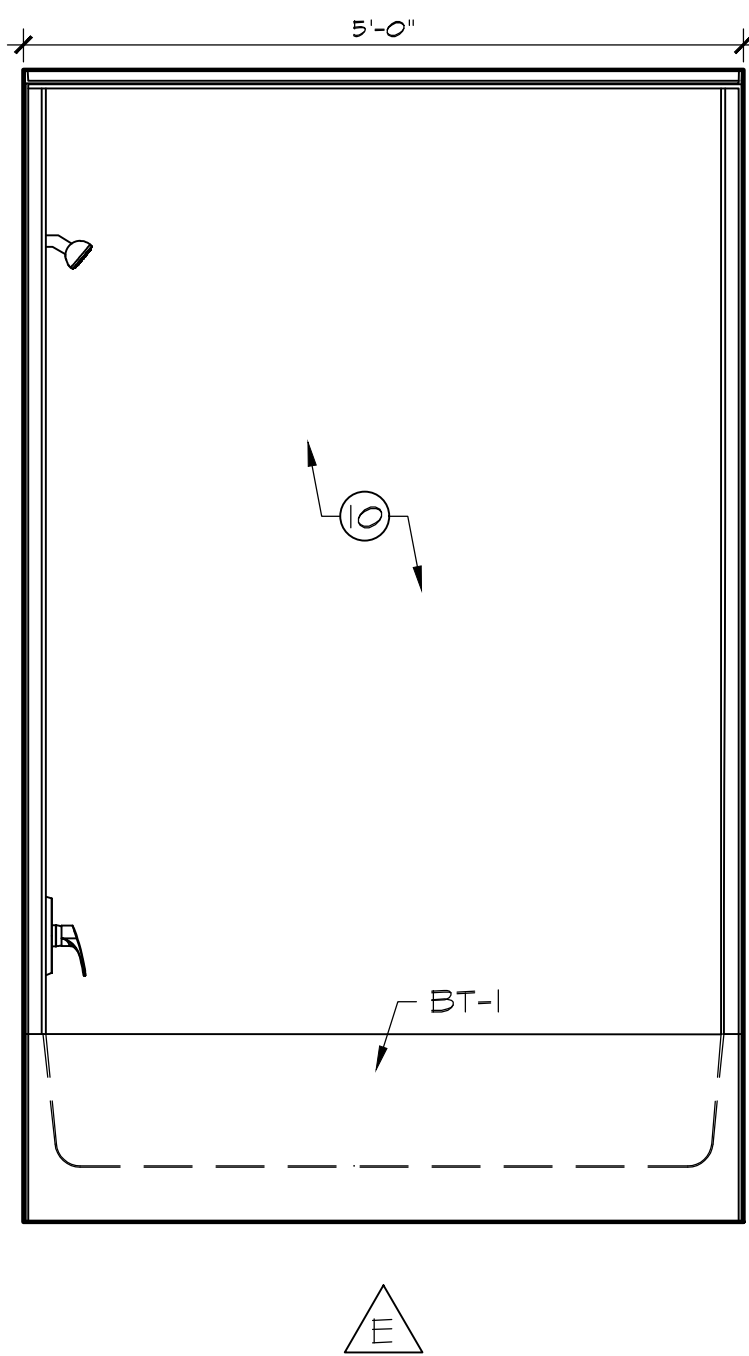
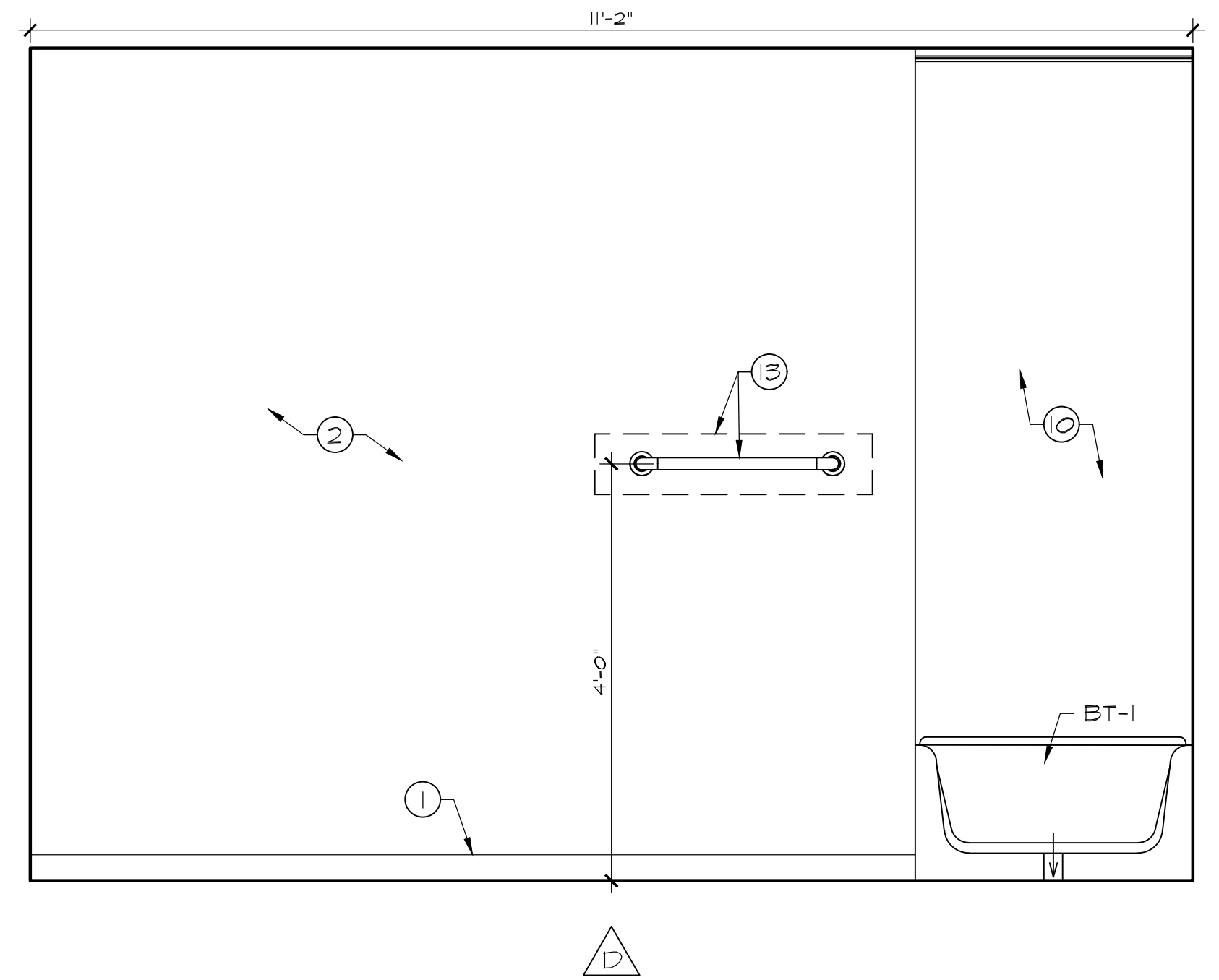
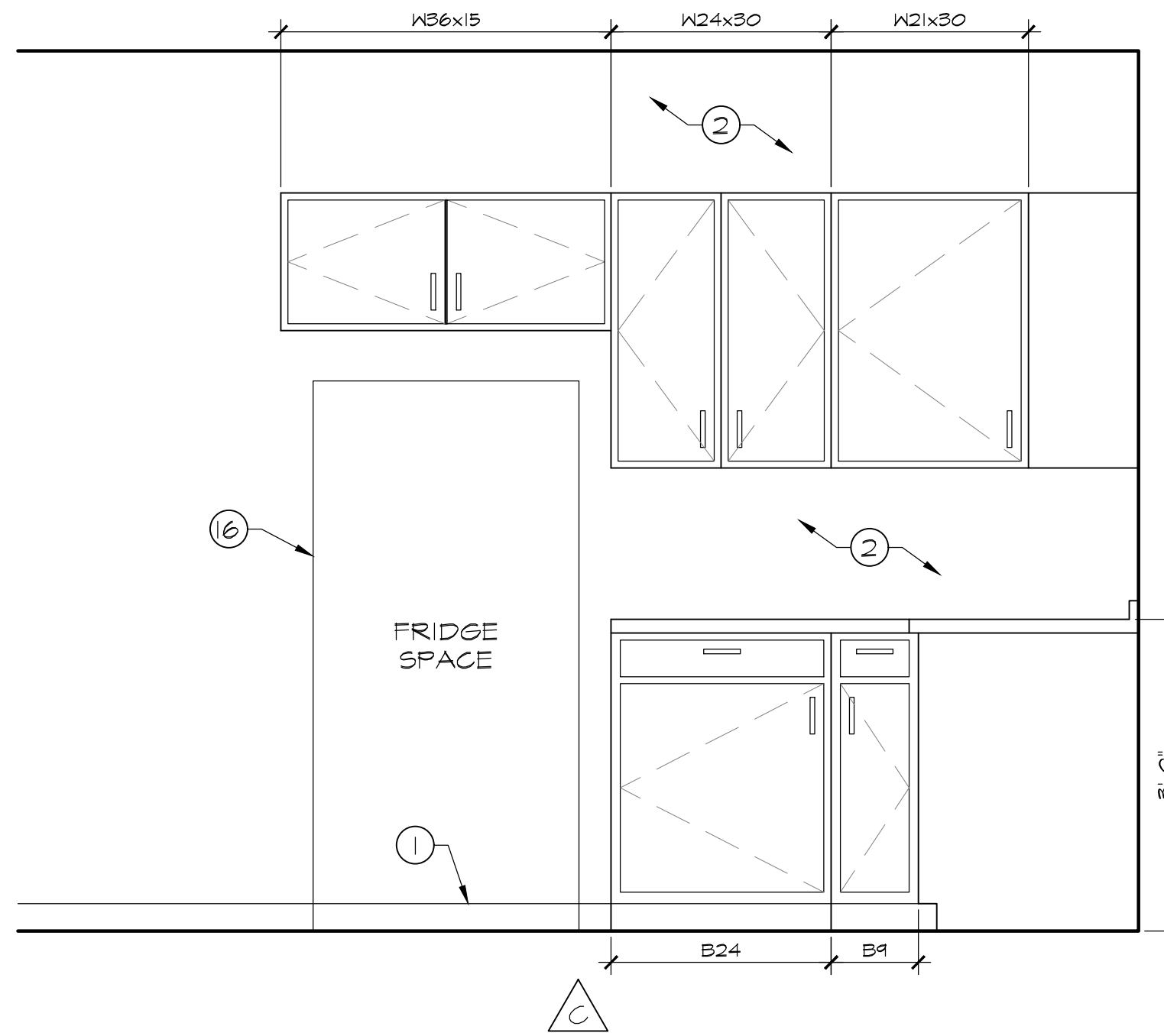
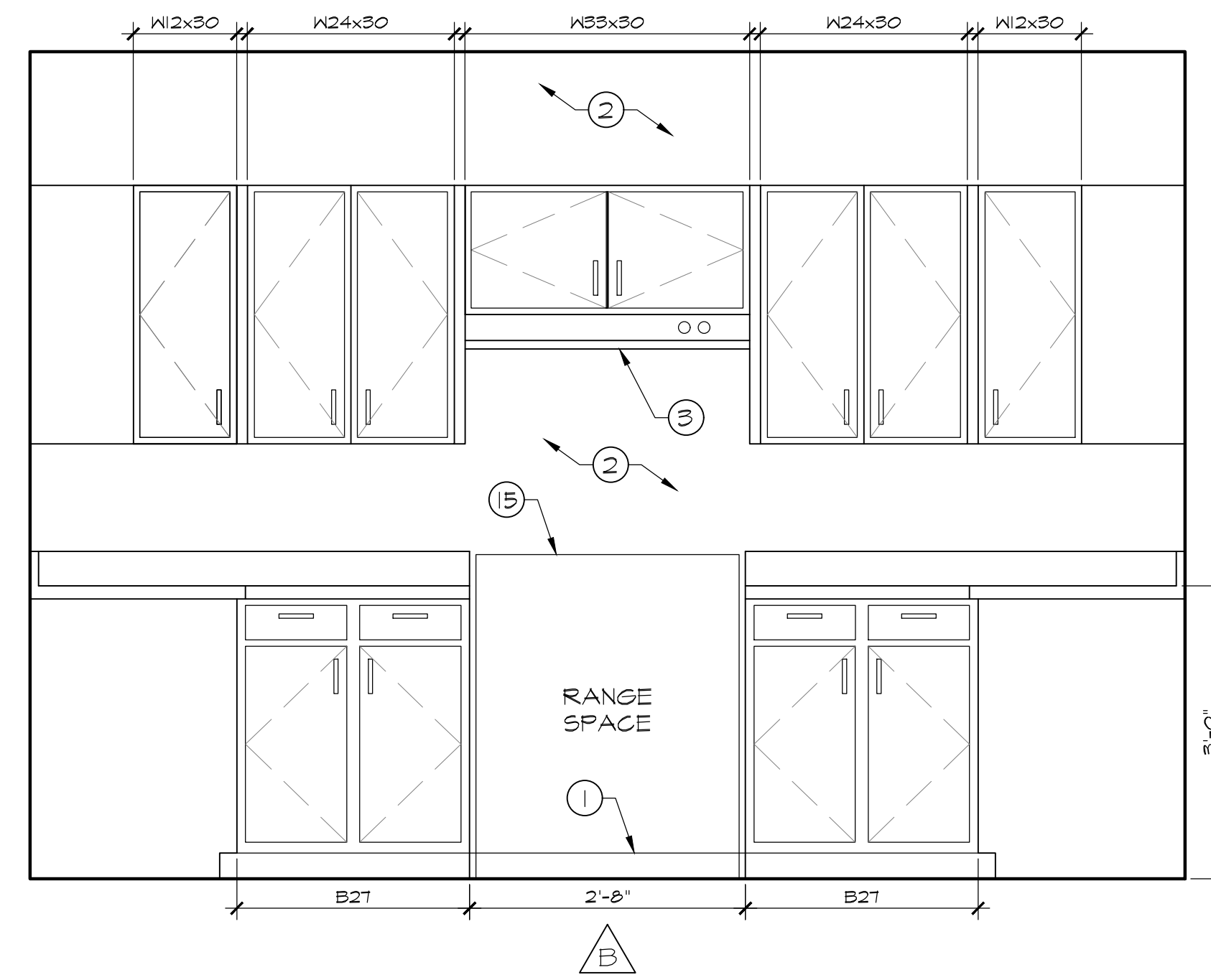
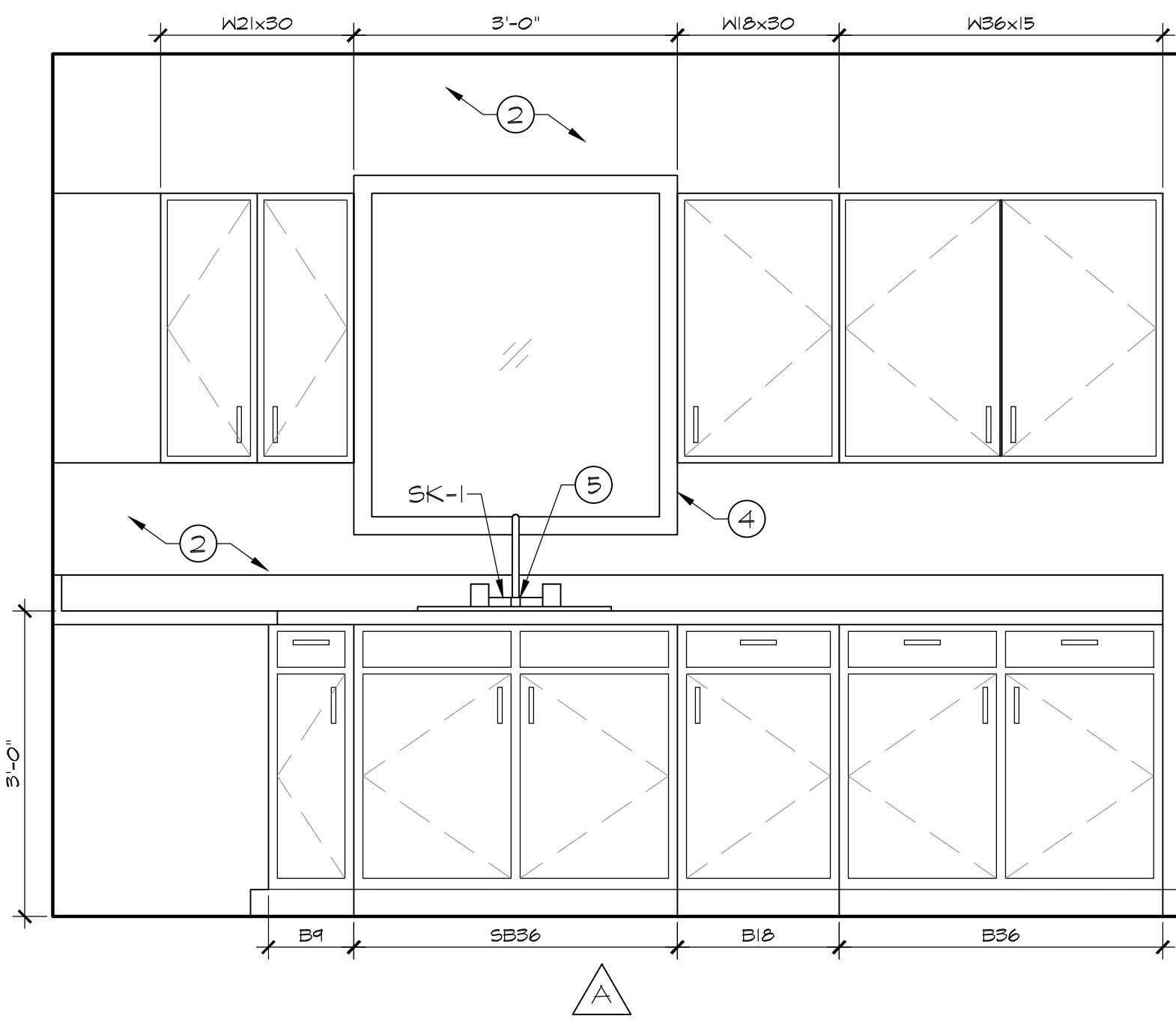
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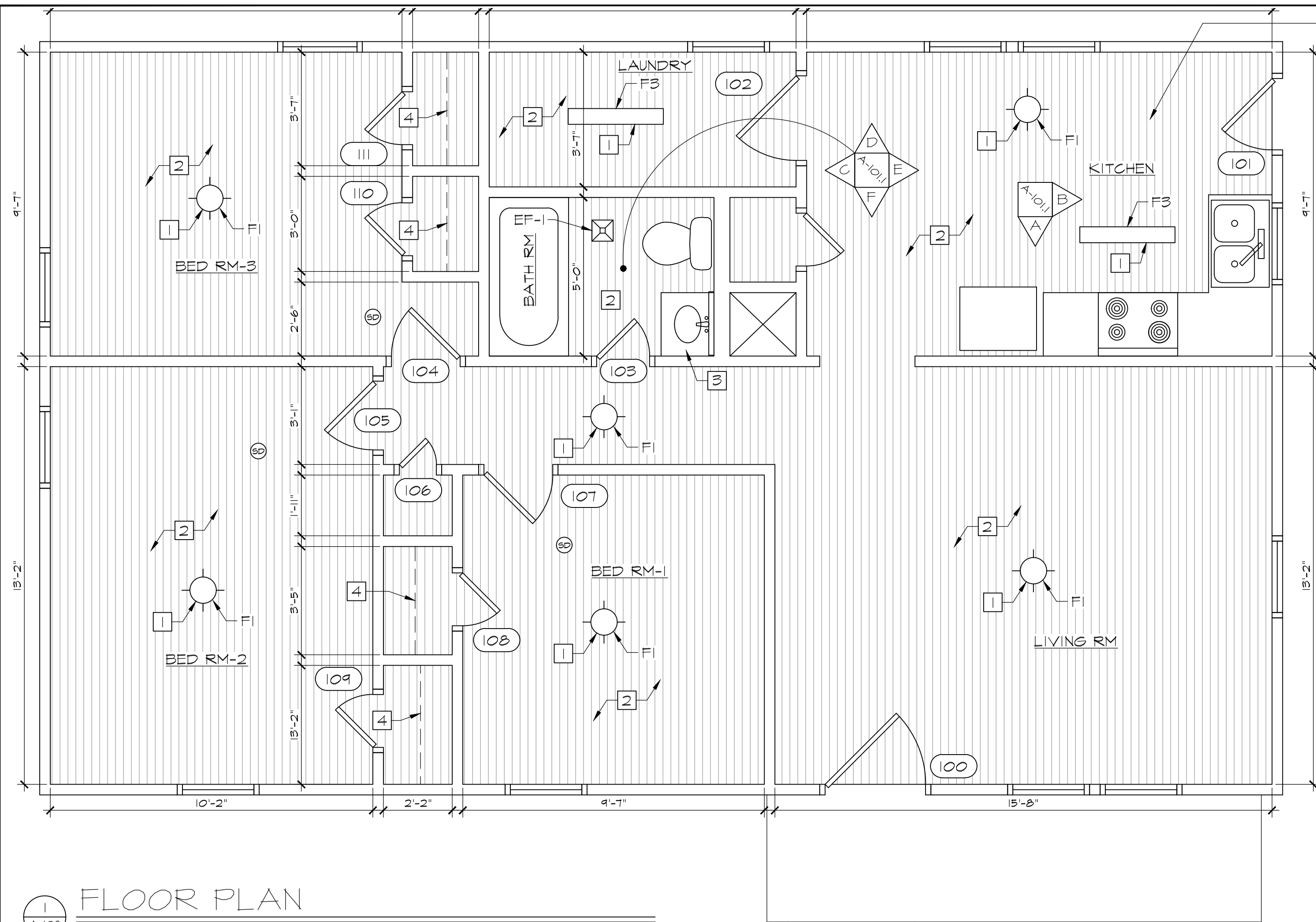
- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

KEYNOTES (THIS SHEET ONLY)

INTERIOR ELEVATIONS

- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.



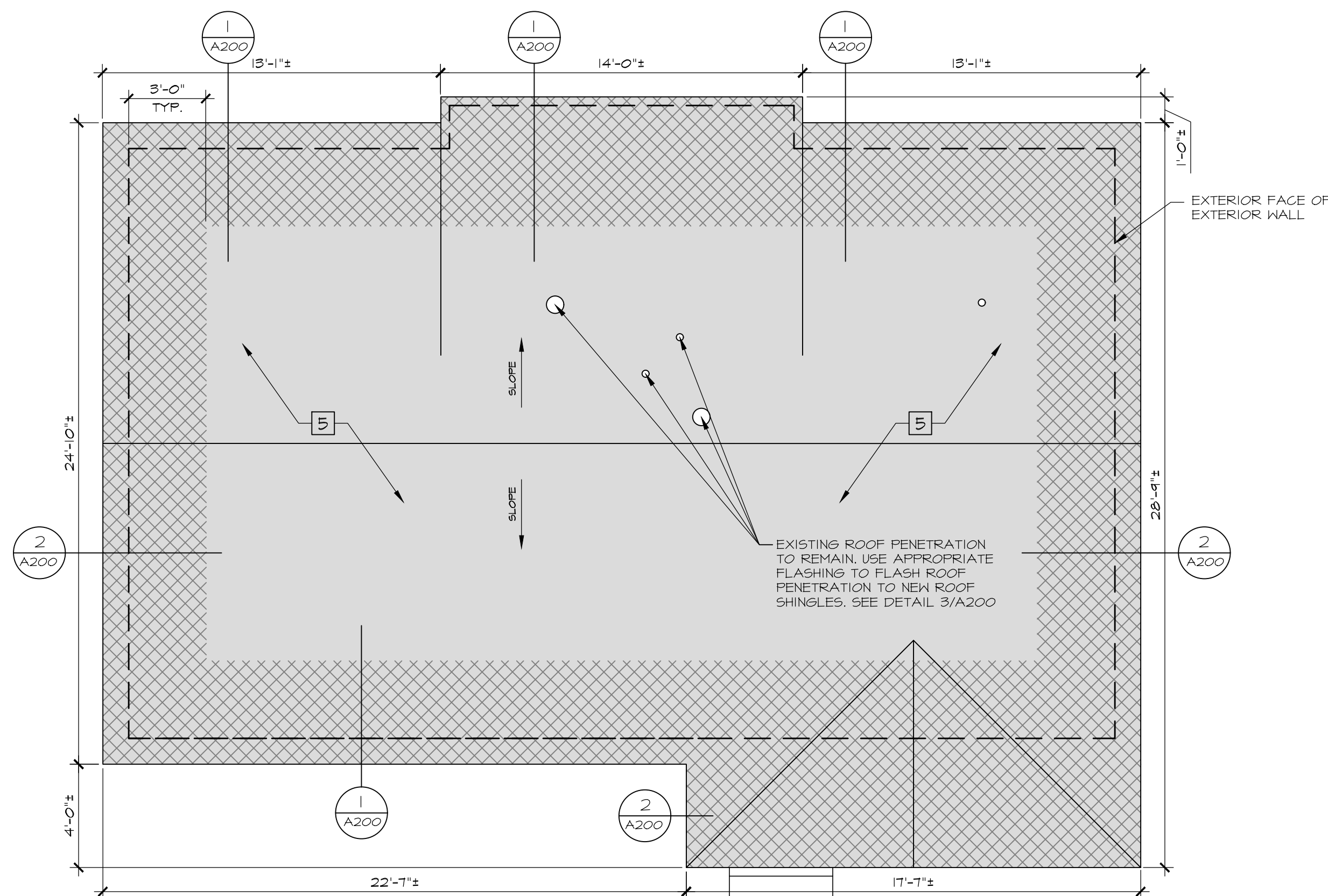


REMOVE EXISTING WOOD WALL PANELING IN THIS ROOM DOWN TO STUDS AND REPLACE WITH 1/2" THK. GYP BOARD. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.1.

\*CRAWL SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:  
 - 1 3/8" CELLULAR PVC DOOR WITH NEW DEADBOLT  
 - BRICK/MOULD  
 - STAINLESS STEEL HARDWARE  
 - 3/2" JAMB AND HEAD DEPTH  
 - OVERLAY CONFIGURATION  
 - SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 W: WWW.CURBAPPEALPRODUCTS.COM/CRAWL-SPACE-DOORS//  
 P: (919)846-8088

1 FLOOR PLAN  
 SCALE: 3/8" = 1'-0"



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

GENERAL NOTES (THIS SHEET ONLY)

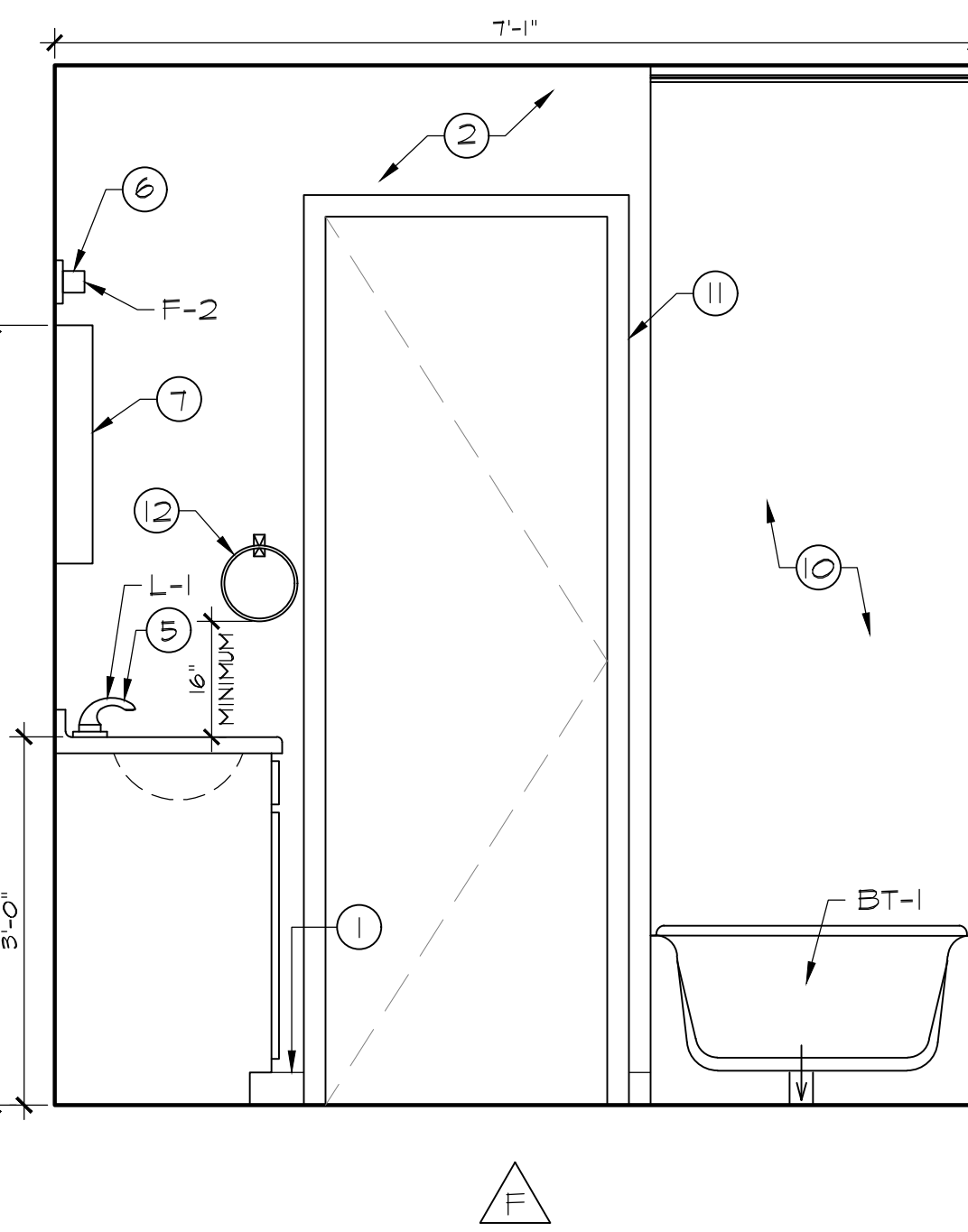
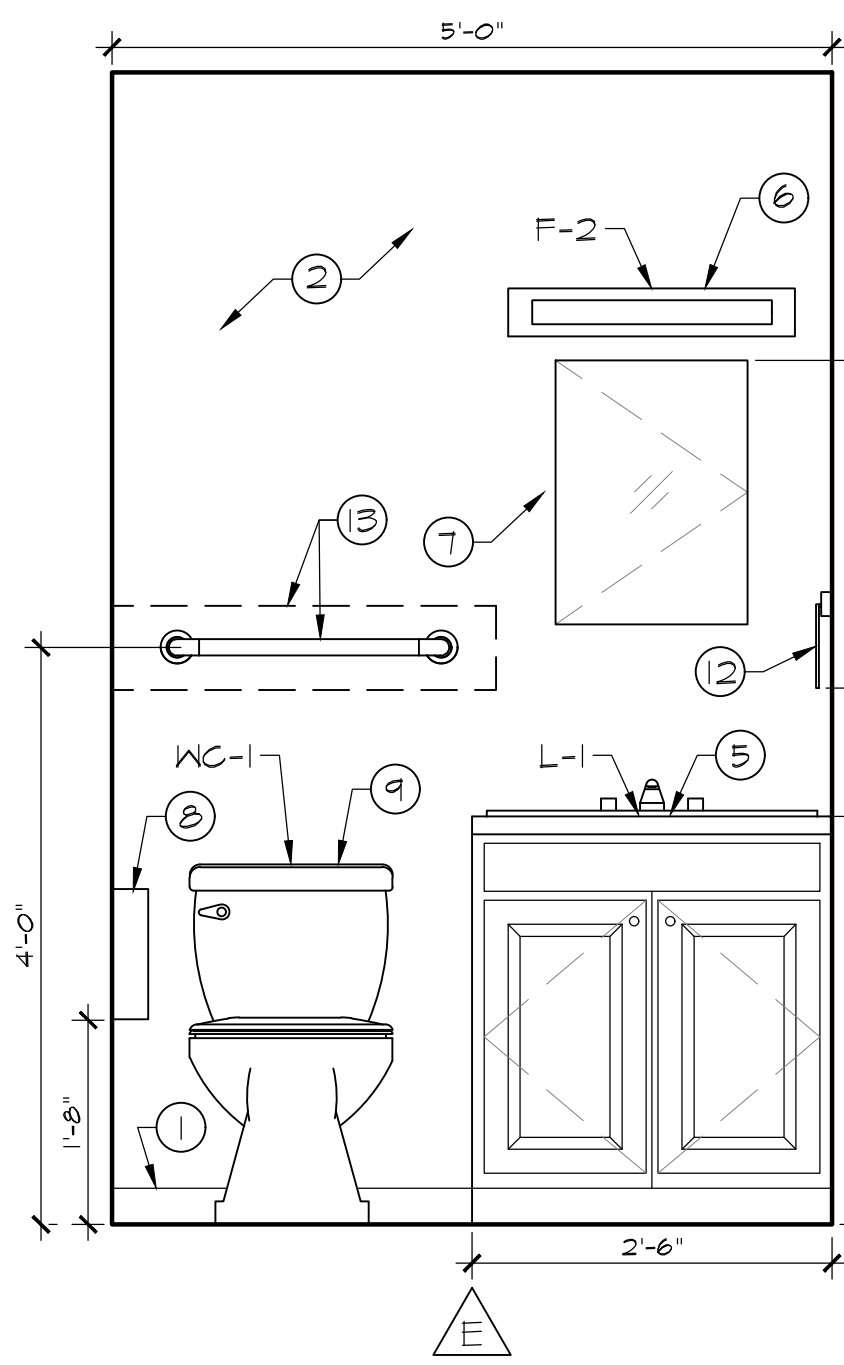
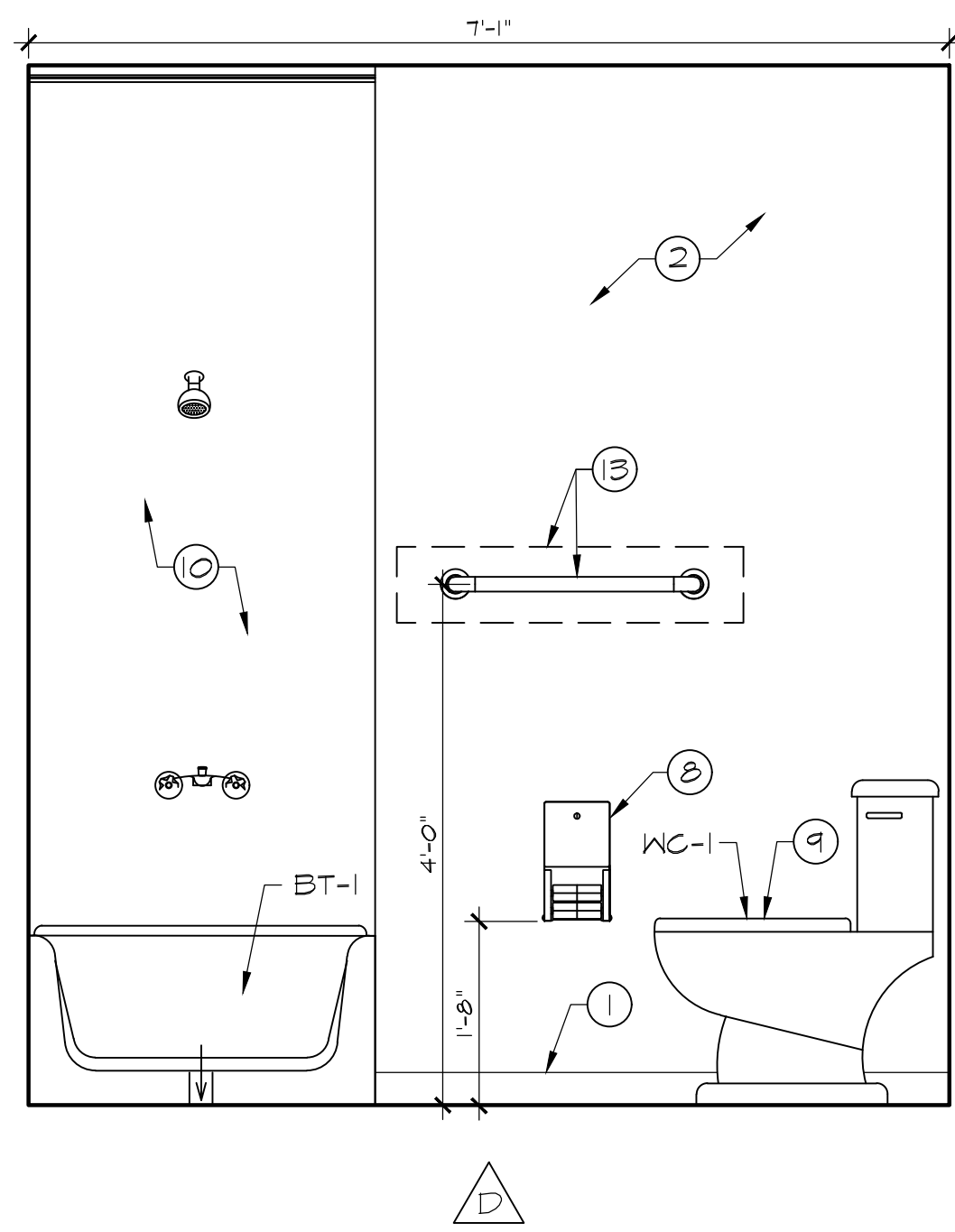
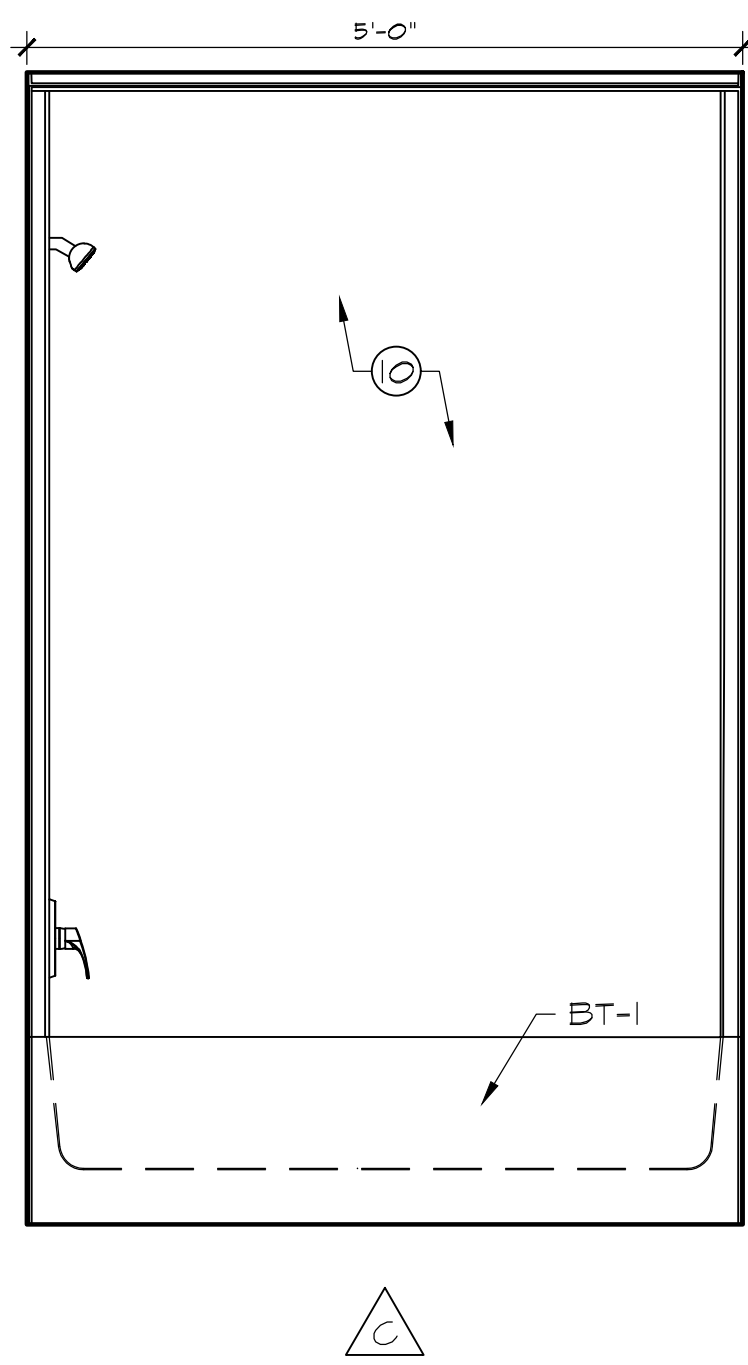
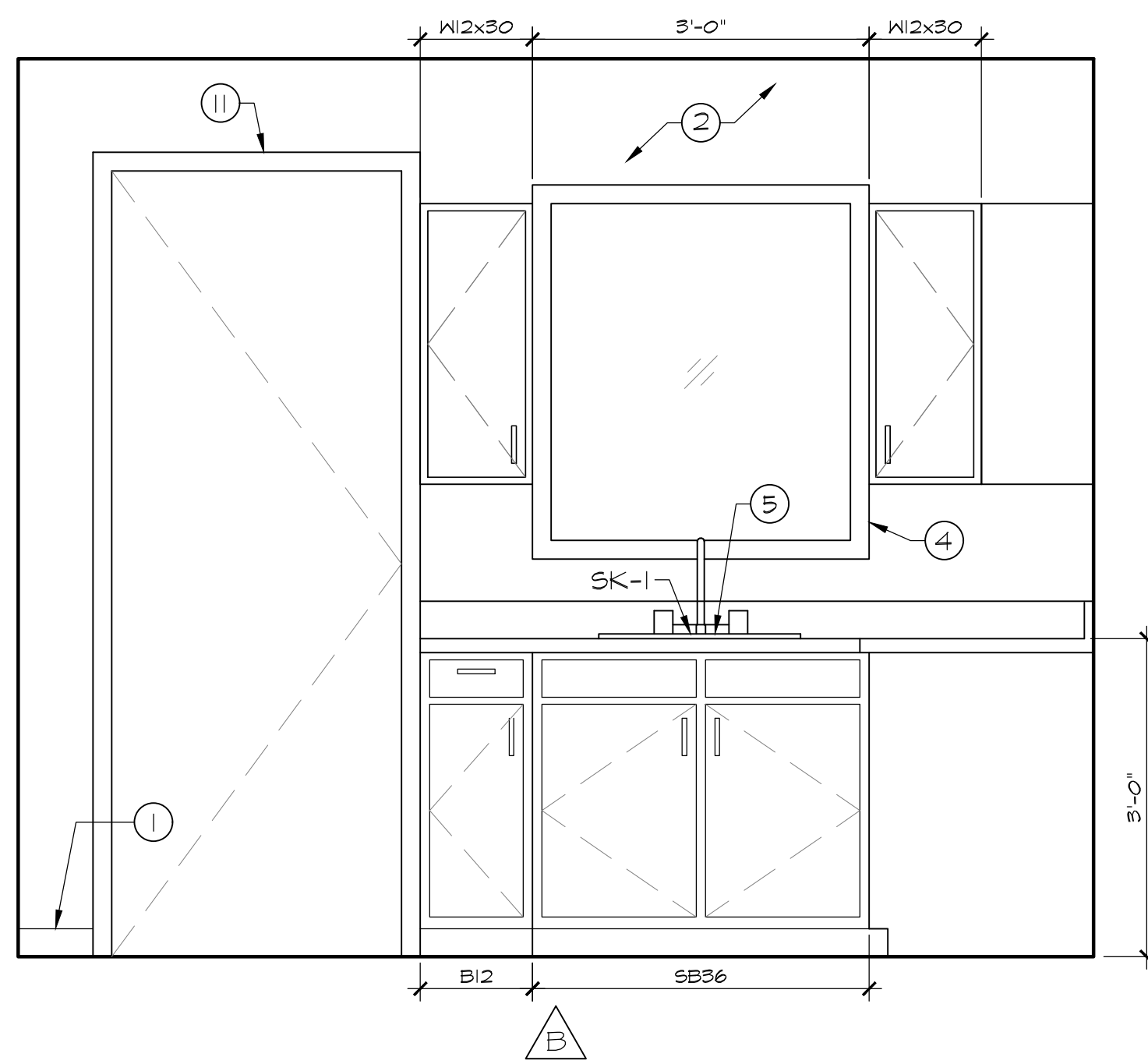
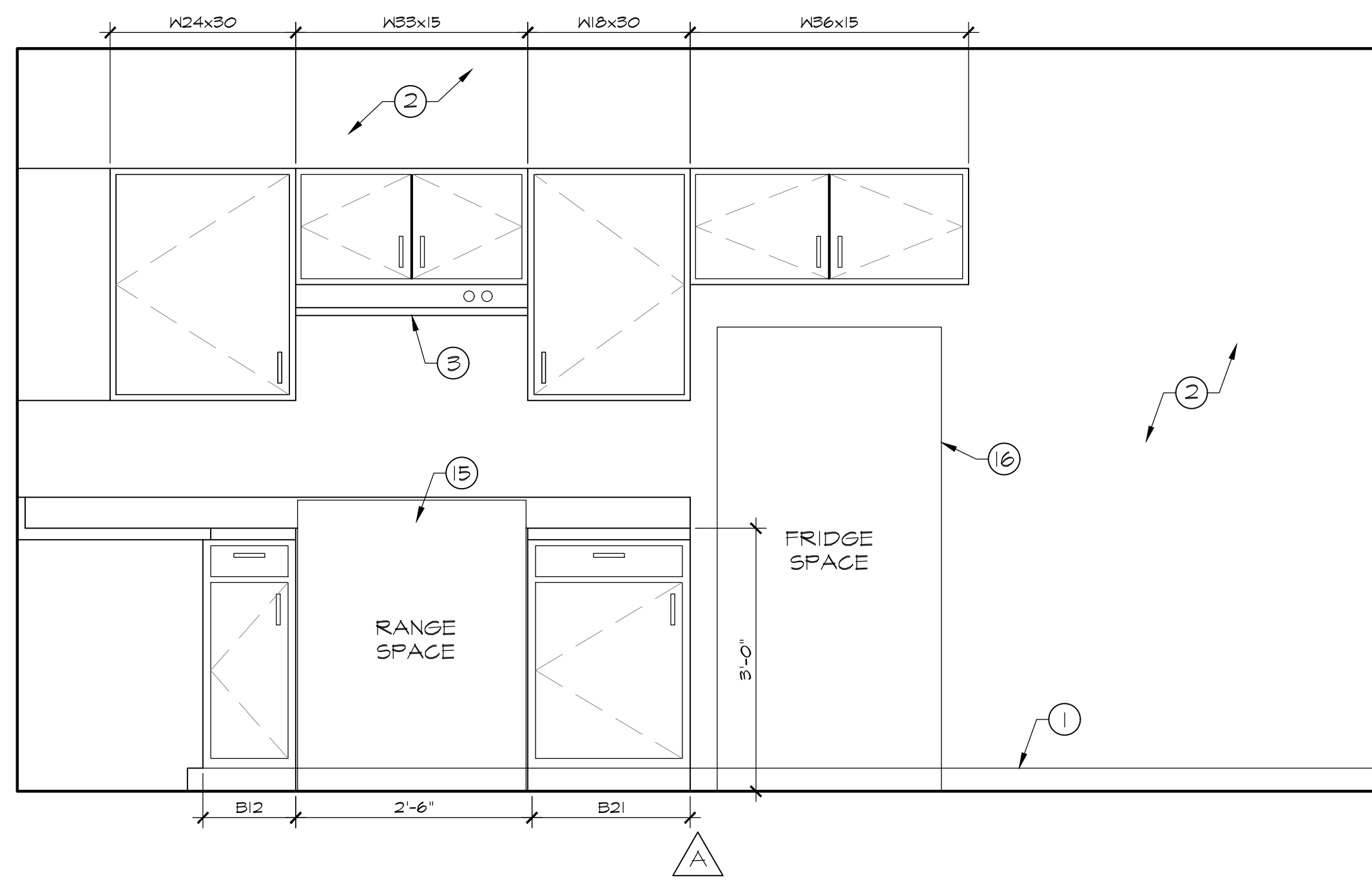
- SEE PROJECT GENERAL NOTES ON 6100.
- ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
- ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
- ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
- ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
- ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
- ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
- REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
- ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

KEYNOTES (THIS SHEET ONLY)

- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17



**GENERAL NOTES** (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

INTERIOR ELEVATIONS

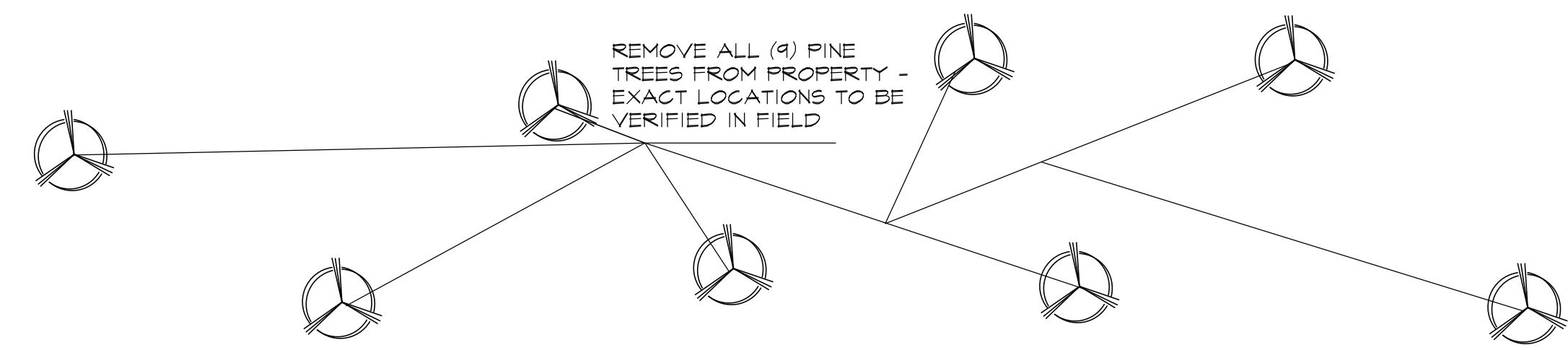
- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR OR MEDICINE CABINET WITH DOOR(S). REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

**INTERIOR ELEVATIONS**  
SCALE: 3/4" = 1'-0"

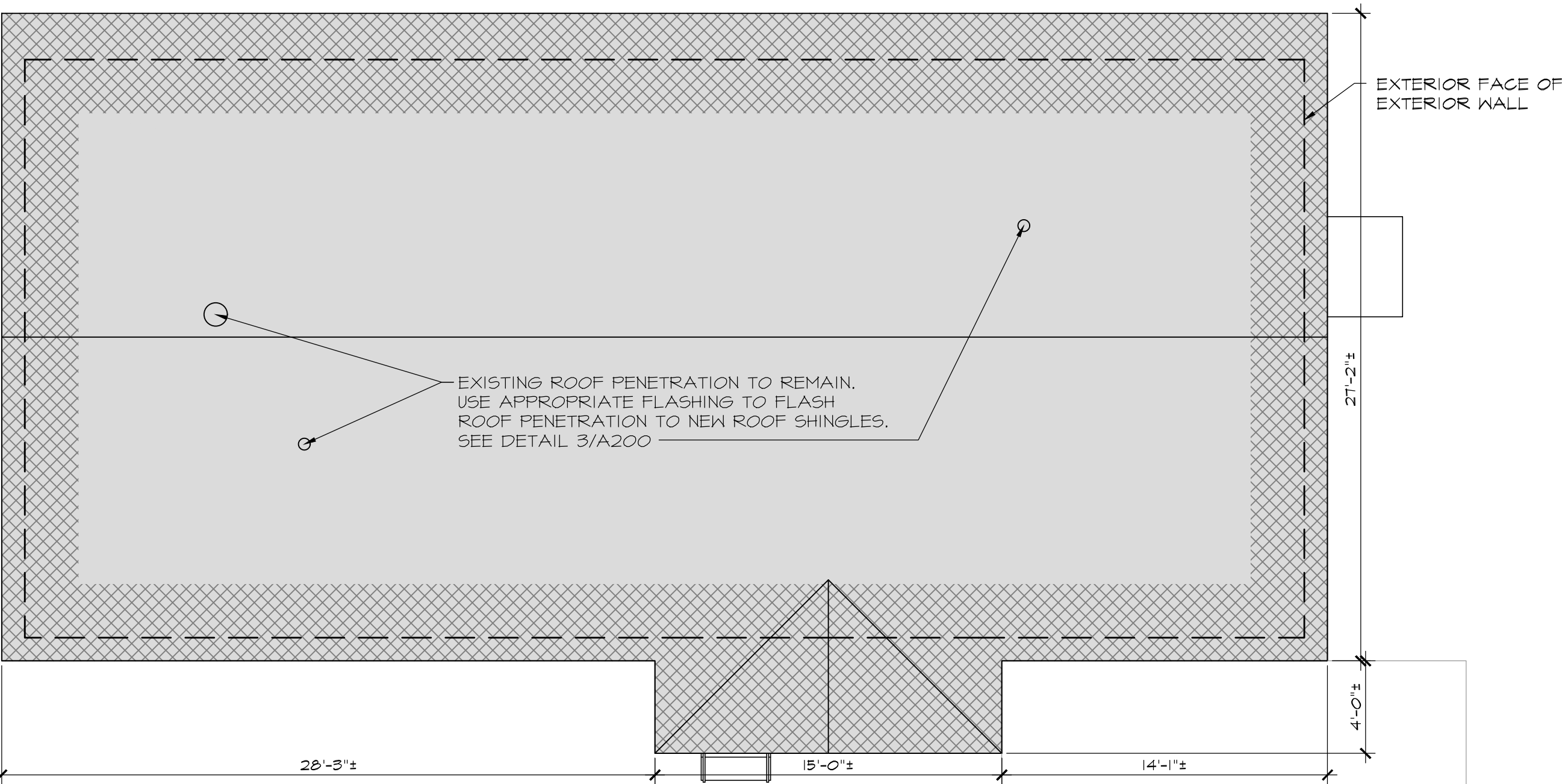
ARCHITECT	CONTRACTOR
OWNER	CONTRACTOR

COLUMBIA H.A. SCATTERED SITE REHAB	PROJECT
(ZONE 1)	DATE
4516 LEEDS ST. COLUMBIA, SC.	06-06-2023
20-12740	JMK
Project Number	Appr.

Rev. Date	
Sheet No.	A108.1



REMOVE ALL (8) PINE TREES FROM PROPERTY - EXACT LOCATIONS TO BE VERIFIED IN FIELD



EXISTING ROOF PENETRATION TO REMAIN. USE APPROPRIATE FLASHING TO FLASH ROOF PENETRATION TO NEW ROOF SHINGLES. SEE DETAIL 3/A200

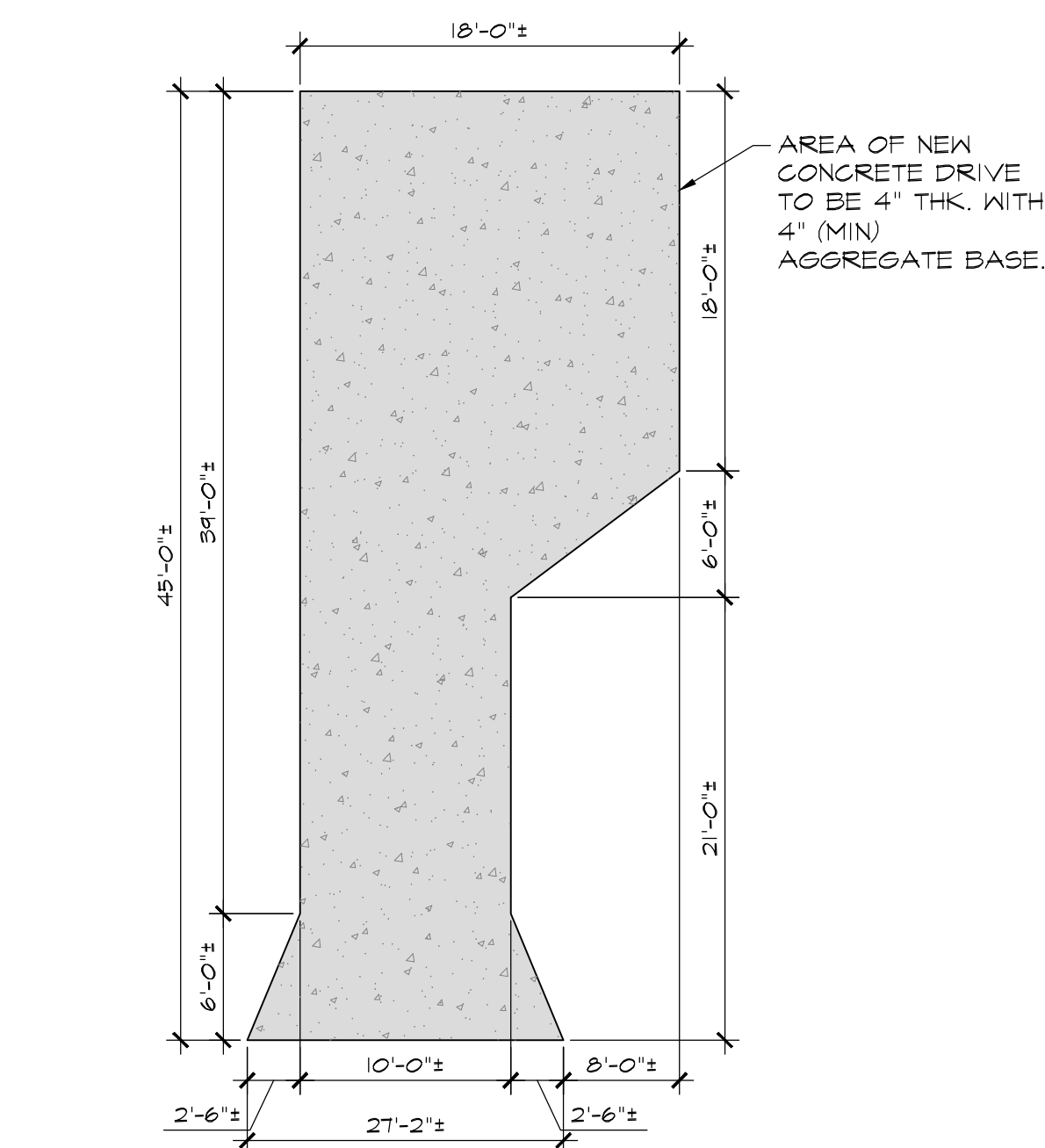
EXTERIOR FACE OF EXTERIOR WALL

EXISTING DRIVEWAY TO BE SAW-CUT, REMOVED AND REPLACED WITH NEW FURRED CONCRETE DRIVEWAY. SEE ENLARGED DRIVE PLAN 3/A109.

REMOVE ALL PINES ON PROPERTY. VERIFY LOCATION IN FIELD

1 SITE/ROOF PLAN

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



AREA OF NEW CONCRETE DRIVE TO BE 4" THK. WITH 4" (MIN) AGGREGATE BASE.

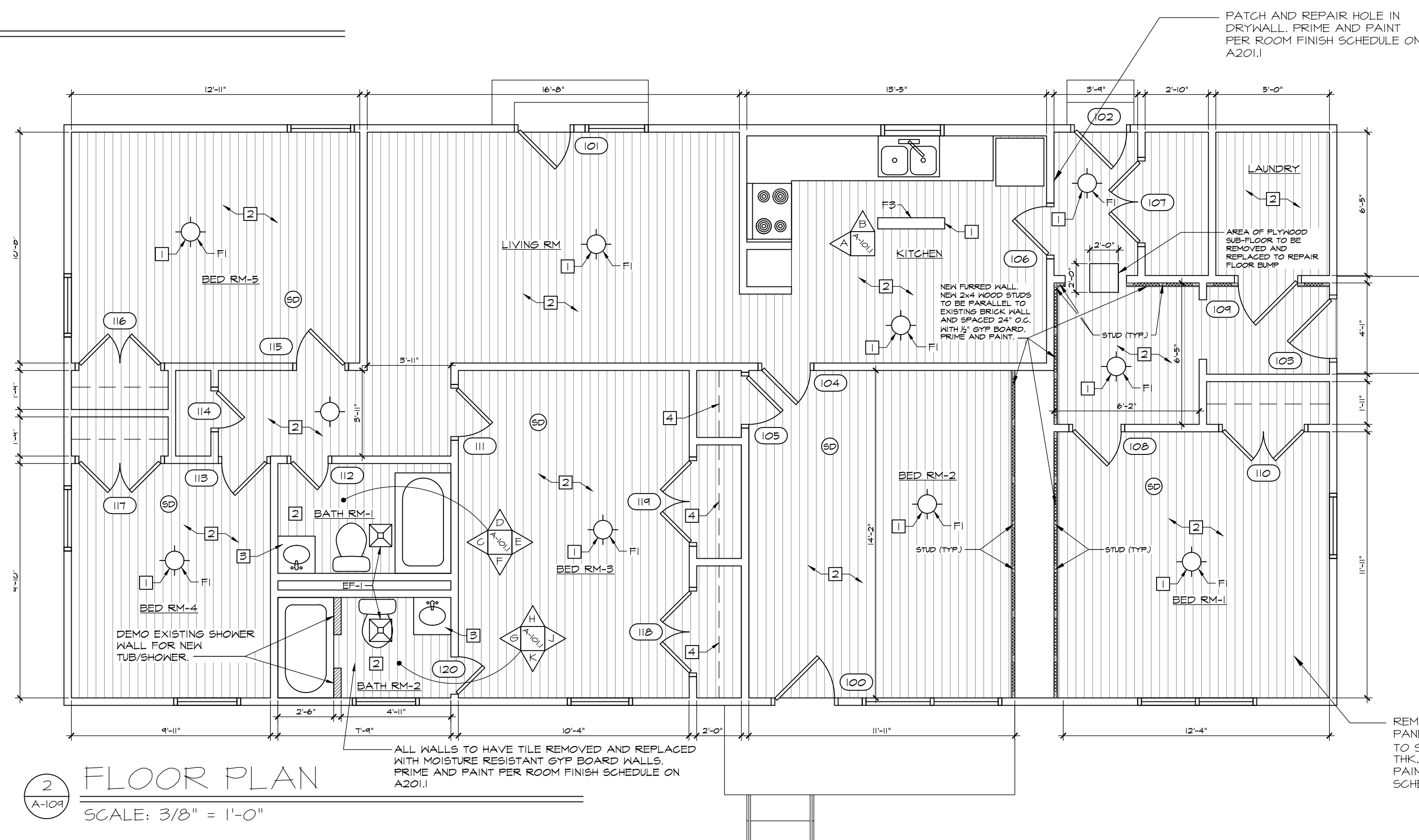
3 ENLARGED DRIVE PLAN

SCALE: 3/8" = 1'-0"

\*THIS PROPERTY HAS EIGHT (8) PINE TREES TO BE REMOVED. CONTRACTOR TO VERIFY EXACT LOCATIONS OF TREES ON SITE.

\*CRAWL-SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:  
 - 1 3/8" CELLULAR PVC DOOR WITH NEW DEADBOLT  
 - BRICKMOLD  
 - STAINLESS STEEL HARDWARE  
 - 3/8" JAMB AND HEAD DEPTH  
 - OVERLAY CONFIGURATION  
 - SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 W: (WWW.CURBAPPEALPRODUCTS.COM/CRAWL-SPACE-DOORS/)  
 P: (919)846-8088



2 FLOOR PLAN

SCALE: 3/8" = 1'-0"

ALL WALLS TO HAVE TILE REMOVED AND REPLACED WITH MOISTURE RESISTANT GYP BOARD WALLS. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.

REMOVE EXISTING WOOD HALL PANELING IN THIS ROOM DOWN TO STUDS AND REPLACE WITH 1/2" THK. GYP BOARD. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.

GENERAL NOTES

(THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING GYP BOARD WALLS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1. ANY EXISTING WOOD PANEL WALLS (SEE ROOM FINISH SCHEDULE ON A201.1) WITHIN UNIT ARE TO BE REMOVED AND REPLACED WITH GYP BOARD WALLS, PRIMED AND PAINTED. ANY EXISTING INTERIOR BRICK WALLS TO BE FURRED WITH 2x4 STUDS AND GYP BD.
- ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
- ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
- ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
- ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
- ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
- REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
- ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

KEYNOTES

(THIS SHEET ONLY)

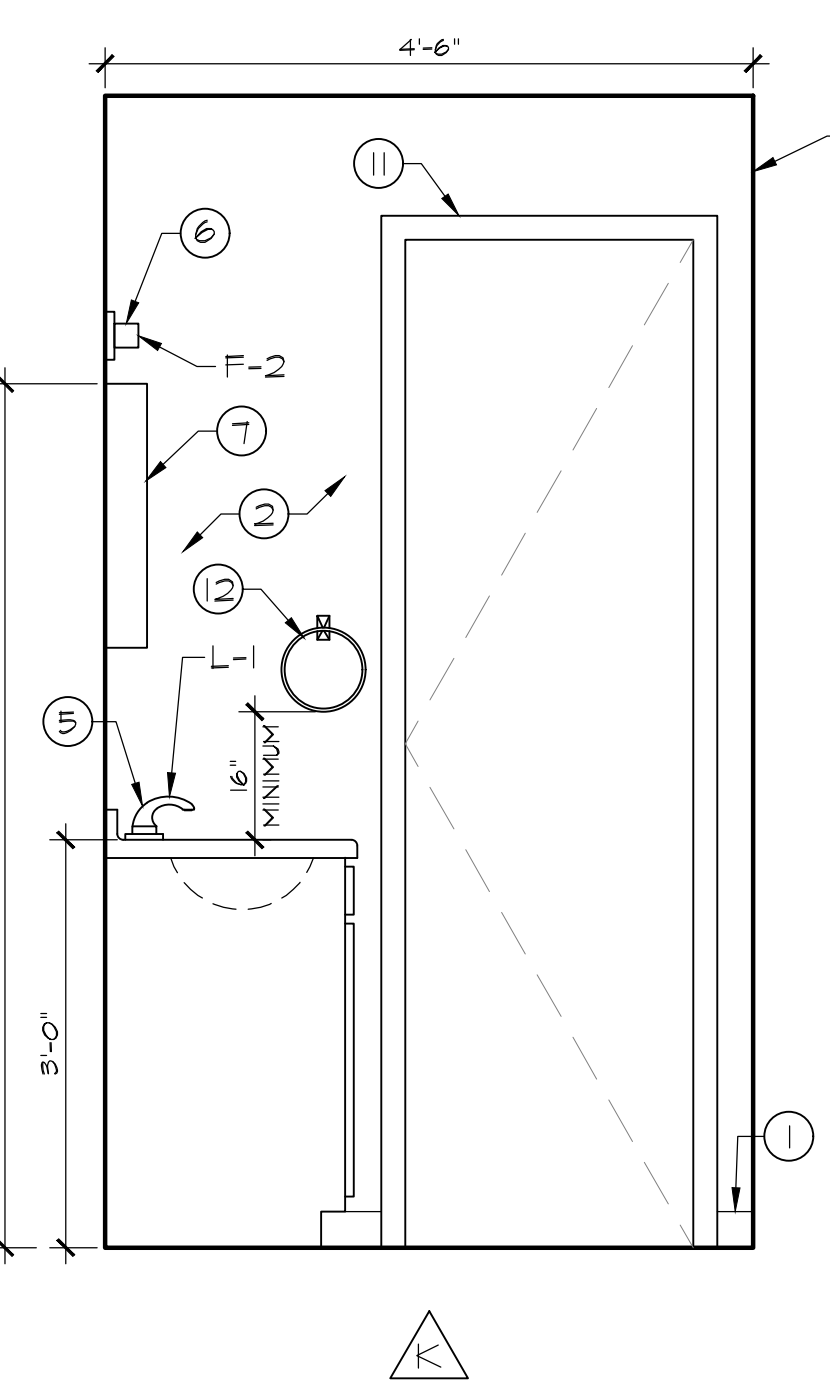
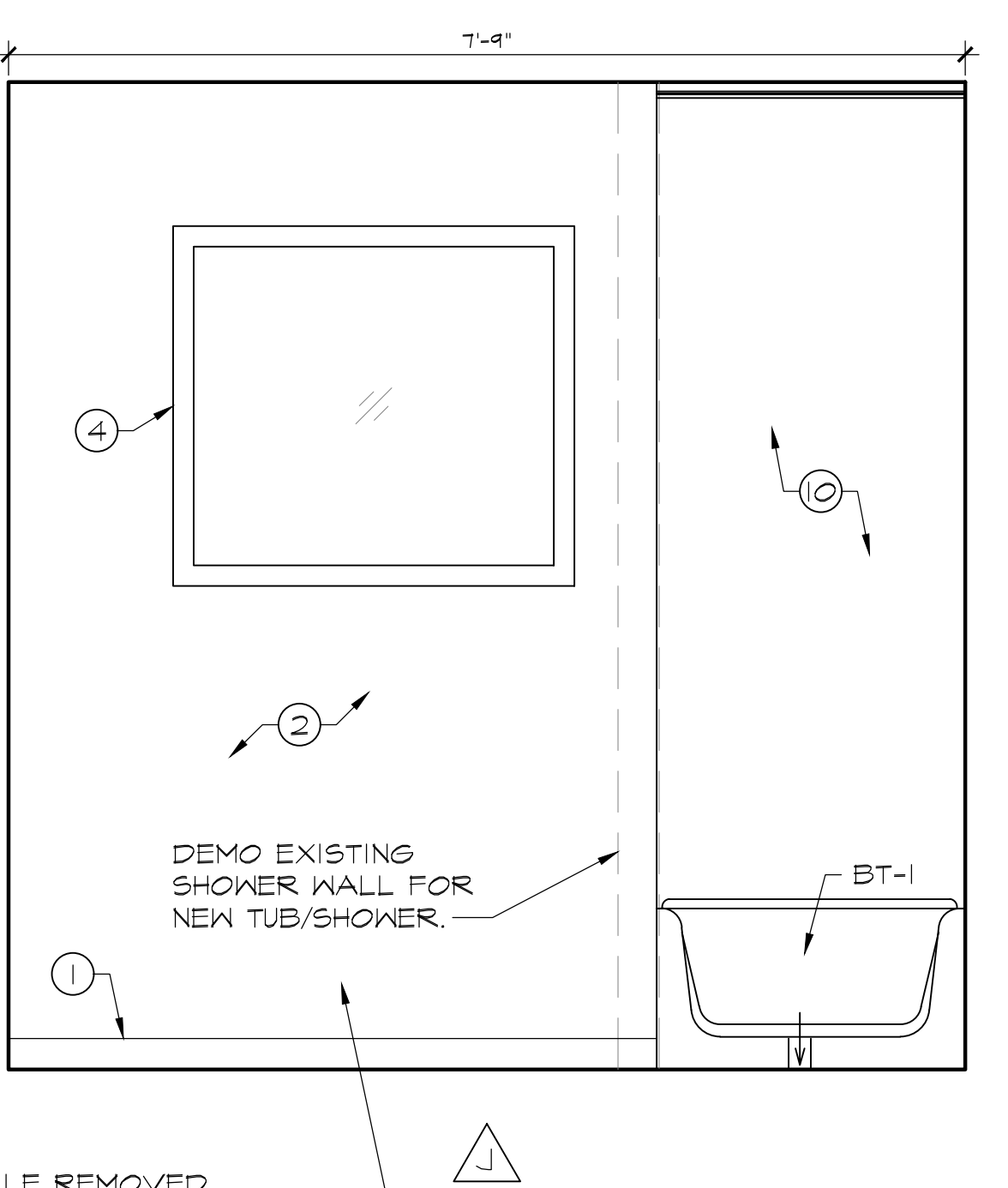
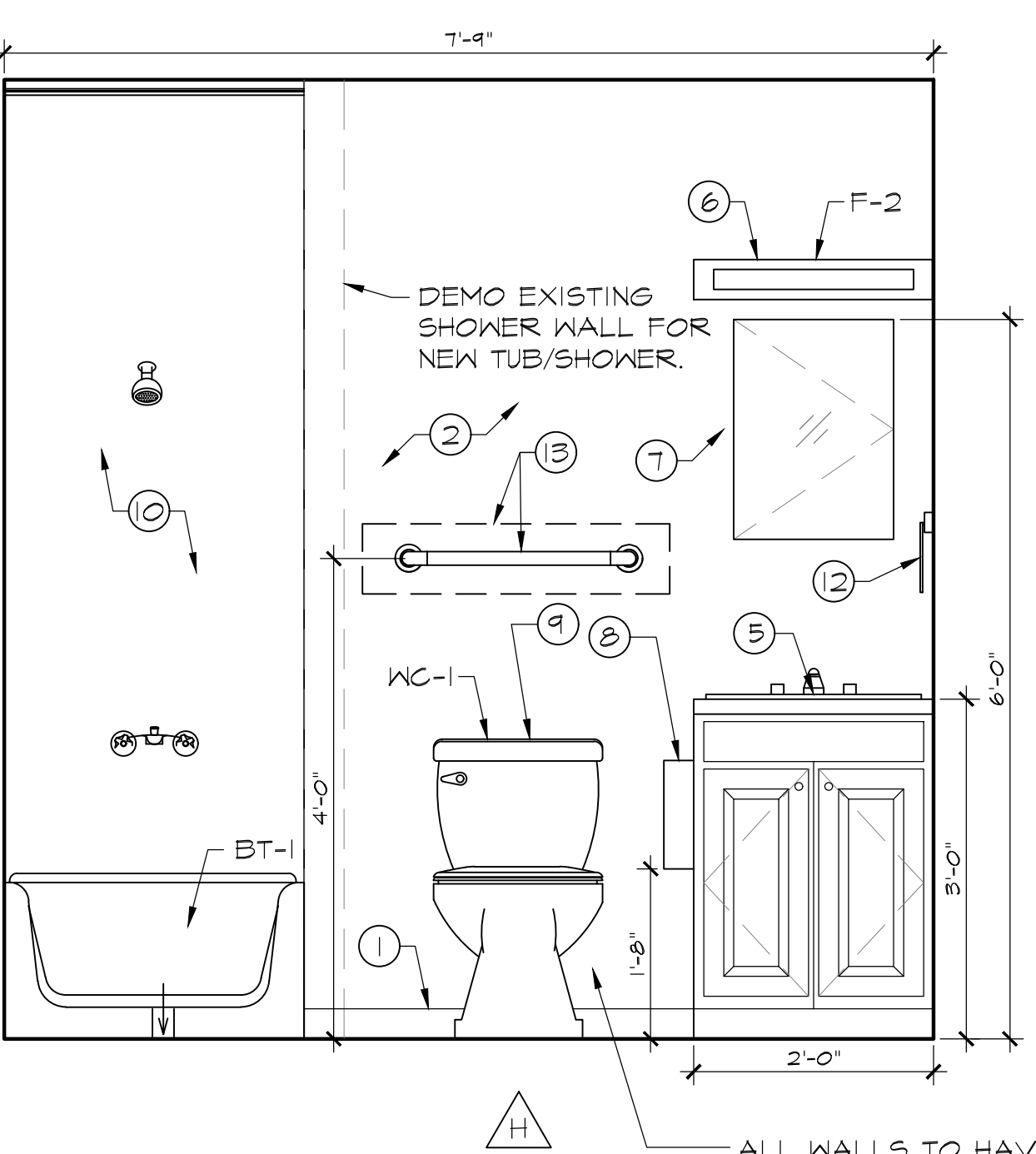
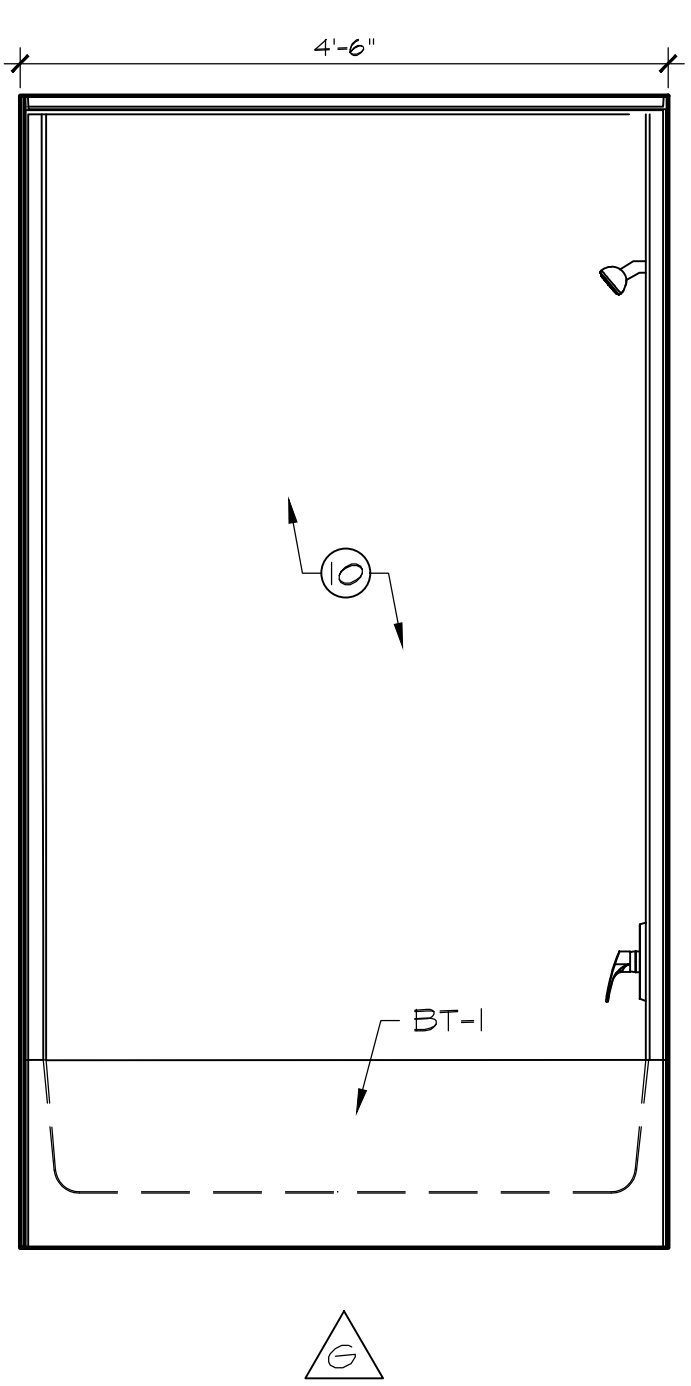
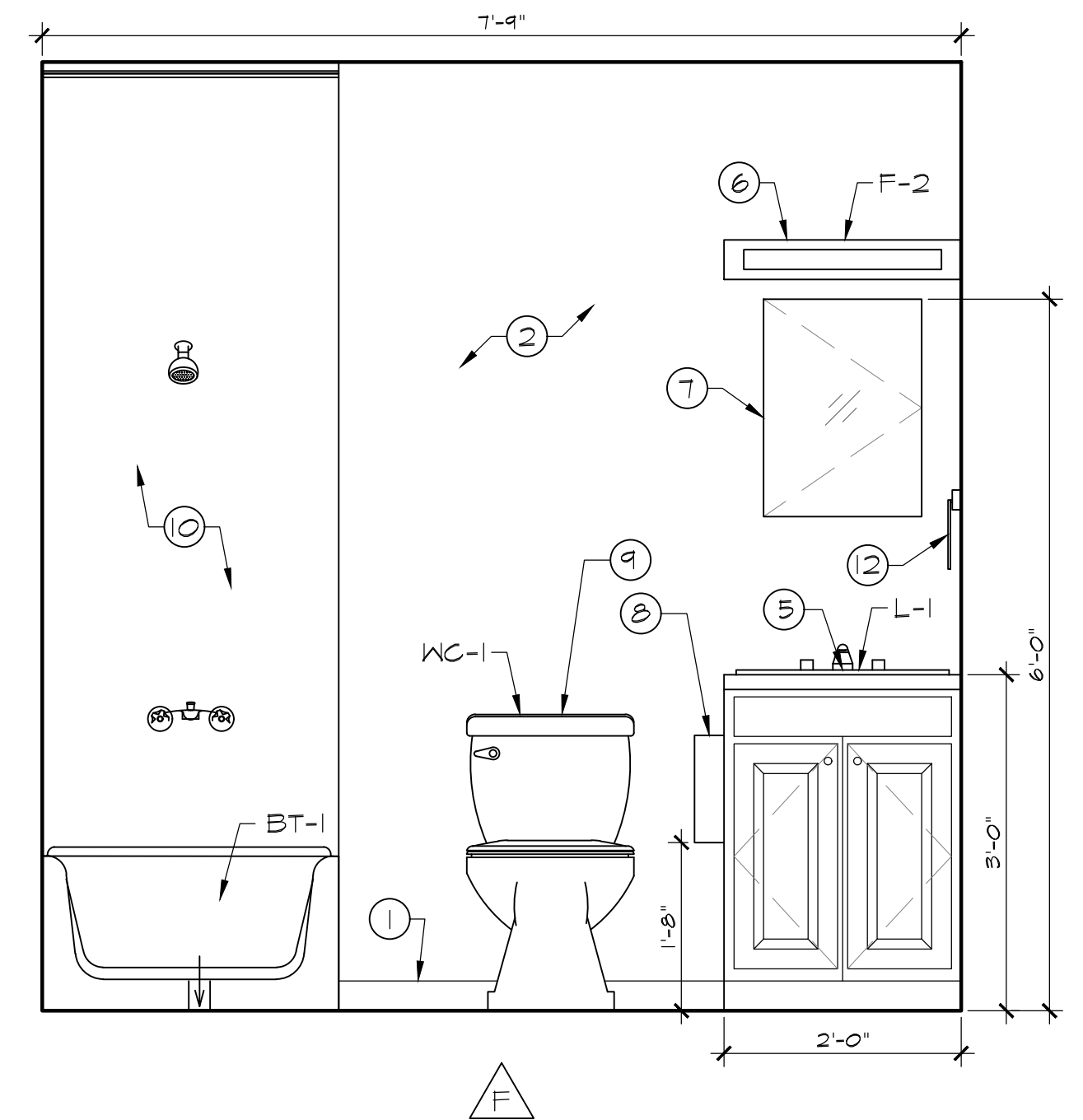
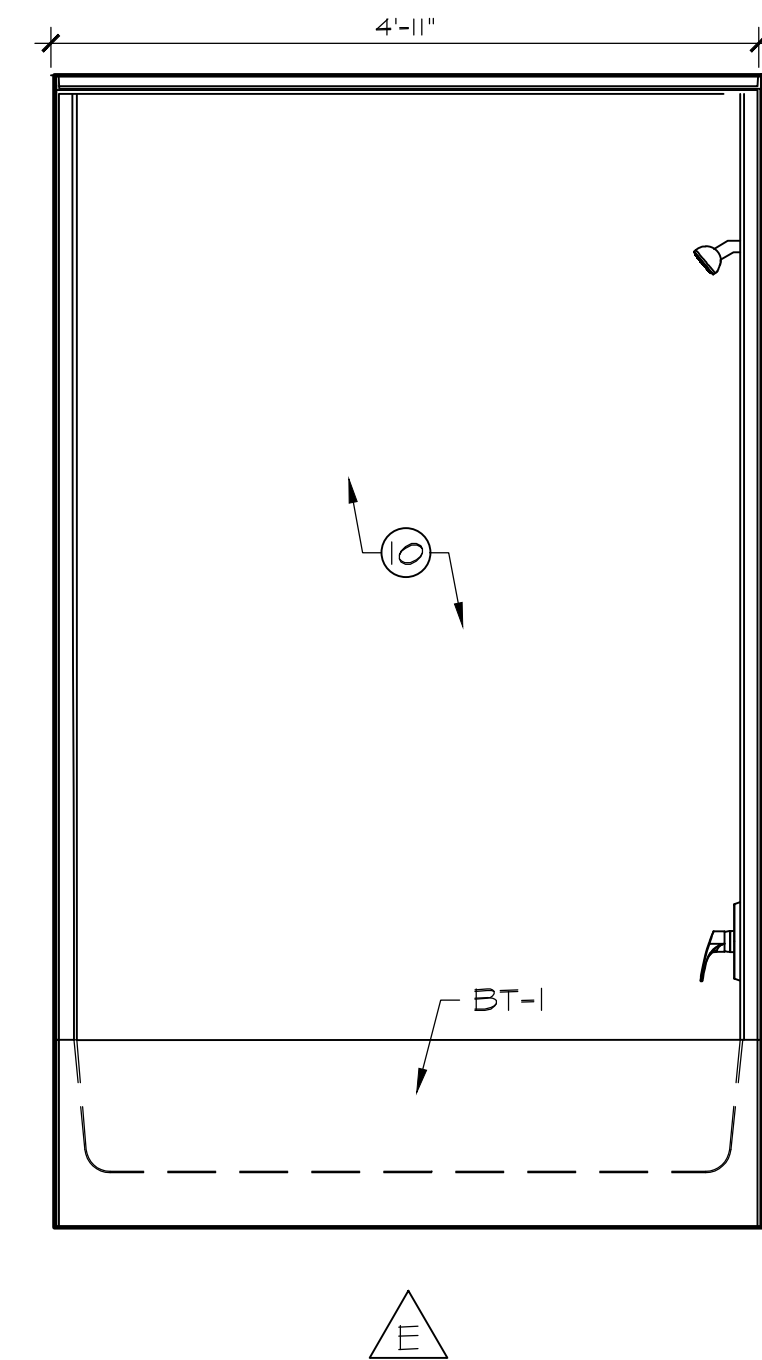
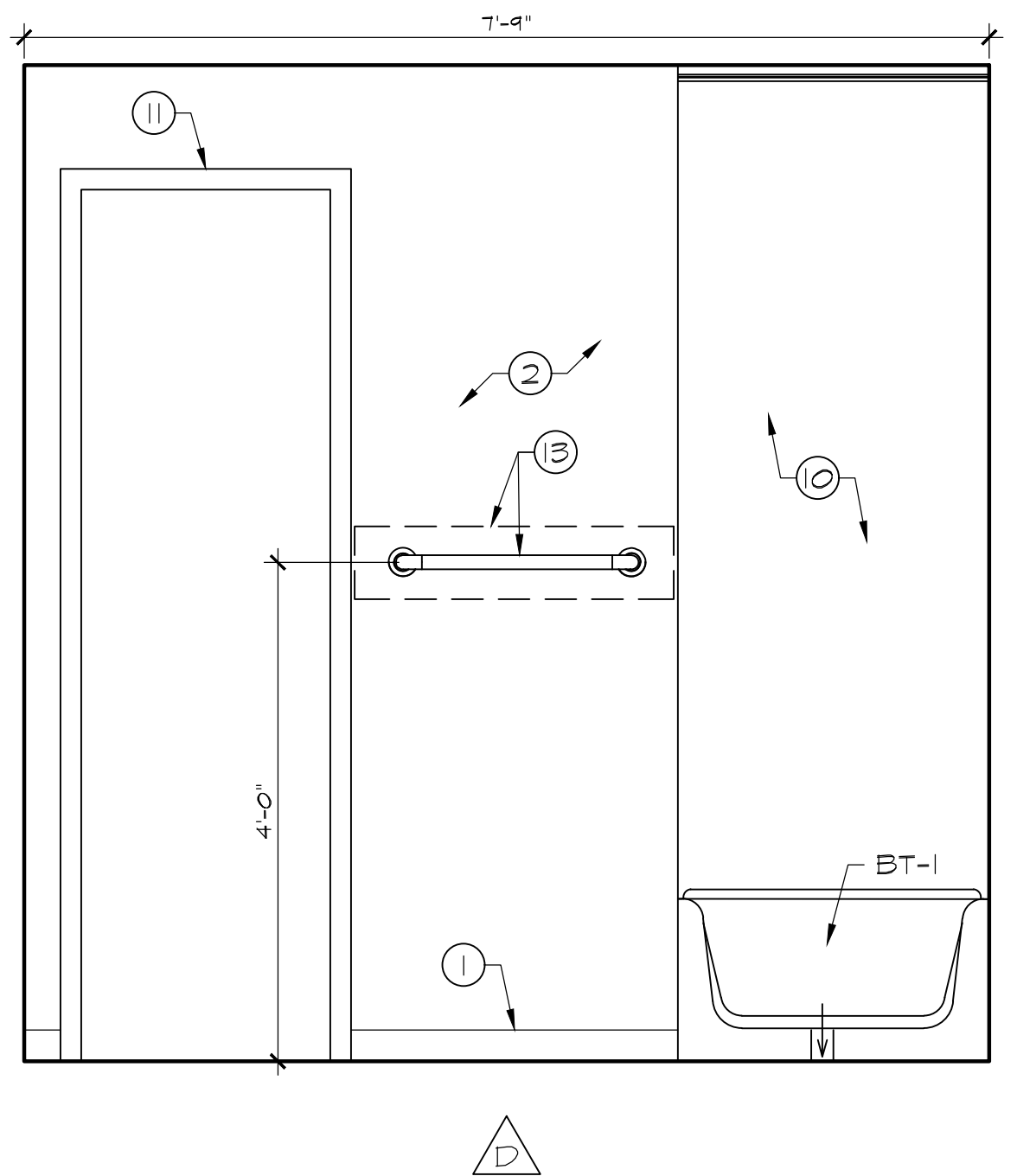
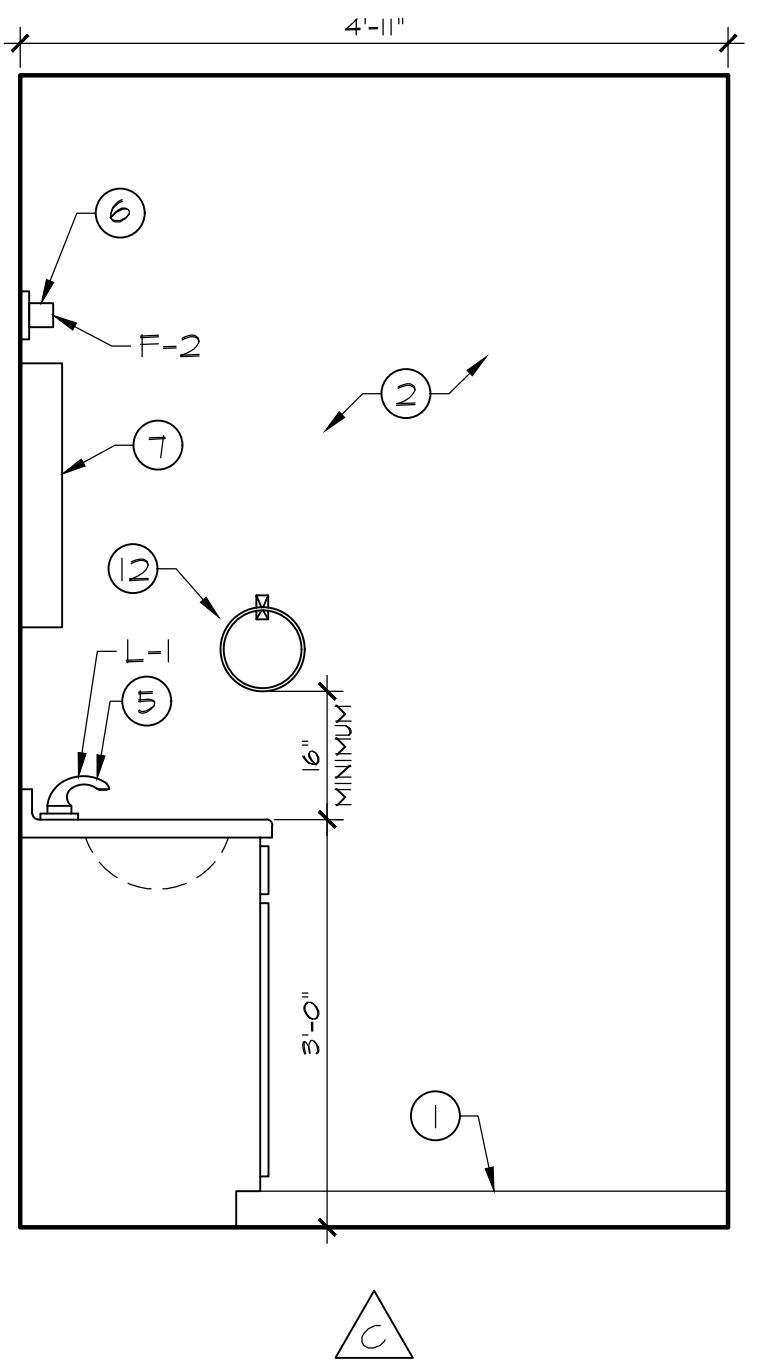
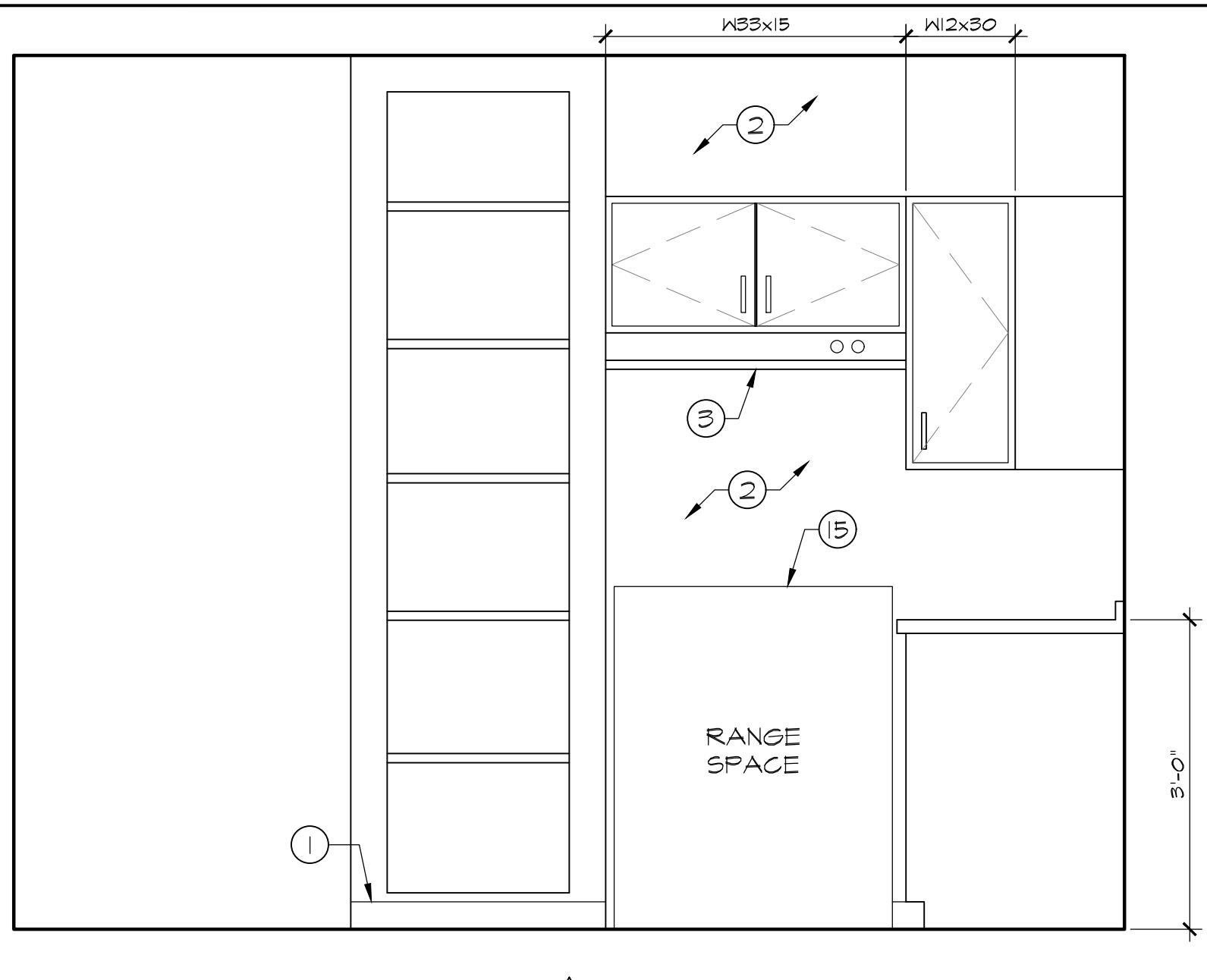
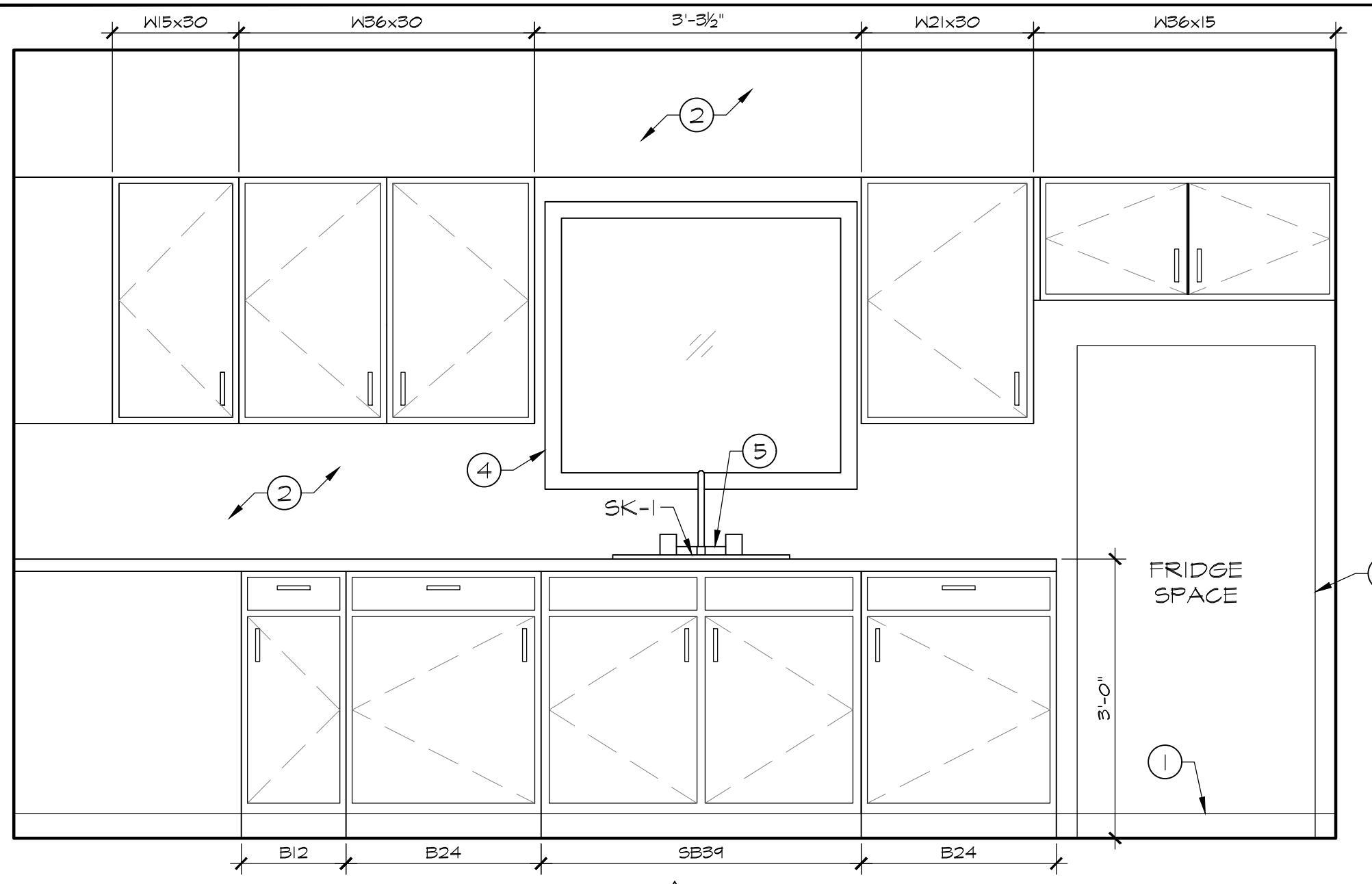
FLOOR PLAN:

- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
- SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
- REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17





**GENERAL NOTES** (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

**KEYNOTES** (THIS SHEET ONLY)

- INTERIOR ELEVATIONS
- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
  - PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
  - REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
  - EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
  - REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR. REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
  - NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
  - REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
  - EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
  - NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
  - NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
  - NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
  - RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
  - FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.

ALL WALLS TO HAVE TILE REMOVED AND REPLACED WITH MOISTURE RESISTANT GYP BOARD WALLS. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.1

**INTERIOR ELEVATIONS**  
SCALE: 3/4" = 1'-0"

ALL WALLS TO HAVE TILE REMOVED AND REPLACED WITH MOISTURE RESISTANT GYP BOARD WALLS. PRIME AND PAINT PER ROOM FINISH SCHEDULE ON A201.1

**1919 Architects**  
4000 Mosside Drive  
Rockford, IL 61107  
(815) 223-8222  
www.1919architects.com

**INTERIOR ELEVATIONS**

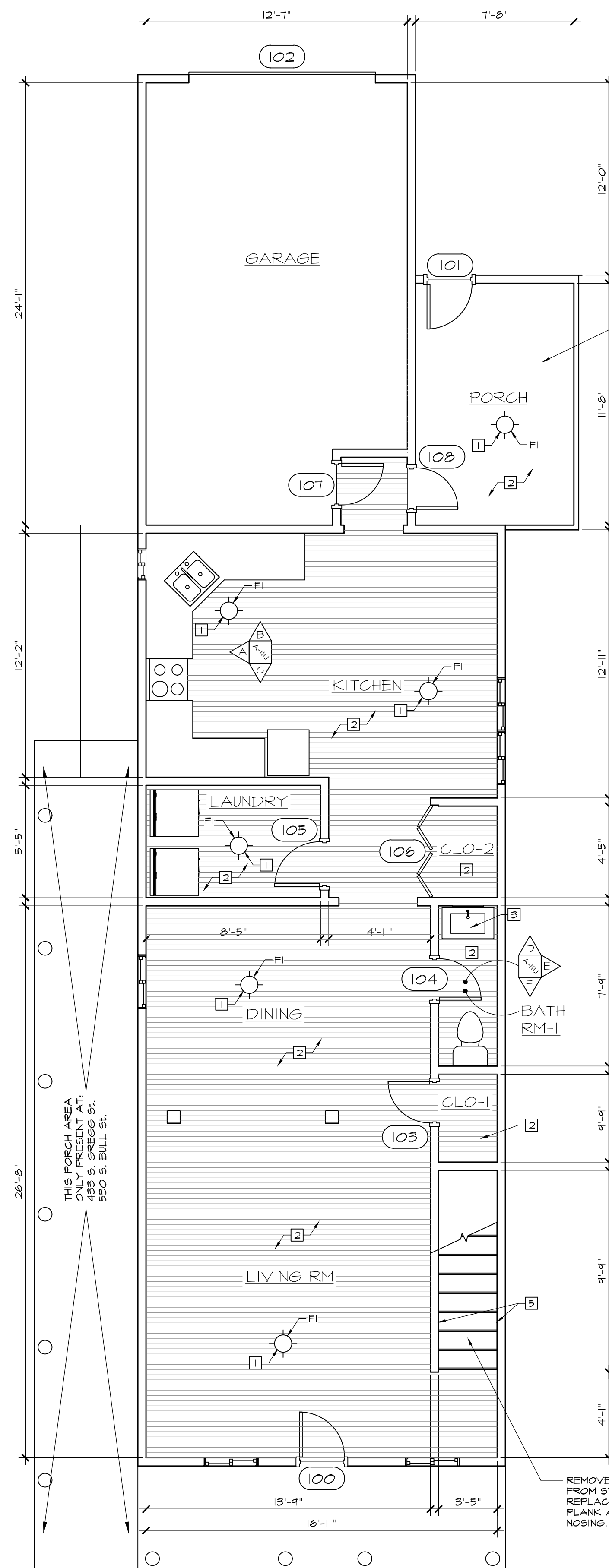
COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)  
4817 FAULKLAND RD., COLUMBIA, SC.  
20-12740  
Project Number

Rev. Date  
Date  
06-06-2023  
Date

ARCHITECT  
OWNER  
CONTRACTOR  
BIDDING CO.

JMK  
App'd

Sheet No.  
A109.1



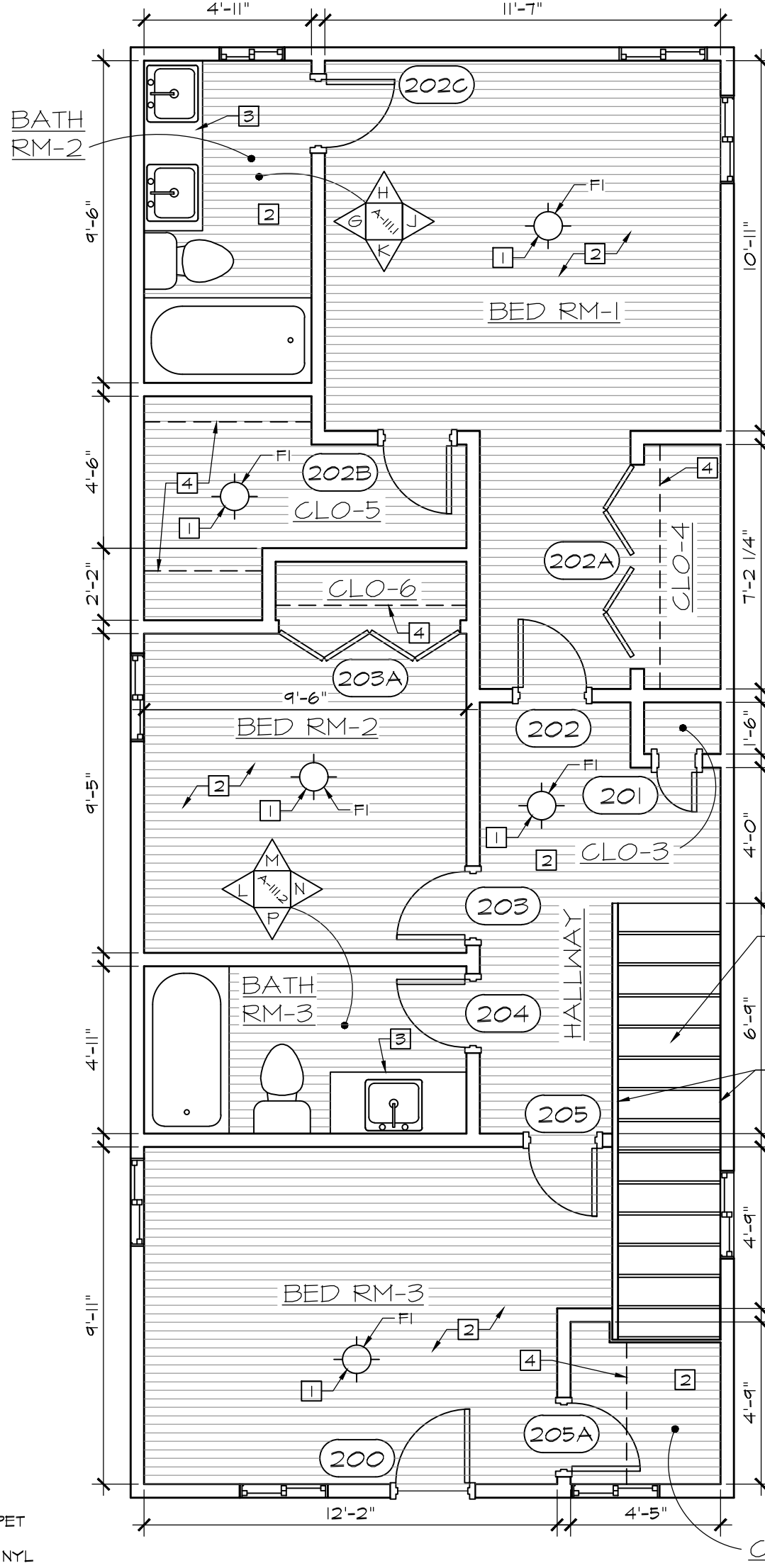
\*(AT ALL ROSEWOOD SITES) CRAWL SPACE DOOR TO BE LOCATED AND REMOVED AND REPLACED WITH THE FOLLOWING:

- 1 3/8" CELLULAR PVC DOOR WITH NEW DEADBOLT
- BRICKMOLD
- STAINLESS STEEL HARDWARE
- 3/8" JAMB AND HEAD DEPTH
- OVERLAY CONFIGURATION
- SIZE TO BE FIELD VERIFIED

AS MANUFACTURED BY CURB APPEAL PRODUCTS  
 W. (WWW.CURBAPPEALPRODUCTS.COM/CRAWL-SPACE-DOORS/)  
 P. (914)846-8088

\*(7) PROPERTIES TO RECEIVE WORK WITH THIS LAYOUT INCLUDE:  
 108 ROSEWOOD HILLS DR.  
 136 ROSEWOOD HILLS DR.  
 164 ROSEWOOD HILLS DR.  
 168 ROSEWOOD HILLS DR.  
 176 ROSEWOOD HILLS DR.  
 433 S. GREGG ST. (SIMILAR)  
 530 S. BULL ST. (SIMILAR)

VENTED SOFFIT CEILING IN THIS ROOM (SCREENED IN PORCH) TO BE RE-MOUNTED TO CEILING AT 168 ROSEWOOD HILLS DR. ONLY

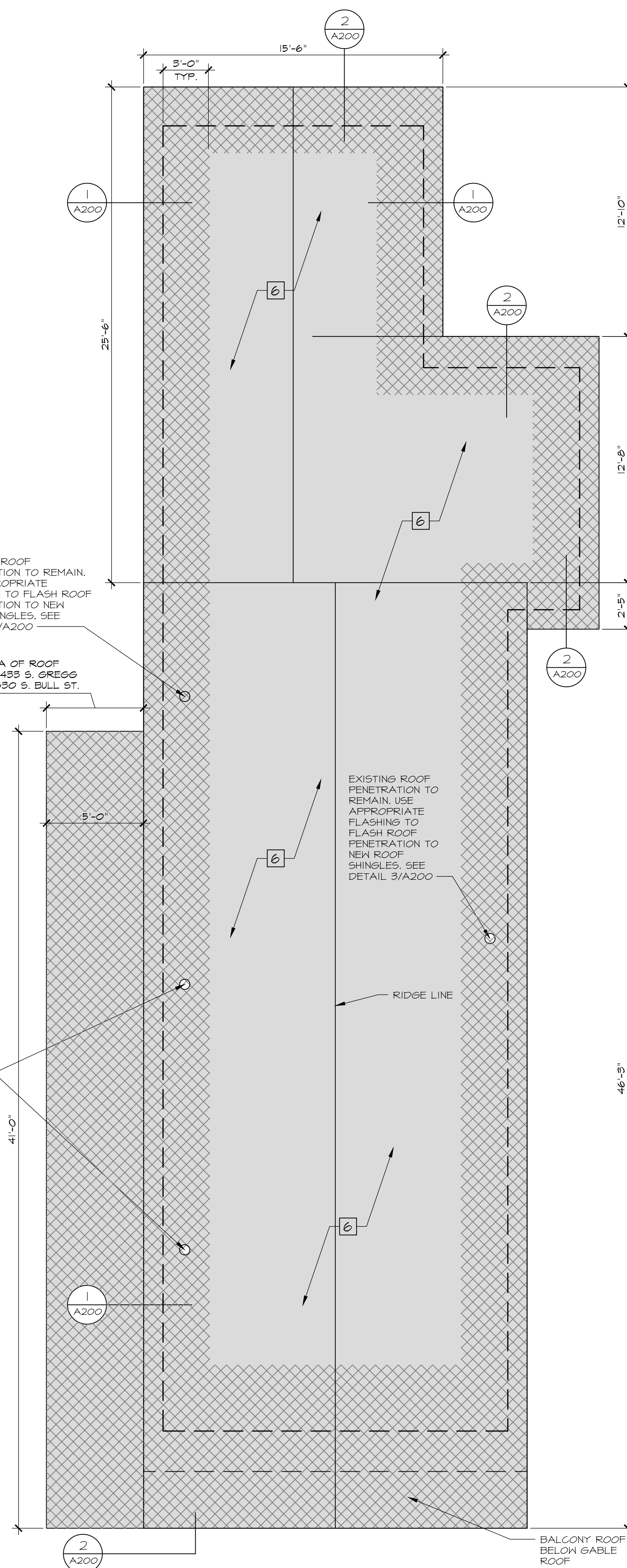


EXISTING ROOF PENETRATION TO REMAIN. USE APPROPRIATE FLASHING TO FLASH ROOF PENETRATION TO NEW ROOF SHINGLES. SEE DETAIL 3/A200

THIS AREA OF ROOF ONLY AT 433 S. GREGG ST. AND 530 S. BULL ST.

EXISTING ROOF PENETRATION TO REMAIN. USE APPROPRIATE FLASHING TO FLASH ROOF PENETRATION TO NEW ROOF SHINGLES. SEE DETAIL 3/A200

REMOVE EXISTING CARPET FROM STAIRS AND REPLACE WITH WOOD VINYL PLANK AND NEW VINYL NOSING. PAINT RISERS WHITE



REMOVE EXISTING CARPET FROM STAIRS AND REPLACE WITH WOOD VINYL PLANK AND NEW VINYL NOSING. PAINT RISERS WHITE

BALCONY ROOF BELOW GABLE ROOF

GENERAL NOTES (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL PINE TREES ON PROPERTY (IF PRESENT) ARE TO BE REMOVED IN THEIR ENTIRETY. AREA OF DISTURBED LAWN SHALL BE REPAIRED BY FINE GRADING, SEED AND STRAW AS NECESSARY.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM (U.N.O.) TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER ROOM FINISH SCHEDULE ON A201.1.
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- ALL GYP. BOARD CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. PATCH AND REPAIR ANY GYP BOARD CEILING AS NECESSARY FOR EVEN FINISHES. EXISTING GYP. CEILINGS ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILING AND WALL LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.
- ALL CASEWORK IN KITCHEN(S) TO BE REMOVED AND REPLACED INCLUDING COUNTERTOPS, WALL CABINETS AND BASE CABINETS.
- ALL VANITY BASES IN UNIT BATHROOM(S) TO BE REMOVED AND REPLACED PER UNIT INTERIOR ELEVATIONS.
- ALL BATHROOM VANITY MIRRORS OR MEDICINE CABINETS ARE TO BE REMOVED AND REPLACED WITH A NEW MIRROR. SEE INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL UNIT BATHTUBS AND SHOWER SURROUNDS (IF PRESENT) ARE TO BE REMOVED AND REPLACED WITH NEW CAST IRON TUB WITH NEW SURROUND. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT.
- ALL WATER CLOSETS IN UNIT BATHROOM(S) ARE TO BE REMOVED AND REPLACED WITH NEW. SEE PLUMBING FIXTURE SCHEDULE ON A201.2 AND INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
- ALL UNIT CLOSET SHELVING IS TO BE REMOVED AND REPLACED WITH NEW CLOSET SHELVING (U.N.O.).
- ALL DOORS WITHIN UNIT ARE TO BE PRIMED AND PAINTED (U.N.O.). SEE DOOR SCHEDULE ON A201 FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBON DIOXIDE DETECTOR LOCATIONS ARE ASSUMED AND MUST BE VERIFIED. VERIFY THAT ALL DETECTORS ARE FUNCTIONING CORRECTLY AND REPAIR, REPLACE OR ADD (IF MISSING OR NOT PRESENT).
- REMOVE AND REPLACE ALL EXISTING RECEPTACLE SWITCHES AND COVER PLATES THROUGHOUT UNIT. PROVIDE NEW SWITCH PLATE OR COVER PLATE IF MISSING.
- ALL BATHROOMS ARE TO HAVE AT LEAST (1) ONE EXHAUST FAN DUCTED TO THE EXTERIOR. REPLACE EXISTING FANS OR PROVIDE NEW FAN AND DUCT PER UNIT PLANS. SEE SHEET A201.2 FOR EXHAUST FAN INFORMATION.

KEYNOTES (THIS SHEET ONLY)

- FLOOR PLAN:
- SCRIBE PAINT AROUND CEILING FIXTURE BASE AND REMOVE EXISTING FIXTURE AND DISPOSE OF LEGALLY. ELECTRICAL CIRCUITRY AND ACCESS TO REMAIN FOR NEW FIXTURE INSTALLATION. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. INSTALL NEW CEILING-MOUNTED LIGHT FIXTURE LOCATION AS SPECIFIED. FIXTURE TO BE INSTALLED AT SAME LOCATION OF PREVIOUS FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
  - EXISTING FLOORING MATERIAL TO BE REMOVED DOWN TO BASE LAYER CONCRETE OR PLYWOOD (VERIFY IN FIELD). TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM. INSTALL NEW FLOORING TO BE INSTALLED OVER EXISTING BASE MATERIAL. SEE ROOM FINISH SCHEDULE ON A201.1.
  - SCRIBE PAINT AT WALL AS NECESSARY AND REMOVE EXISTING VANITY BASE CABINET, VANITY COUNTERTOP, AND ALL ASSOCIATED SINK COMPONENTS INCLUDING BOIL, FAUCET AND CONTROLS AND DISPOSE OF LEGALLY. TAKE CARE NOT TO DAMAGE NEW OR EXISTING FINISHES. NEW VANITY BASE CABINET, VANITY COUNTERTOP AND SINK COMPONENTS TO BE INSTALLED AT SAME LOCATION OF PREVIOUS VANITY. SEE INTERIOR ELEVATIONS FOR THIS UNIT FOR ADDITIONAL INFORMATION.
  - REMOVE AND REPLACE EXISTING SHELVING (ONE SHELF) AND REPLACE WITH NEW SHELVING.
  - CLEAN, PREPARE, PRIME AND PAINT ENTIRE EXISTING HANDRAIL OR GUARDRAIL AT THIS LOCATION. TAKE CARE NOT TO DAMAGE EXISTING FINISHES.
  - REMOVE EXISTING ROOF SHINGLES DOWN TO EXISTING SHEATHING. REMOVE EXISTING ICE AND WATER SHIELD AND UNDERLAYMENT IF PRESENT. INSTALL NEW ROOF SHINGLES OVER NEW UNDERPAYMENT AND OVER NEW ICE AND WATER SHIELD WHERE INDICATED.

LEGEND OF SYMBOLS

- NEW VINYL PLANK WOOD FLOORING - SEE SCHEDULE ON A201.1
- NEW ICE AND WATER SHIELD - EXTEND 3'-0" PAST INSIDE OF EXTERIOR WALL (MIN.)
- AREA OF ROOF TO BE REPLACED. SEE KEYNOTES FOR ADDITIONAL INFORMATION.
- SMOKE AND CARBOND DIOXIDE DETECTOR - SEE GENERAL NOTE 15
- CEILING-MOUNTED EXHAUST FAN - SEE GENERAL NOTE 17

1 LOWER LEVEL FLOOR PLAN  
 SCALE: 1/4" = 1'-0"

2 UPPER LEVEL FLOOR PLAN  
 SCALE: 1/4" = 1'-0"

3 ROOF AND SITE PLAN  
 SCALE: 1/4" = 1'-0"

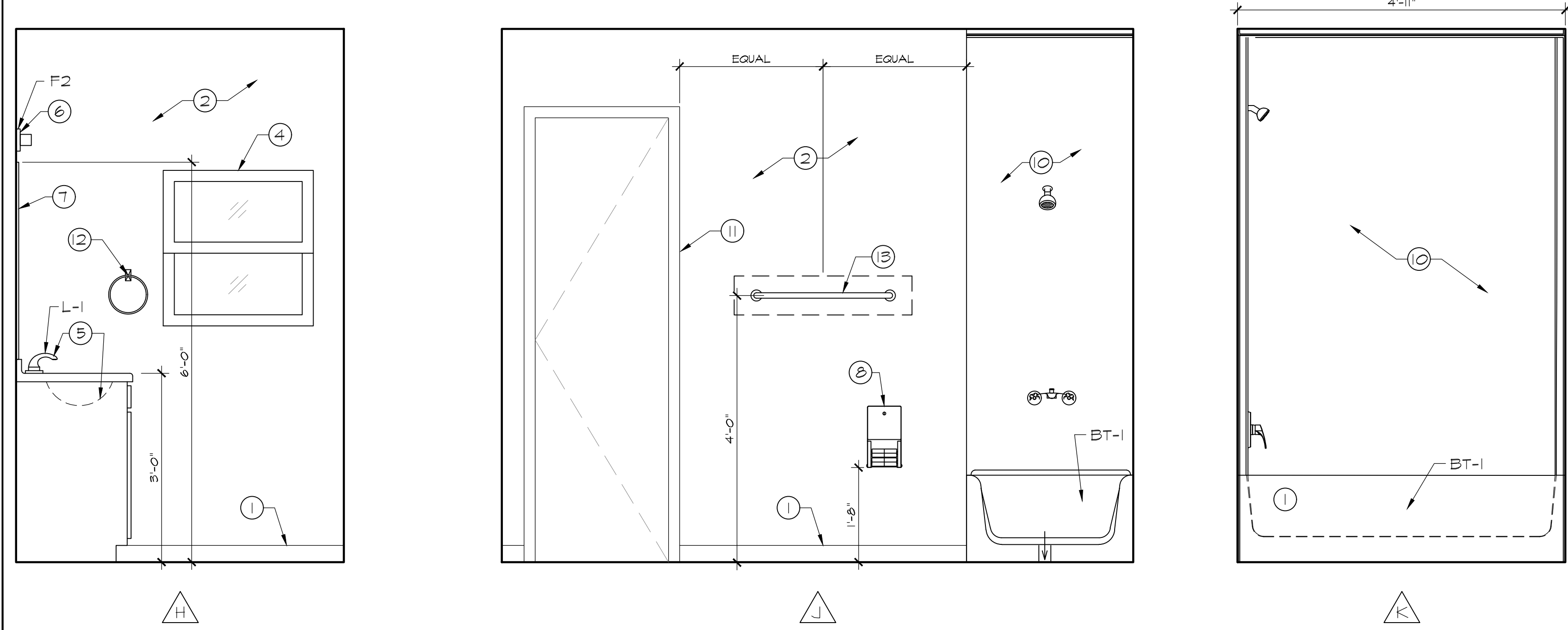
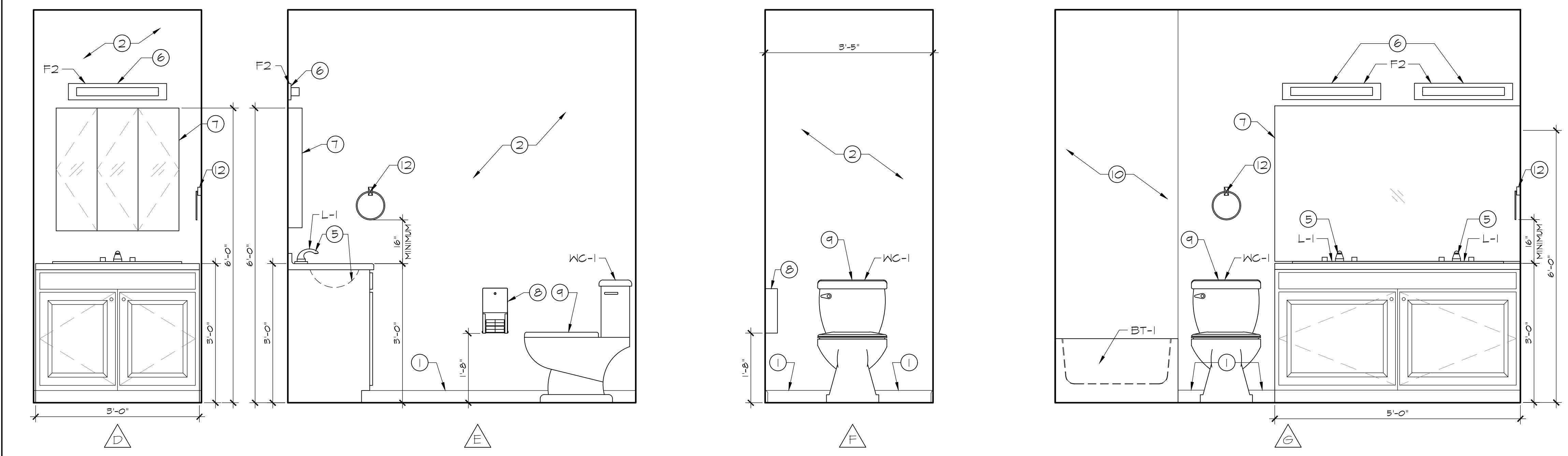
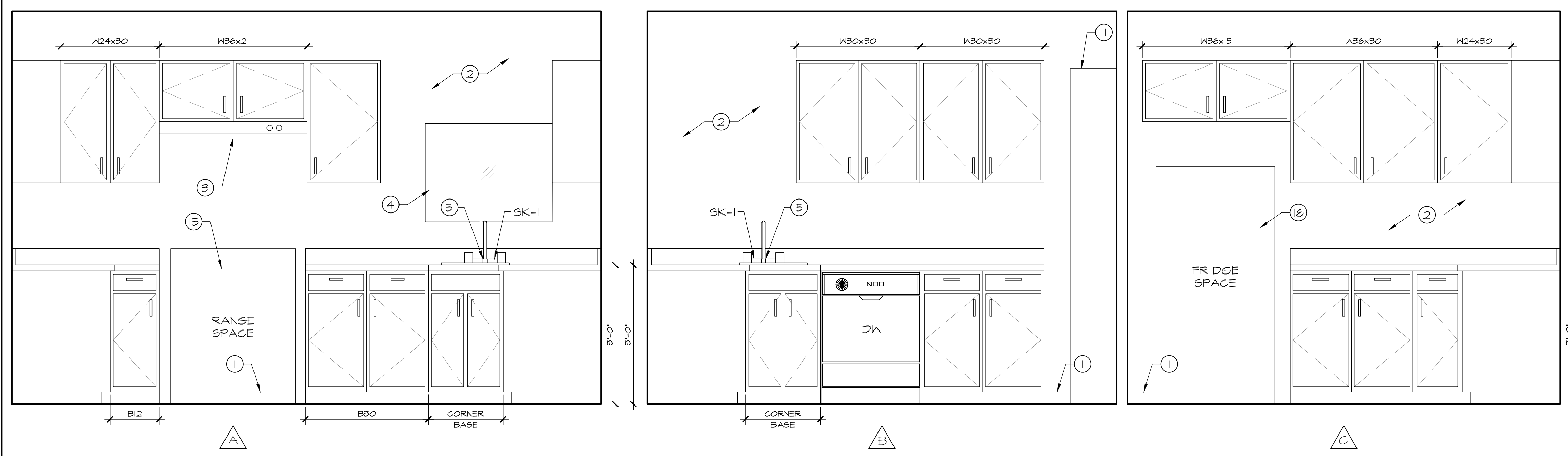
GENERAL NOTES (THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON G100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
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- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

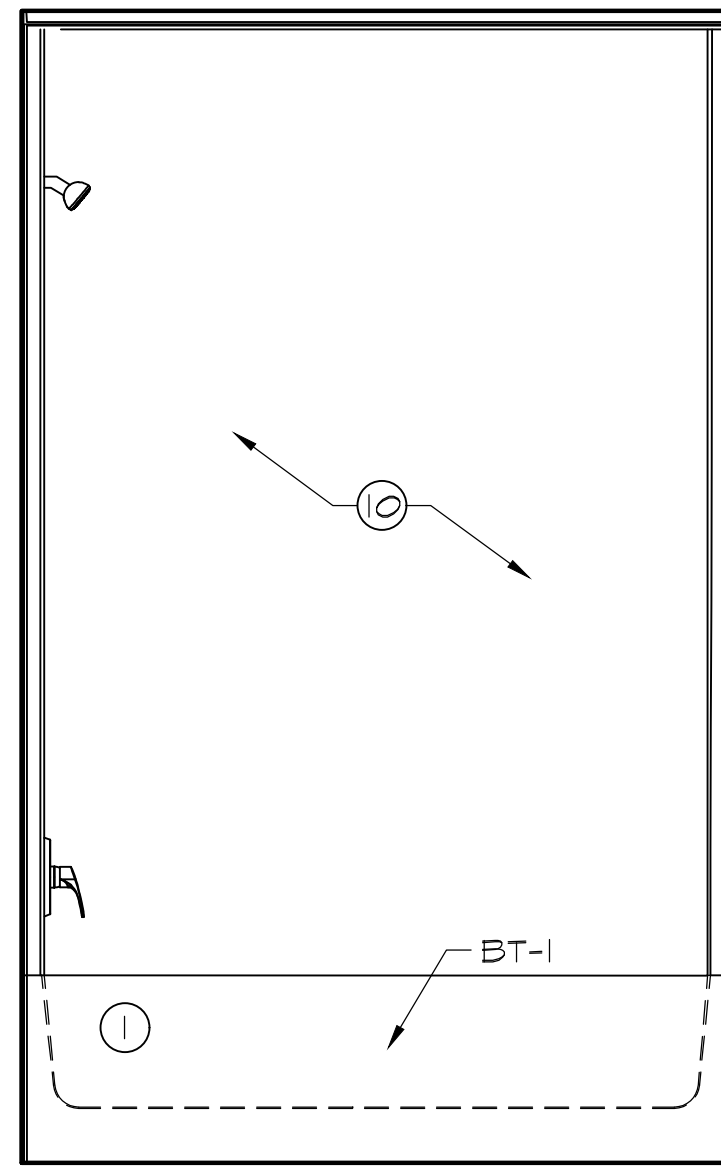
KEYNOTES (THIS SHEET ONLY)

INTERIOR ELEVATIONS

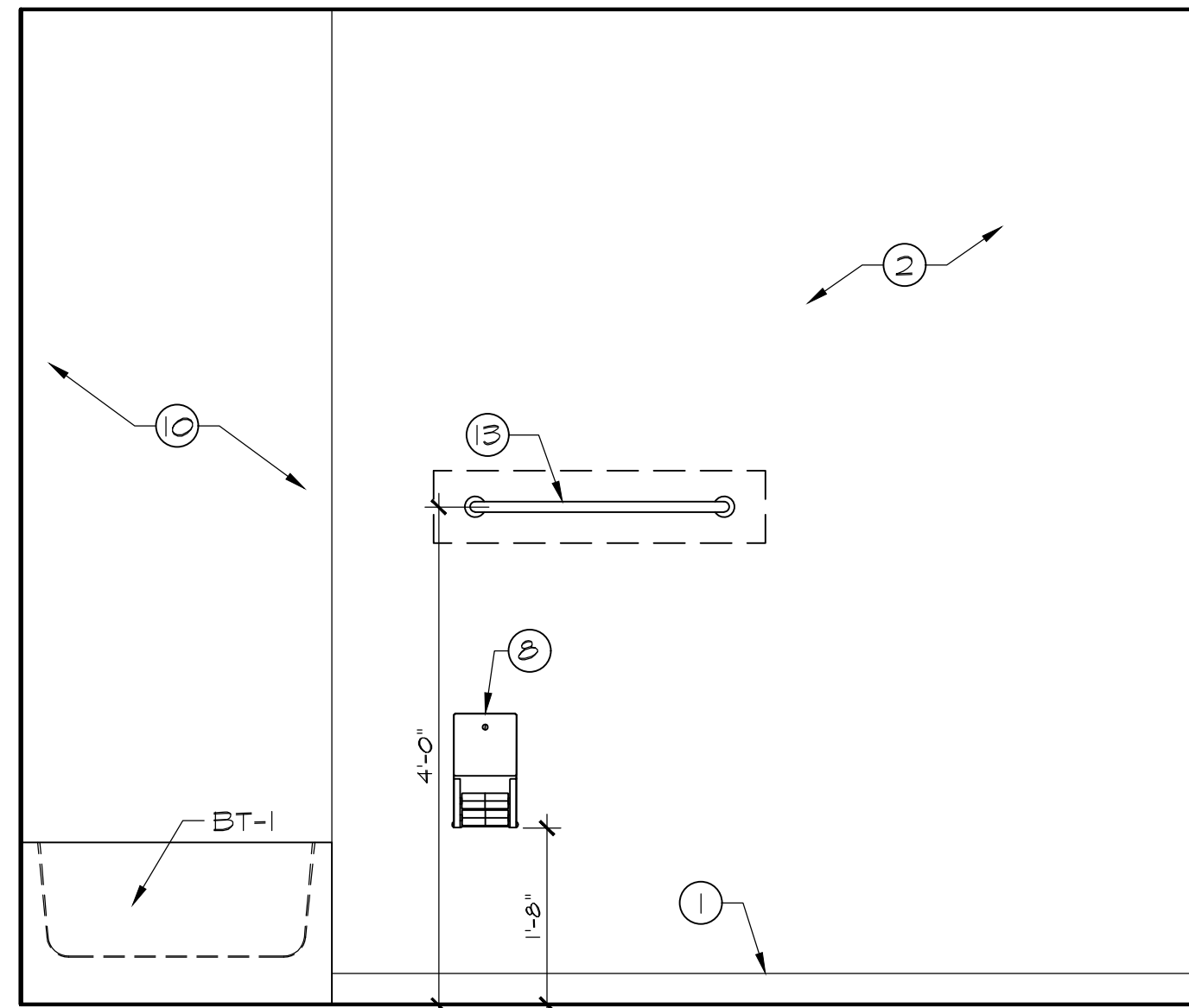
- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON A201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING WALL MOUNTED VANITY LIGHT FIXTURE. REPLACE WITH NEW WALL-MOUNTED LIGHT FIXTURE. SEE LIGHT FIXTURE SCHEDULE ON A201.2.
- REMOVE EXISTING MIRROR OR MEDICINE CABINET AND REPLACE WITH NEW WALL-MOUNTED MIRROR. REPAIR DISTURBED DRYWALL, PRIME AND PAINT AS NECESSARY TO MATCH NEW FINISHES. SEE ROOM FINISH SCHEDULE ON A201.1.
- NEW TOILET PAPER DISPENSER. SEE SPECIFICATION.
- REMOVE AND REPLACE EXISTING WATER CLOSET WITH NEW WATER CLOSET. USE EXISTING SANITARY DRAIN FROM REMOVAL OF WATER CLOSET FOR NEW UNIT LOCATION. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- REMOVE AND REPLACE EXISTING TUB/SHOWER SURROUND AND TUB INCLUDING FAUCETS, CONTROLS, BARS, CURTAIN ROD ETC. NEW TUB TO BE CAST-IRON AND NEW SURROUND IS TO EXTEND FROM TOP OF NEW TUB TO CEILING. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
- EXISTING DOOR AND FRAME TO REMAIN. PREPARE DOOR AND FRAME, PRIME AND PAINT PER DOOR SCHEDULE ON A201.
- NEW TOWEL RING - SEE SPECIFICATION SECTION 10 28 00.
- NEW 2'-0" LONG HORIZONTAL TOWEL BAR. PROVIDE WOOD BACKING AS NECESSARY BEHIND EXISTING DRYWALL. - SEE SPECIFICATION SECTION 10 28 00.
- NEW TOWEL HOOK - SEE SPECIFICATION SECTION 10 28 00.
- RANGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW RANGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.
- FRIDGE AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW. NEW FRIDGE SHALL BE IN SAME LOCATION AS PREVIOUS UNIT. SEE SPECIFICATION.



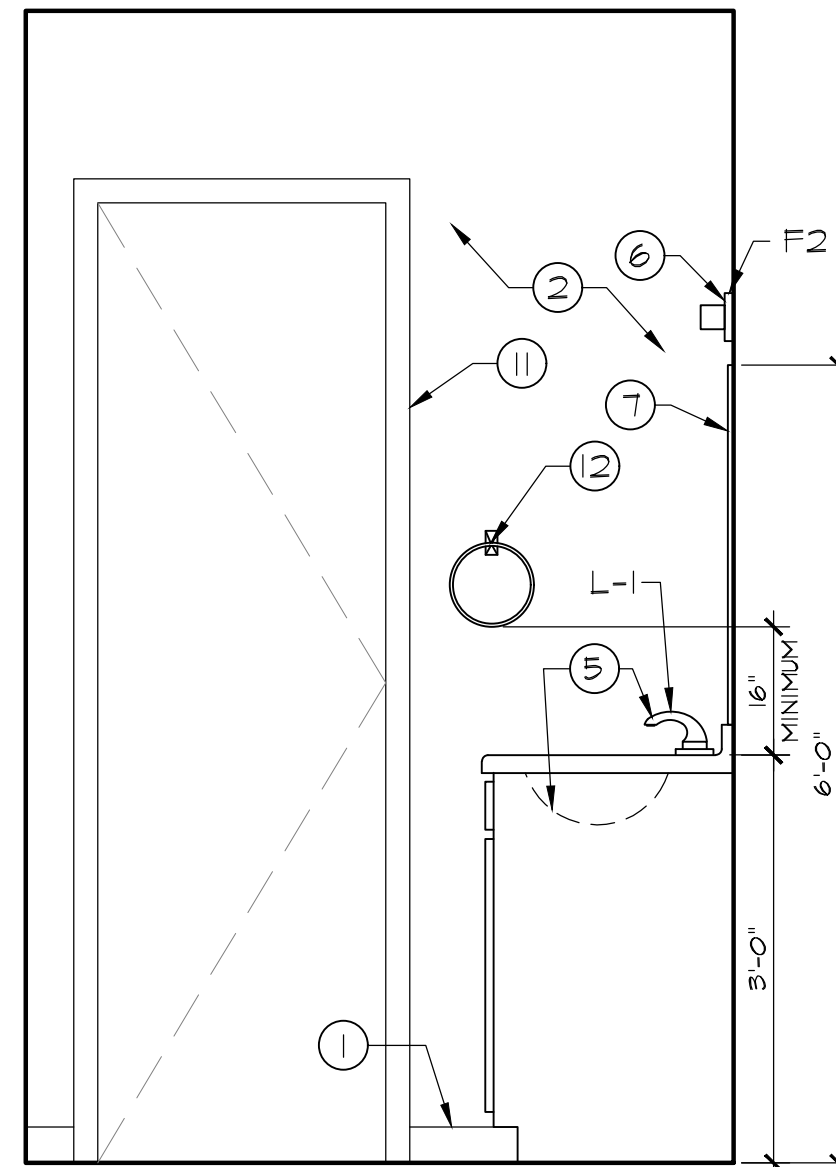
ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		RGE	JMK
20-12740		Date	06-06-2022
COLUMBIA H.A. SCATTERED SITE REHAB (ZONE 1)		26 THISTLE CT., COLUMBIA, SC.	
Rev. Date			
Sheet No.	A110.1		



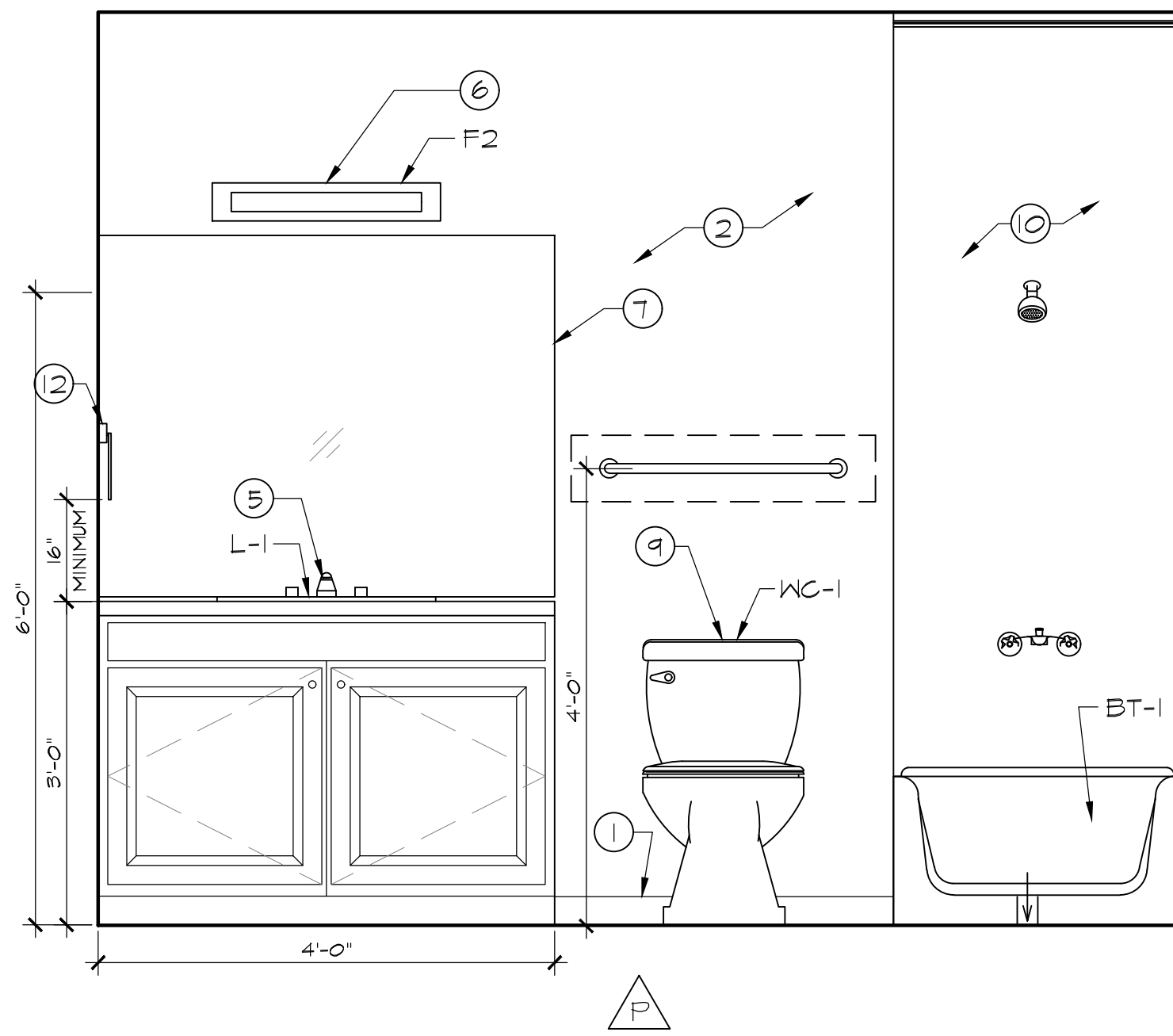
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1 INTERIOR ELEVATIONS  
SCALE: 3/4" = 1'-0"

GENERAL NOTES

(THIS SHEET ONLY)

- SEE PROJECT GENERAL NOTES ON 6100.
- ALL FLOORING FINISH MATERIAL IN EVERY ROOM TO BE REMOVED DOWN TO BASE LAYER (WOOD OR CONCRETE) AND LEGALLY DISPOSED OF. ALL FLOORING AREAS TO BE REPLACED WITH NEW FLOORING MATERIAL PER LEGEND OF SYMBOLS. SEE ROOM FINISH SCHEDULE ON A201.1.
- ALL WALLS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON A201.1.
- ALL CEILINGS IN EVERY ROOM TO RECEIVE NEW PAINT. EXISTING FINISHES ARE TO BE PREPARED, PRIMED AND PAINTED PER ROOM FINISH SCHEDULE ON 201.1.
- ALL CEILING LIGHTING FIXTURES IN ENTIRE UNIT TO BE REMOVED AND REPLACED WITH NEW LIGHTING FIXTURES. SEE LIGHTING FIXTURE SCHEDULE ON A201.2.
- ALL WALL BASE TRIM TO REMAIN. REMOVE AND REINSTALL AS NECESSARY FOR COMPLETION OF WORK OR TAKE CARE NOT TO DAMAGE EXISTING BASE TRIM THROUGHOUT DURATION OF WORK.

KEYNOTES

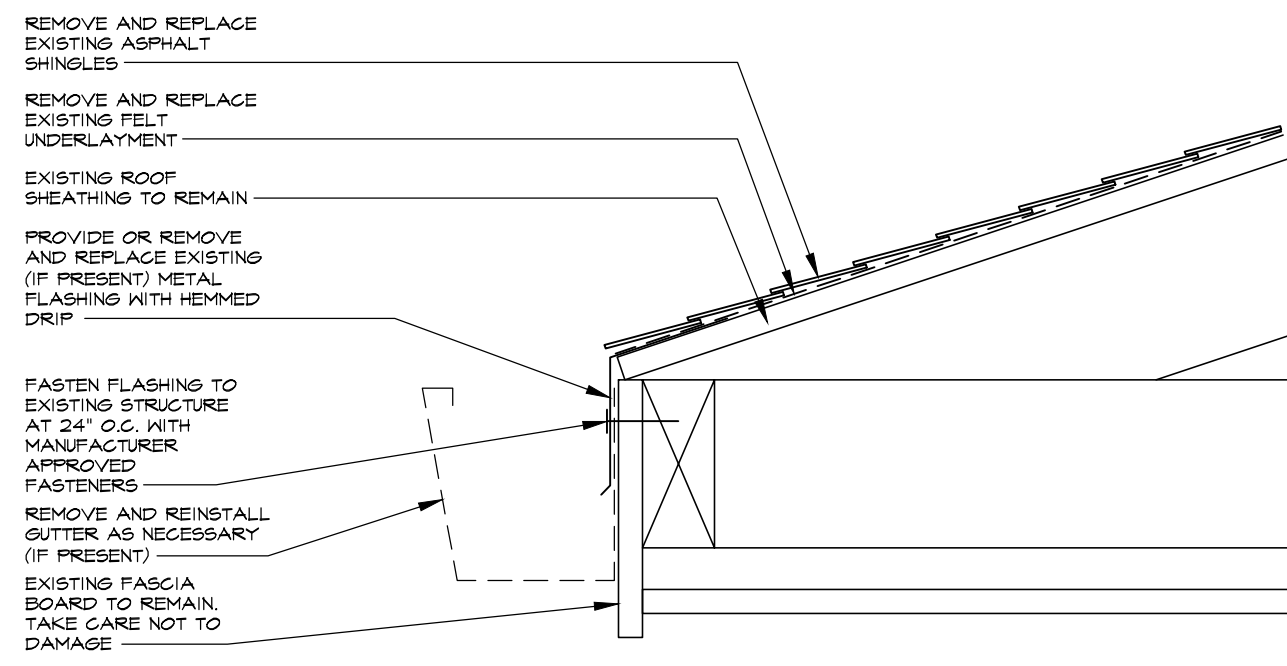
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INTERIOR ELEVATIONS

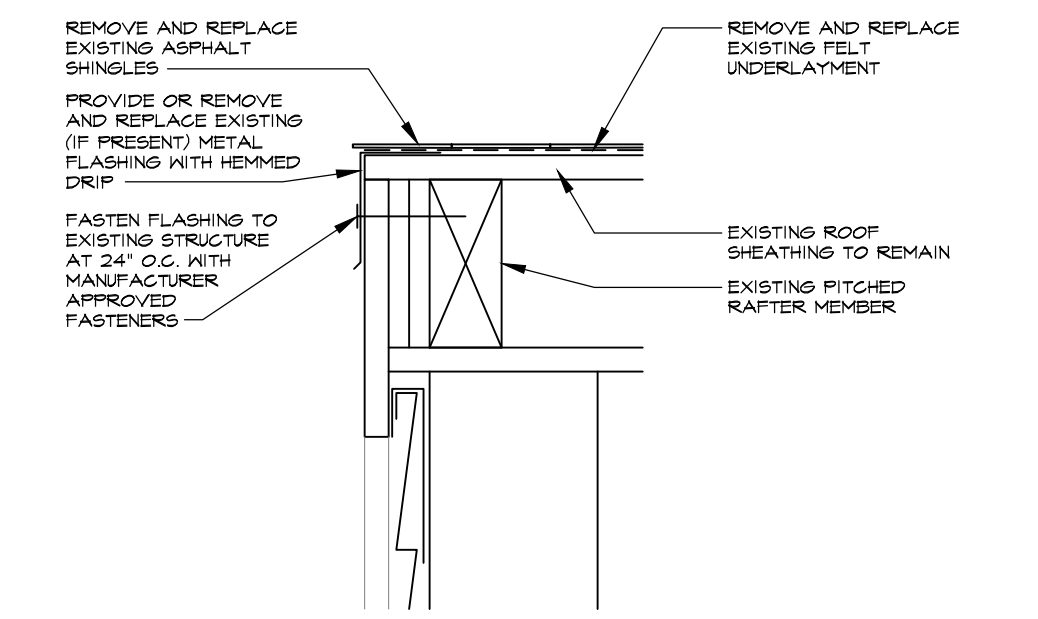
- EXISTING BASE TRIM - TAKE CARE NOT TO DAMAGE THROUGHOUT DURATION OF WORK.
- PRIME AND PAINT EXISTING WALL AND ENTIRE ROOM PER ROOM FINISH SCHEDULE ON 201.1.
- REMOVE AND REPLACE EXISTING RANGE HOOD WITH NEW.
- EXISTING WINDOW AND TRIM TO REMAIN - TAKE CARE NOT TO DAMAGE.
- REMOVE AND REPLACE EXISTING SINK COMPONENTS WITH NEW SINK FAUCET, CONTROLS AND BOWL. SEE PLUMBING FIXTURE SCHEDULE ON A201.2.
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ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
COLUMBIA H.A. SCATTERED SITE REHAB		RGE	JMK
(ZONE 1) 26 THISTLE CT., COLUMBIA, SC.		Date	Appr.
20-12740	06-06-2023		

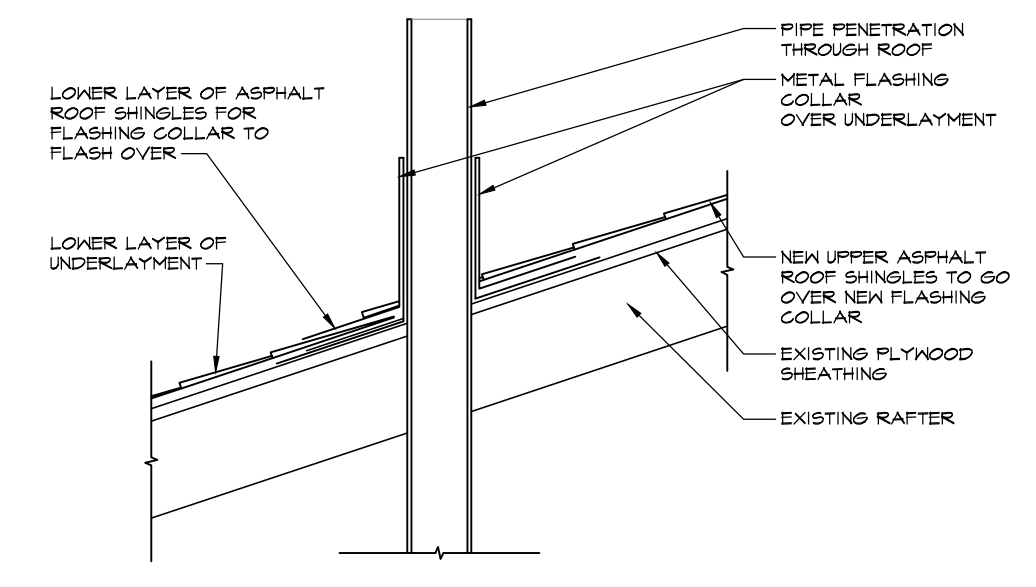
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Sheet No.	A110.2



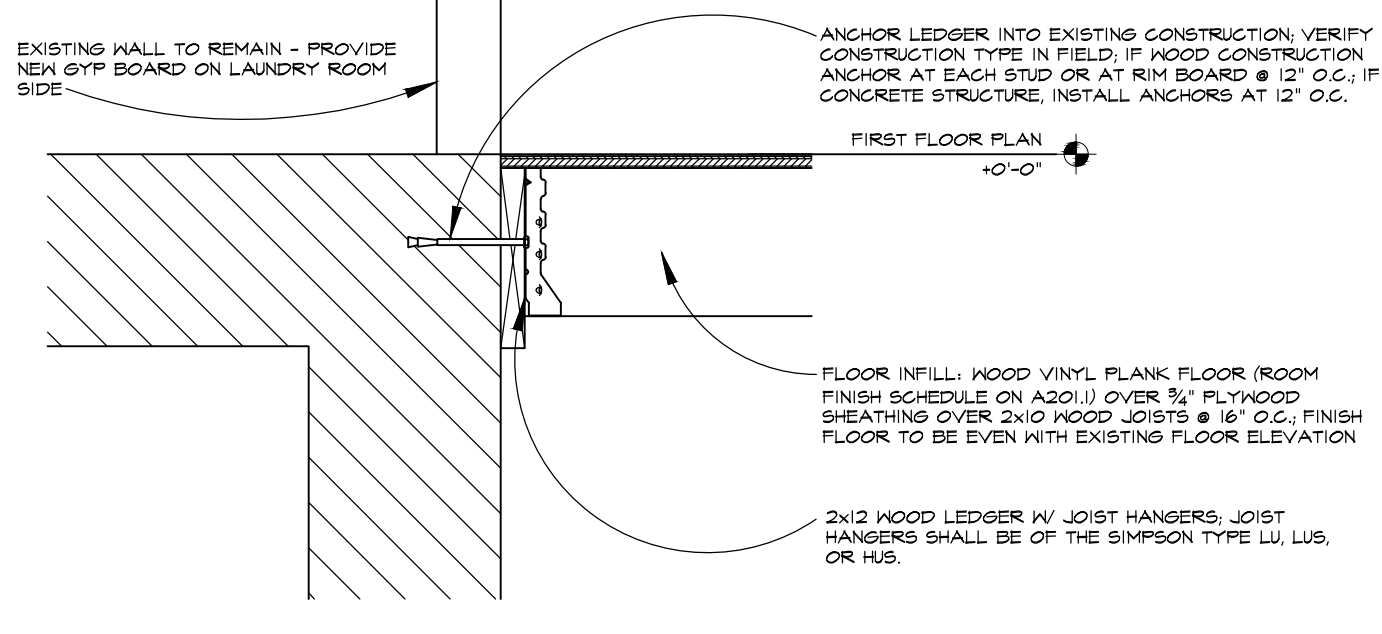
1 ROOF EDGE DETAIL  
SCALE: 3" = 1'-0"



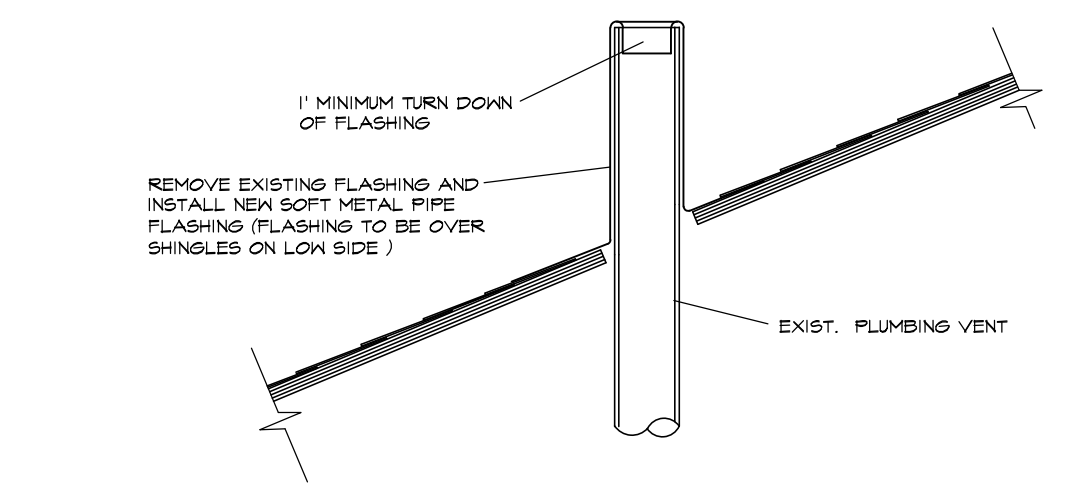
2 ROOF RAKE DETAIL  
SCALE: 3" = 1'-0"



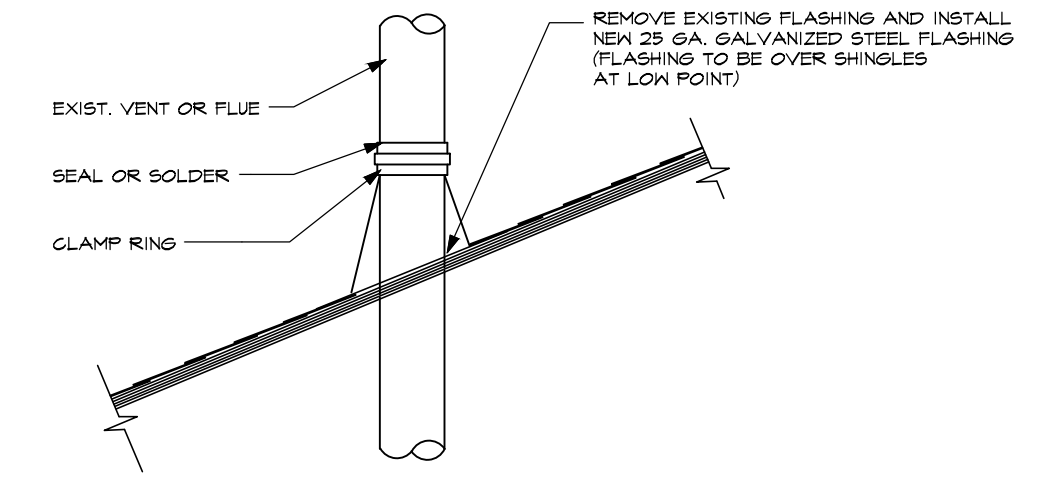
3 PIPE FLASHING DETAIL  
SCALE: 3" = 1'-0"



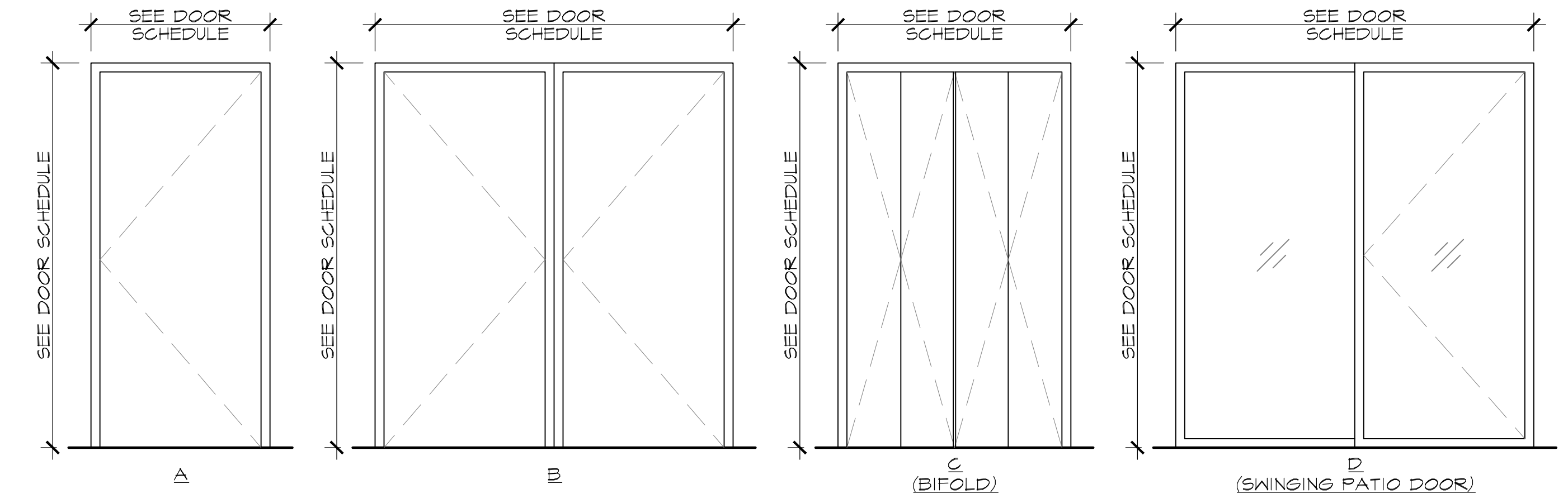
4 FLOOR INFILL DETAIL  
SCALE: 3" = 1'-0"



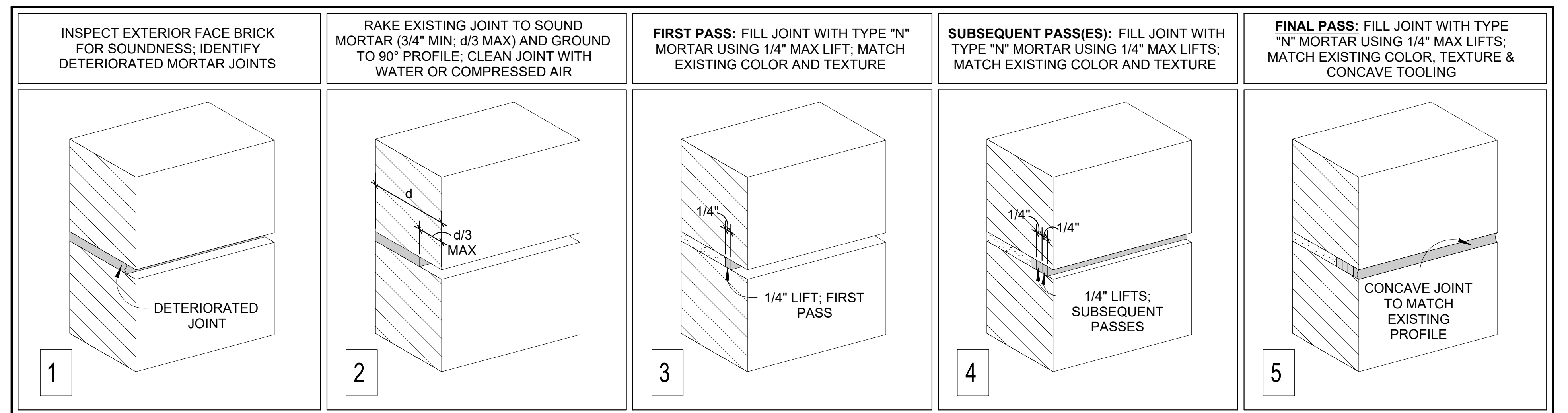
5 PLUMBING VENT DETAIL  
SCALE: 1" = 1'-0"



6 FLUE DETAIL  
SCALE: 1" = 1'-0"



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



MASONRY POINTING DETAILS  
NOT TO SCALE

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
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COLUMBIA H.A. SCATTERED SITE REHAB	(ZONE 1) COLUMBIA, SC.	20-12740 Project Number	06-06-2023 Date	JMK Appr.	RGE Appr.
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DETAILS	Rev. Date	Sheet No.
		A200



SITE/ROOM NAME	EXISTING			NEW (RENOVATION)		
	FLOOR FINISH	WALL FINISH	CEILING FINISH	FLOOR FINISH	WALL FINISH	CEILING FINISH
<b>26 THISTLE CT.</b>						
LIVING RM-1	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM-2	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
KITCHEN	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
DINING	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
PANTRY	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLOSET	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
MECH	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>41 SALVIA CT.</b>						
LOWER LEVEL	CONC	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
KITCHEN	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
UPPER LEVEL HALLWAY	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLOSET	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>109 PEACHTREE DR.</b>						
GARAGE	CONC	PT	PT	WD PLANK LVT	PT-I	PT-I
KITCHEN	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
DINING	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM-1	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM-2	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>218 BARGER CIR.</b>						
KITCHEN	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
DINING	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
CLOSET	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>817 RIVERWALK WAY</b>						
KITCHEN	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
DINING	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
CLOSET	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>1620 HOLLINGSHEAD RD.</b>						
KITCHEN	WD	WOOD PANEL	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	WOOD PANEL	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	CONC	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>2317 HILLBECK RD.</b>						
KITCHEN	LVT	WOOD PANEL	PT	WD PLANK LVT	PT-I	PT-I
DINING	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-4	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	TILE	TILE	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	CONC	PT	PT	WD PLANK LVT	PT-I	PT-I

SITE/ROOM NAME	EXISTING			NEW (RENOVATION)		
	FLOOR FINISH	WALL FINISH	CEILING FINISH	FLOOR FINISH	WALL FINISH	CEILING FINISH
<b>4232 DONAVAN DR.</b>						
KITCHEN	VINYL	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
HALLWAY	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM	VINYL	PT	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	EXPOSED WOOD	EXPOSED WOOD	EXPOSED WOOD	WD PLANK LVT	PT-I	PT-I
<b>4316 LEEDS ST.</b>						
KITCHEN	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>4817 FAULKLAND RD.</b>						
KITCHEN	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	WOOD PANEL	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-4	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-5	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	WD	TILE	PT	WD PLANK LVT	PT-I	PT-I
HALLWAY	WD	BRICK/GYP	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	WD	PT	PT	WD PLANK LVT	PT-I	PT-I
<b>ROSEWOOD HILLS DR. PROPERTIES AND SIMILAR (7 PROPERTIES) - SEE SHEET A110</b>						
PORCH	CONG.	SIDING	SOFFIT	EXIST.	EXIST.	EXIST.
KITCHEN	LVT/TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
LIVING RM	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
DINING	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
LAUNDRY	LVT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BED RM-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-1	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-2	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-3	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-4	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-5	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-6	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
CLO-7	CPT	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-1	LVT/TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-2	LVT/TILE	PT	PT	WD PLANK LVT	PT-I	PT-I
BATH RM-3	LVT/TILE	PT	PT	WD PLANK LVT	PT-I	PT-I

PLUMBING FIXTURE SCHEDULE

FIXTURE TYPE	FIXTURE
L-1	"AMERICAN STANDARD" MODEL: 0476.037 AQUALYN LAVATORY, VITREOUS CHINA, DROP-IN, FRONT OVERFLOW, FAUCET LEDGE, FAUCET HOLES ON 4" CENTERS.  "SYMMONS" MODEL #5-60-H SINGLE HANDLE METERING LAVATORY FAUCET WITH VANDAL RESISTANT 0.5GPM FLOW RESTRICTOR.  "SYMMONS" MODEL #5-120-CK POINT-OF-USE THERMOSTATIC MIXING VALVE WITH INTEGRAL CHECKS. (SET TEMP. SHALL NOT EXCEED 110 DEGREES F).  "MCGUIRE" MODEL #PA21502C PRO SEAMLESS PRE-WRAPPED ADJUSTABLE P-TRAP KIT WITH PRE-WRAPPED PRO-DRAIN OFFSET GRID STRAINER.  PROVIDE CHROME PLATED RISER TUBES.
SK-1	"ELKAY" MODEL #LRAD3322 STAINLESS STEEL DOUBLE BOWL SINK, SINK IS SEAMLESSLY DRAWN OF #18 GAUGE, TYPE 304 STAINLESS STEEL.  "SYMMONS" MODEL #5-23-1.5 SYMMETRIX SINGLE LEVER KITCHEN FAUCET WITH CERAMIC CONTROL COMPONENTS AND HANDLE LIMIT STOP, 8-1/2" SWING SPOUT WITH AERATOR, 3/8" SUPPLIES, POLISHED CHROME FINISH.  "SYMMONS" MODEL #5-210-CK POINT-OF-USE THERMOSTATIC MIXING VALVE WITH INTEGRAL CHECKS. (SET TEMPERATURE SHALL NOT EXCEED 110 DEGREES F).  PROVIDE CHROM-PLATED P-STRAPS, TAILPIECES, ANGLES STOPS, ESCUTCHEONS AND RISER TUBES AS REQUIRED.
BT-1	"KOHLER" MODEL: #K-838 (RIGHT-SIDE DRAIN) OR K-837 (LEFT-SIDE DRAIN) BELLWETHER ALCOVE CAST IRON BATH  "KOHLER" MODEL #K-PL515601 FAUCETS - SEE SPEC  MIXING VALVE: PRESSURE BALANCED WITH INTEGRAL STOPS SHOWER HEAD: 1.5 GPM WITH WALL SHOWER HEAD FITTING. TUB SPOUT: WALL MOUNTED WITH FULL-UP DIVERTER.  PROVIDE 3-SIDED TUB SURROUND FROM TUB TO CEILING; COLOR TO MATCH NEW TUB.
WC-1	FIXTURES: a. AMERICAN STANDARD. b. KOHLER. c. MANSFIELD. d. SLOAN. e. ZURN.  SEATS: a. BEMIS. b. BENEKE. c. CENTOCO. d. CHURCH. e. OLSONITE  MATERIALS (UNLESS OTHERWISE NOTED): A. FIXTURE, WHITE VITREOUS CHINA. B. SEAT, EXTRA HEAVY DUTY ANTIMICROBIAL FIRE RETARDANT PLASTIC SEAT WITH STAINLESS STEEL SELF-SUSTAINING CHECK HINGE.  FLOOR OUTLET TOILET: ELONGATED BOWL, SIPHON JET, 1.1 -1.6 GPF COMPATIBLE, 1,000 GRAM MAP SCORE RATED, 1,000 LB. STATIC LOAD RATING ON END OF BOWL, 10" - 12" ROUGH-IN RANGE, TOP SPUD INLET, 15" - 16" FINAL SEAT HEIGHT. REFER TO ARCHITECTURAL DRAWINGS FOR INSTALLATION DIMENSIONS.

LIGHT FIXTURE SCHEDULE

FIXTURE TYPE	FIXTURE	COMMENTS
F1	I-LUMINOSITY MODEL: ILPLMIHO-SQ-24W-3000K-WH	SIZE: 12"
F2	I-LUMINOSITY MODEL: ILSCPWAC-15W-3000K-AL	SIZE: 18"
F3	LITHONIA MODEL: 11430-RE-WH	WHITE

EXHAUST FAN SCHEDULE

ITEM TAG	MANUFACTURER AND MODEL NUMBER	CFM	ESP	SONES	ELECTRICAL DATA			CONTROLLED VIA	DAMPER TYPE	AREA SERVING	UNIT WEIGHT (LBS)	REMARKS
					VOLT-PH-HZ	HP	RPM					
EF-1	NUTONE HB80RL	80	0.10	2.5	120-1-60	-	-	WALL SWITCH	INTEGRAL GRAVITY	SEE PLAN	7	ALL

REMARKS

- VERIFY EXACT VOLTAGE PRIOR TO ORDERING EQUIPMENT.
- ELECTRICAL CONTRACTOR SHALL PROVIDE DISCONNECT SWITCH AND LINE WIRING.
- PROVIDE HOODED WALL CAP, BRICK VENT, PITCHED ROOF CAP, OR FLAT ROOF CAP AS REQUIRED.
- THE EQUIPMENT SCHEDULED IS TO SET STANDARDS, INTENTION IS "OR EQUAL" PENDING APPROVED SUBMITTALS. APPROVED ALTERNATIVES INCLUDE, BUT ARE NOT LIMITED TO: LOREN COOK, GREENHECK, TWIN CITY, AND ACME.

ARCHITECT	OWNER	CONTRACTOR	BIDDING CO.
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COLUMBIA H.A. SCATTERED SITE REHAB  
(ZONE 1)  
COLUMBIA, SC.  
06-06-2023  
Date  
20-1-27-14  
Project Number  
JMK  
Appr.

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Sheet No.	A201.2