

PROJECT MANUAL

NEW CONSTRUCTION

MADISON ROAD APARTMENTS

454 North Madison Road
Orange, Virginia 22960

Owner
Encompass Community Supports
15361 Bradford Road
Culpeper, Virginia 22701

September 24, 2024

Architect's Project# 2030



16125 Raccoon Ford Rd
Culpeper, Virginia 22701
540-829-2590 (v)
www.sanders-pc.com

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Bid Announcement
Issue Date: September 30, 2024

Project:
Madison Road Apartments
454 North Madison Road
Orange, VA 22960

Owner:
Encompass Community Supports
15361 Bradford Road, PO Box 1568, Culpeper, Virginia 22701
Jim McGraffe, Executive Director

Architect:
Sanders Architecture, PC
Dex Sanders
434.825.2424

Description of Work:
The work includes site demolition of two existing structures and construction of a new 7,091 SF building footprint (3) story R-2 universal design & accessible apartments over ground floor level Business office story. The Work includes all site work, utilities & parking for (21) accessible apartment units and ECS business offices more fully described in the construction documents. Gross new floor area of 28,122 SF.

Mandatory Pre-Bid Conference:
A Mandatory Pre-bid Conference will be held **Tuesday**, October 15, 2024, 10:00 AM, at the site.

Technical Questions:
Questions shall be directed to Architect. The deadline for RFIs is Wednesday, October 23, 2024, 10:00 AM.

Receipt of Bids:
Sealed bids will be received at the office of Encompass Community Supports, 15361 Bradford Road, PO Box 1568, Culpeper, Virginia 22701, Attention: Deborah Fenner until 2:00 PM, local prevailing time, on Wednesday, October 30, 2024. Bids will be opened publicly and read aloud in Conference Room B following bid receipt.

Bids shall be submitted on the Bid Form contained in the Bidding Documents. Additional procedures for submitting a bid, claiming an error, withdrawing of bids and other pertinent information are contained in the Instruction to Bidders. Withdrawal due to error in bid in accordance with Section 11-54A(ii) Code of Virginia. Owner reserves the right to reject any and/or all bids.

The contract is to be awarded on a lump sum basis. Contractor registration in accordance with Title 54.1, Chapter 11, of the Code of Virginia is required.

Bonds:

Bid Bond: A certified check or bank draft, payable to Encompass Community Supports or a satisfactory bid bond underwritten by an acceptable surety listed in the current U.S. Treasury Department Circular No. 570 and executed by the bidder in an amount equal to 5 percent of the bid shall be submitted with each bid.

Performance and Payment Bonds: The successful bidder will be required to furnish and pay for Performance and Payment Bonds in the amount of 100 percent of the contract price.

Retainage:

Retainage is 5% in accordance with Section 2.2-4333 Code of Virginia.

Availability of Bid Documents: The Bidding Documents shall be provided as an attachment to the solicitation on the Virginia DGS electronic procurement system eVA.

The Bidding Documents include both Drawings and Specifications and bidders shall be responsible for obtaining both and verifying that their sub-bidders have all bid documents including any addenda.

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

Part 1 - GENERAL

1.1. GENERAL REQUIREMENTS

- A. **Instruction to Bidders:** AIA Document A701, current edition, is an extension of these specifications and shall be reviewed by the Contractor bidding the project.
- B. **Site Conditions:** The contractor and his subcontractors shall visit the site before submitting his bid to familiarize himself with all existing and new conditions. The failure to do so shall in no way relieve any bidder from any obligation with respect to his bid or the contract.
- C. **Availability of the Bid Documents:** See the Bid Announcement or contact the Architect for details on obtaining Bid Documents.
- D. **Communications During Bidding:** No oral explanation in regard to the meaning of drawings and specifications will be made and no oral instructions will be given before the award of the contract. Discrepancies, omissions or doubts as to the meaning of drawings and specifications shall be communicated in writing to the Architect for interpretation. A full description of the question shall be included as well as contact information in case further explanation is required. Bidders must so act at least five (5) days prior to the time set for the receipt of bids to allow a sufficient time for a reply to reach them before the submission of their bids. Any interpretation made will be in the form of an addendum to the specifications which will be forwarded to all bidders, and its receipt shall be acknowledged by the bidder on Bid Forms.
- E. **No Contact Policy:** No Bidder shall initiate or otherwise have contact related to the solicitation with any Owner representative or employee, other than the Procurement Department, after the date and time established for receipt of bids. Any contact initiated by a Bidder with any Owner representative, other than the Procurement Department, concerning this solicitation is prohibited and may cause the disqualification of the Bidder from this procurement process.
- F. **Non-Discrimination of Contractors:** A bidder or contractor shall not be discriminated against in the solicitation or award of this contract because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, or disability, faith-based organizational status, any other basis prohibited by state law relating to discrimination in employment or because the bidder or offeror employs ex-offenders unless the state agency, department or institution has made a written determination that employing ex-offenders on the specific contract is not in its best interest.

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

- G. **Time for Completion:** "Time for Completion" means the number of consecutive calendar days following the receipt of a Notice to Proceed in which the Contractor has to complete everything required of it by the Contract. The Contractor, in preparing and submitting his bid, is required to take into consideration normal weather conditions. Normal weather does not mean statistically average weather, but rather means a range of weather conditions which might be anticipated, (i.e., conditions which are not extremely unusual). Normal weather conditions shall be determined from the public historical records available, including the U.S. Department of Commerce, Local Climatological Data Sheets, Oceanic and Atmospheric Administration/Environmental Data and Information Service, National Climatic Center and the National Weather Service. The data sheets to be used shall be for the locality or localities closest to the site of the work. No additional compensation will be paid to the Contractor because of adverse weather conditions; however, an extension of time for abnormal weather will be considered by the Owner as indicated in the General Conditions.
- H. **General Compliance Provision:** By signing this Bid, the Bidder certifies that it is and will remain in full compliance with:
- The Federal Civil Rights Act of 1964, as amended.
 - The Federal Immigration Reform and Control Act of 1986.
 - The Virginia Fair Employment Act of 1975, as amended, where applicable.
 - The Virginia Conflict of Interest Act.
 - The Virginians With Disabilities Act.
 - The Americans With Disabilities Act.
 - Section 2.2-4311 (Employment Discrimination Act) of the Virginia Public Procurement Act.
 - Section 2.2-4354 (Payment to Subcontractor) of the Virginia Public Procurement Act.
 - Sections 2.2-4367 and 2.2-4377 (Ethics in Public Contracting) of the Virginia Public Procurement Act.
 - The Antitrust laws of the United States and the Commonwealth of Virginia.
- I. **Ethics In Public Contracting:** By submitting their bids, Bidders certify that their bids are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other Bidder, supplier, manufacturer or subcontractor in connection with their bid, and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised unless consideration of substantially equal or greater value was exchanged.
- J. **Debarment Status:** By submitting their bids, Bidders certify that they are not currently debarred from submitting bids on contracts by any agency of the Commonwealth of Virginia, nor are they an agent of any person or entity that is currently debarred from submitting bids on contracts by any agency of the Commonwealth of Virginia.

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

1.2. PREPARATION AND SUBMISSION OF BIDS

- A. Bids must give the full business address of the Bidder and be signed by him/her with his/her usual signature. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership or any authorized representative, followed by the designation of the person signing. Bids by corporations must be signed with the legal name of the corporation followed by the name of the State in which it is incorporated and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. A bid by a person who affixes to the signature the word "President", "Secretary", "Agent" or other designation without disclosing the principal, may be held to be the bid of the individual signing. When requested by ECS, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished. The bidder shall place on the outside of the envelope containing the bid and shall place in the bid over his signature his Contractor license/registration number.
- B. Qualification of Bidder: It is required, as a condition of bidding, that all Bidders complete the attached Contractor Data Sheet and show sufficient evidence of previous satisfactory experience in constructing at least three (3) projects of comparable size. If the Bidder is deemed to be the apparent low Bidder, the Owner reserves the right to require a listing of such projects, including more specific information to adequately permit checking of references for such projects.

- C. Identification of Bid Envelope: The signed bid should be returned in a separate envelope or package, sealed and identified as follows:
From:

_____	_____	_____
Name of Bidder	Due Date	Time

Street or Box Number		

City, State, Zip Code		
Licensed Class A Virginia Contractor No. _____		

- D. The envelope should be addressed as directed on Page 1 of the solicitation.
- E. If a bid is mailed, the Bidder takes the risk that the envelope, even if marked as described above, may be inadvertently opened and the information compromised which may cause the bid to be disqualified. Bids may be hand delivered to the designated location in the office issuing the solicitation. No other correspondence or other Bids should be placed in the envelope.

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

1.3. BID BOND:

- A. Each bid shall be accompanied by a bid bond or guarantee of five percent (5%) of the amount of the bid, which shall be a certified check, cashier's check, or a bid bond payable to Rappahannock Rapidan Community Services Board. The sureties of all bonds shall be of such surety company or companies as are approved by the State and are authorized to transact business in the Commonwealth of Virginia. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the Bidder will not withdraw such bid during the period of (60) days following the opening of bids; that if such bid is accepted, the Bidder will accept and perform under the terms of the Invitation for Bid and purchase order or contract. The bid guarantee will be returned upon award of contract.

1.4. WITHDRAWAL OR MODIFICATION OF BIDS:

- A. Bids may be withdrawn or modified by written notice received from bidders prior to the time fixed for bid receipt. The withdrawal or modification may be made by the person signing the bid or by an individual(s) who is authorized by him on the face of the bid. Written modifications may be made on the bid form itself, on the envelope in which the bid is enclosed, or on a separate document. Written modifications, whether the original is delivered or transmitted by facsimile, must be signed by the person making the modification or withdrawal.
- B. Errors In Bids: A bidder may withdraw his or her bid from consideration if the price bid was substantially lower than the other bids due solely to a mistake therein, provided the bid was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the bid sought to be withdrawn.
 1. In accordance with Section 2.2-4330 A.(ii) of the Code of Virginia, the bidder must submit to the contracting authority his or her original work papers, documents and materials used in the preparation of the bid within one day after the date fixed for submission of bids. Such work papers shall be delivered by the bidder in person or by registered mail at or prior to the time fixed for the opening of bids. Such work papers, documents and materials may be considered as trade secrets or proprietary information subject to the conditions of subsection D of Section 2.2-4342, Code of Virginia. The bids shall be opened one day following at the time fixed by the contracting authority for the submission of bids. Thereafter, the bidder shall have two (2) hours after the opening of bids within which to claim in writing any mistake as defined herein and withdraw his bid. The contract shall not be awarded by the contracting authority until such two-hour period has elapsed. Such mistake shall be proved only from the original work papers, documents and materials delivered to the contracting authority as required herein.
 2. No bid may be withdrawn under this section when the result would be the awarding of the contract on another bid of the same bidder or of another bidder in which the ownership of the withdrawing bidder is more than five percent. No bidder who is permitted to withdraw a bid shall, for compensation, supply any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

contract is awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn bid was submitted.

3. If a bid is withdrawn under authority of this section, the next higher bidder shall be deemed to be the low bidder on the project.

1.5. RECEIPT AND OPENING OF BIDS:

- A. It is the responsibility of the Bidder to assure that the bid is delivered to the place designated for receipt of bids and prior to the time set for receipt of bids. No bids received after the time designated for receipt of bids shall be considered. If a bid is mailed, the Bidder takes the risk that the envelope, even if marked as described above, may be inadvertently opened and the information compromised which may cause the bid to be disqualified. Bids may be hand delivered to the designated location in the office issuing the solicitation. No other correspondence or other Bids should be placed in the envelope.
- B. Bids will be opened at the time and place stated in the advertisement, and their contents made public for the information of the bidders and others interested who may be present either in person or by representative. The officer or agent of the Owner, whose duty it is to open them, will decide when the specific time has arrived. No responsibility will be attached to any officer or agent for the premature opening of a bid not properly addressed and identified.
- C. Bid Acceptance Period: Any bid in response to this solicitation shall be valid for (60) days. At the end of the (60) days the bid may be withdrawn at the written request of the Bidder. If the bid is not withdrawn at that time it remains in effect until an award is made or the solicitation is canceled.

1.6. QUALIFICATIONS OF BIDDERS:

- A. The Owner may make such reasonable investigations as deemed proper and necessary to determine the ability of the Bidder to perform the work/furnish the item(s) and the Bidder shall furnish to the Owner all such information and data for this purpose as may be requested. The Owner Board reserves the right to inspect Bidder's physical facilities prior to award to satisfy questions regarding the Bidder's capabilities. The Owner further reserves the right to reject any bid if the evidence submitted by, or investigations of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the contract and to complete the work/furnish the item(s) contemplated therein.
- B. The Owner reserves the right to ask any bidder to submit information missing from its bid, to clarify its bid, and to submit additional information which the Owner deems desirable.
- C. Responsible Bidder: In determining a responsible bidder, a number of factors, including but not limited to the following, shall be considered. The bidder shall:
 1. have the ability to comply with the required delivery or performance schedule, taking into consideration other business commitments;
 2. have a satisfactory record of performance;
 3. have a satisfactory record of integrity; and
 4. have the necessary facilities, organization, experience, technical skills, and financial

SECTION 00 0350 – INSTRUCTIONS TO BIDDERS

resources to fulfill the terms of the contract

1.7. NEGOTIATION WITH THE LOWEST BIDDER:

- A. Unless all bids are canceled or rejected, the Owner reserves the right granted by Section 2.2-4318 of the Code of Virginia to negotiate with the lowest responsive, responsible Bidder to obtain a contract price within the funds available. For the purpose of determining when such negotiations may take place, the term "available funds" shall mean those funds which were budgeted by the Owner agency for this contract prior to the issuance of the written Invitation for Bids. Negotiations with the low Bidder may include both modifications of the bid price and the Scope of Work/Specifications to be performed.

1.8. AWARD OF CONTRACT:

- A. An award will be made to the lowest responsive and responsible Bidder. The Owner reserves the right to reject any and all bids in whole or in part, to waive any informality, and to delete items prior to making an award.

End of Section

BID FORM

PROJECT:

New Construction

454 North Madison Road, Orange, VA 22960

OWNER:

Encompass Community Supports

15361 Bradford Road, PO Box 1568, Culpeper, Virginia 22701

Contact: Procurement Department (540) 825-3100

PROPOSAL #1:

We propose to furnish all labor and materials for the construction of the above listed project for Encompass Community Supports in accordance with the drawings and specifications prepared by Sanders Architecture, PC, and consultants, dated September 24, 2024, for the following

sum: _____ (\$ _____).

PROPOSAL #2:

CHANGE ORDERS: For additions to the Project Scope executed through approved Change Orders, we propose the following markup for Overhead & Profit: _____ percent.

PROPOSAL #3:

INSURANCE:

By signing and submitting a bid, the Bidder certifies that it will provide the required insurance as noted in the specifications.

PROPOSAL #4:

UNIT PRICES: In accordance with the description of Unit Prices in Division 1, and further described in each respective Division, we propose the following unit prices for additional or omitted work:

DIVISION 31 – EARTHWORK

1. Rock Removal greater than 1 CY: Add: \$_____/CY

Unit prices includes all costs associated with the unit price work

PROPOSAL #5:

Bid Alternate #1: Parking Pole lights \$_____

Bid Alternate #2: TBD \$_____

PROPOSAL #6:

CONSTRUCTION TIME: Bidder agrees to commence work within (10) days of the Notice to Proceed and to substantially complete the work within _____ calendar days from Notice to Proceed. Final completion within _____ days of the Notice to Proceed.

CONTRACTOR INFORMATION:

PERSONNEL:

We propose the following personnel (resumes attached):

Project Manager: _____

Project Superintendent: _____

REFERENCES:

Bidders shall provide a list of at least 3 references where similar goods and/or services have been provided. Each reference shall include the name of the organization, the complete mailing address, name, and direct telephone number (or email) of the person most familiar with the bidder's work. See attached Contractor Data Sheet.

SIGNATURE:

This Bid is submitted by the following:

Company: _____ Registered VA Contractor # _____

Address: _____ Phone No.: _____

Authorized Signature: _____

Printed Name and Title: _____

Bidder acknowledges the receipt of the following:

Addendum No. _____ dated _____.

Addendum No. _____ dated _____.

Addendum No. _____ dated _____.

Addendum No. _____ dated _____.

SECTION 00 520 – CONSTRUCTION CONTRACT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 1. Construction Contract
 2. Bonds
 3. Insurance Requirements
 4. General Conditions
 5. Supplementary Conditions

1.2 CONSTRUCTION CONTRACT

- A. Contract: AIA Document A107-2017, Standard Form of Agreement Between Owner and Contractor, including (but not limited to) the following modifications:
 1. Project shall be a Stipulated Sum.
 2. Application for Payment: The following shall be submitted:
 - a. General Contractor's Lien Waiver: With each Application for Payment, submit waiver of mechanic's lien related to the Work covered through the current Application for Payment, conditional upon payment by Owner.
 3. Retainage shall be 5%, released in accordance with the form of agreement.
 4. Property Insurance: The Contractor shall purchase Builder's Risk Insurance, listing Rappahannock Rapidan Community Services as an Additional Insured.

1.3 BONDS

- A. Bid Bond: See Bidding Instructions.
- B. Performance Bond: Provide a 100 percent Performance Bond.
 1. Forms: AIA Document A312, PERFORMANCE BOND, AND PAYMENT BOND, current edition, shall be used on this project.
 2. The successful Bidder shall provide executed Standard Performance and Labor and Material Payment Bonds, each in the sum of the contract amount, with the Community Service Board as Obligee.
 - a. A cash escrow or certified check payable to the Community Services shall be acceptable as an alternative
 3. The surety shall be a surety company or companies approved by the State Corporation Commission to transact business in the Commonwealth of Virginia.
 4. Deliver Bond within 3 days of execution of the contract. No payment shall be due and payable to the Contractor, even if the contract has been performed in whole or in part, until the bonds have been delivered to and approved by the purchasing office.

SECTION 00 5200 – CONSTRUCTION CONTRACT REQUIREMENTS

1.4 INSURANCE REQUIREMENTS

- A. By signing and submitting a bid under this solicitation, the Bidder certifies that if awarded the contract, it will have the following insurance coverages at the time the work commences. For construction contracts, if any subcontractors are involved, the subcontractor will have workers' compensation insurance in accordance with Sections 2.2-4332 and 65.2-800 et seq. Of the *Code of Virginia*.
- B. The bidder further certifies that the contractor and any subcontractors will maintain these during the entire term of the contract and that all insurance coverages will be provided by insurance companies authorized to sell insurance in Virginia by the Virginia State Corporation Commission.
- C. Insurance Coverages and Limits Required: see minimum insurance below.
- D. Prior to the commencement of any construction of the Project, General Partner (or Managing Member) shall cause to be obtained by the General Contractor and all employed Subcontractors the following insurance:
 - 1. Commercial General Liability insurance with limits of liability at least \$1 million per occurrence and \$2 million in the aggregate. Coverage shall be maintained for a minimum of three years after completion of the project. The policy shall include the following endorsements and/or conditions:
 - a. Endorsement adding the Limited Partner (or Investor Member) and Special Limited Partner (or Special Member) as additional insureds and certificate holders with respect to ongoing and completed operations.
 - b. Coverage shall be primary for the additional insureds and certificate holders, without contribution from other valid insurance policies which may be carried directly by the additional insureds and certificate holders.
 - c. 30-day Notice of cancellation shall be given to additional insured and certificate holders.
 - d. Limits of insurance shall apply per project.
 - 2. Comprehensive Automobile Liability Insurance, including hired and non-owned vehicles, if any, in the amount of not less than \$1 million.
 - 3. Worker's Compensation insurance with Employer's Liability limits of at least \$500,000 per occurrence.
 - 4. Commercial Umbrella/Excess with a limit of at least \$1,000,000. The policy shall include the following endorsements and/or conditions.
 - a. Umbrella coverage must include as insureds all entities that are additional insureds on the underlying policies.
 - b. Coverage at a minimum extends the coverage of CGL, AL and EL.”
- E. Contractor shall submit certificate of insurance for owner's review and approval prior to the award of the Contract.

SECTION 00 5200 – CONSTRUCTION CONTRACT REQUIREMENTS

1.5 CONTRACTOR EXPERIENCE

- A. Contractors must have successful demonstrated experience and capability to complete LIHTC & VHDA financed projects and comply with EarthCraft Gold, Energy Star, ZERH, Indoor airplus, UD & UFAS requirements.

1.6 GENERAL CONDITIONS

- A. The General Conditions are contained in the Contract.

1.7 SUPPLEMENTARY CONDITIONS

- A. See 00 7300 for Supplementary Conditions

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

End of Section

SECTION 00 7300 - SUPPLEMENTAL CONDITIONS

PART 1 - GENERAL

1.1 ADDITIONAL TERMS AND CONDITIONS

- A. PROCUREMENT REGULATIONS: This solicitation is subject to the provisions of the purchasing regulations of the Community Services Board and any revisions thereto, which are hereby incorporated into this contract in their entirety. A copy of these regulations are available for review at the purchasing office and, in addition, a copy can be obtained by (540) 825-3100.
- B. APPLICABLE LAWS AND COURTS: This solicitation and any resulting contract shall be governed in all respects by the laws of the Commonwealth of Virginia and any litigation with respect thereto shall be brought in the courts of the Commonwealth. The Contractor shall comply with applicable federal, state and local laws and regulations.
- C. LAWS AND REGULATIONS:
1. The Contractor shall comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the Work and shall give all notices required thereby.
 2. This Contract and all other contracts and subcontracts are subject to the provisions of Articles 3 and 5, Chapter 4, Title 40.1, Code of Virginia, relating to labor unions and the "right to work," The Contractor and its Subcontractors, whether residents or nonresidents of the Commonwealth, who perform any work related to the project shall comply with all of the said provisions.
 3. The provisions of all rules and regulations governing safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia, and as issued by the Department of Labor and Industry under Title 40.1 of the Code of Virginia shall apply to all work under this contract. Inspectors from the Department of Labor and Industry shall be granted access to the Work for inspection without first obtaining a search warrant from the court.
 4. The Contractor, if not licensed as an asbestos abatement contractor or an RFS contractor in accordance with Section 54.1-514, Code of Virginia, shall have all asbestos related Work performed by subcontractors who are duly licensed as asbestos contractors or RFS contractors as appropriate for the Work required.
- D. DRUG FREE WORKPLACE: During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.

SECTION 00 7300 - SUPPLEMENTAL CONDITIONS

For the purposes of this section, “*drug-free workplace*” means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

The Contractor acknowledges and certifies that it understands that the following acts by the Contractor, its employees, and/or agents performing services on state property are prohibited.

- a. The unlawful manufacture, distribution, dispensing, possession or use of alcohol or other drugs; and
- b. Any impairment or incapacitation from the use of alcohol or other drugs (except the use of drugs for legitimate medical purposes).

The Contractor further acknowledges and certifies that it understands that a violation of these prohibitions constitutes a breach of contract and may result in default action being taken by the CSB in addition to any criminal penalties that may result from such conduct.

E. PAYMENTS TO SUBCONTRACTORS:

1. A contractor awarded a contract under this solicitation is hereby obligated:
 - a. To pay the subcontractor(s) within seven (7) days of the contractor’s receipt of payment from the CSB for the proportionate share of the payment received for work performed by the subcontractor(s) under the contract; or
 - b. To notify the CSB and the subcontractor(s), in writing, of the contractor’s intention to withhold payment and the reason.
2. The contractor is obligated to pay the subcontractor(s) interest at the rate of one percent per month (unless otherwise provided under the terms of the contract) on all amounts owed by the contractor that remain unpaid seven (7) days following receipt of payment from the CSB, except for amounts withheld as stated in (2) above. The date of mailing of any payment by U.S. Mail is deemed to be payment to the addressee. These provisions apply to each sub-tier contractor performing under the primary contract. A contractor’s obligation to pay an interest charge to a subcontractor may not be construed to be an obligation of the CSB.

F. ASSIGNMENT OF CONTRACT: A contract shall not be assignable by the Contractor in whole or in part without the written consent of the Community Services Board.

G. TESTING AND INSPECTION:

1. The Community Services Board reserves the right to conduct any test/inspection it may deem advisable to assure supplies and services conform to the specification.
2. Job-site inspections, tests conducted on site or tests of materials gathered on site, which the Contract requires to be performed by independent testing entities, shall be contracted and paid for by the Owner. Examples of such tests are the testing of cast in-place concrete, foundation materials, soil compaction, pile installations, caisson bearings and steel framing connections. Although conducted by independent testing entities, the Owner will not contract and pay for tests or certifications of materials, manufactured products or assemblies which the Contract, codes, standards, etc. require to be tested and/or certified for compliance with industry standards such as Underwriters Laboratories, Factory Mutual or ASTM. If there are any fees to be paid for such tests and certifications, they will be

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paid by the Contractor. The Contractor shall also pay for all inspections, tests, and certifications which the Contract specifically requires him to perform or pay, together with any inspections and tests which he chooses to perform for his own quality control purposes. The Contractor shall promptly furnish, without additional charge, all reasonable facilities, labor and materials necessary and convenient for making such tests. Except as provided below, whenever such examination and testing finds defective materials, equipment or workmanship, the Contractor shall reimburse the Owner for the cost of reexamination and retesting.

3. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire Work to make an examination of any part of the Work already completed, by removing or tearing out portions of the Work, the Contractor shall on request promptly furnish all necessary facilities, labor and material to expose the Work to be tested to the extent required. If such Work is found to be defective in any respect, due to the fault of the Contractor or his Subcontractors, he shall defray all the expenses of uncovering the Work, of examination and testing, and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of the Contractor's labor and material necessarily involved in uncovering the Work, the cost of examination and testing and Contractor's cost of material and labor necessary for replacement shall be paid to the Contractor and he shall, in addition, if completion of the Work has been delayed thereby, be granted a suitable extension of time.
4. The Project Inspector will recommend to the Owner that the Work be suspended when in his judgment the drawings and specifications are not being followed. Any such suspension shall be continued only until the matter in question is resolved to the satisfaction of the Owner. The cost of any such Work stoppage shall be borne by the Contractor unless it is later determined that no fault existed in the Contractor's Work.
5. The Project Inspector has no authority to and shall not:
 - a. Authorize deviations from the Contract Documents;
 - b. Enter into the area of responsibility of the Contractor's superintendent;
 - c. Issue directions relative to any aspect of construction means, methods, techniques, sequences or procedures, or in regard to safety precautions and programs in connection with the Work;
 - d. Authorize or suggest that the Owner occupy the project, in whole or in part;
 - e. Issue a certificate for payment.

H. SUPERINTENDENCE BY CONTRACTOR

1. The Contractor shall have a competent foreman or superintendent, satisfactory to the Owner, on the job site at all times during the progress of the Work. The Contractor shall be responsible for all construction means, methods, techniques, sequences and procedures, for coordinating all portions of the Work under the Contract except where otherwise specified in the Contract Documents, and for all safety and worker health programs and practices. The Contractor shall notify the Owner, in writing, of any proposed change in superintendent including the reason therefor prior to making such change.
2. The Contractor shall, at all times, enforce strict discipline and good order among the workers on the project, and shall not employ on the work any unfit person, anyone not skilled in the work assigned to him, or anyone who will not work in

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harmony with those employed by the Contractor, the Subcontractors, the Owner or the Owner's separate contractors and their subcontractors.

3. The Owner may, in writing, require the Contractor to remove from the Work any employee the Owner deems to be incompetent, careless, not working in harmony with others on the site, or otherwise objectionable.
- I. ACCESS TO WORK: The Owner, the Owner's inspectors and other testing personnel, and inspectors from the Department of Labor and Industry shall have access to the Work at all times. The Contractor shall provide proper facilities for access and inspection.
- J. AVAILABILITY OF MATERIALS: If material specified in the Contract Documents is not available on the present market, alternate materials may be proposed by the Contractor for approval of the Architect.
- K. CONTRACTOR'S TITLE TO MATERIALS: No materials or supplies for the work shall be purchased by the Contractor or by any Subcontractor subject to any security interest, installment or sales contract or any other agreement or lien by which an interest is retained by the seller or is given to a secured party. The Contractor warrants that he has clear title to all materials and supplies which he uses in the Work or for which he accepts payment in whole or in part.
- L. DEFAULT: In case of failure to deliver goods or services in accordance with the contract terms and conditions, the Community Services Board, after due oral or written notice, may procure them from other sources and hold the Contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies which the Community Services Board may have.
- M. AUDIT: The Contractor hereby agrees to retain all books, records, and other documents relative to this contract for five (5) years after final payment, or until audited by the Community Services Board, whichever is sooner. The agency, its authorized agents, and/or State auditors shall have full access to and the right to examine any of said materials during said period.
- N. CONTRACT MANAGEMENT AND ADMINISTRATION: A contract manager will be appointed by the Community Services Board who will be responsible for monitoring contractor performance, resolving contractual issues, and interpreting contractual terms and conditions. Further, the Contract Manager may pursue any issue(s), relating to the contract agreement that results from this solicitation, that are in the best interest of the Community Services Board. The Contract Manager is not authorized to make or authorize changes to the contract, to approve additional work or expenditures, or to change deliverables or timeframes.
- O. CRIMINAL HISTORY: The Community Services Board reserves the right to restrict activities required to provide the services herein to only those persons who are without criminal conviction. This restriction shall not relieve the contractor of any requirements herein. Upon request of the Community Services Board, the contractor shall obtain a criminal history background check on any person, employee or subcontractor used for the delivery of services herein. The Community Services Board may, in its sole decision, determine that an individual possessing a criminal conviction poses no risk or threat to

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the Community Services Board, its employees or clients, and may waive this restriction on a case by case basis.

- P. SEVERABILITY: Each paragraph and provision of this agreement is severable from the entire agreement, and if any provision is declared invalid, the remaining provisions shall nevertheless remain in effect.
- Q. SUBCONTRACTING ENCOURAGED: It is the policy of the Community Services Board to contribute to the establishment, preservation, and strengthening of disadvantaged minority, small and women-owned businesses and to encourage their participation in the CSB procurement activities. Toward that end, the CSB encourages contractors to provide for the participation of disadvantaged minority businesses, small, and women-owned businesses through partnerships, joint ventures, subcontracts, and other contractual opportunities.
- R. SEPARATE CONTRACTS
If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up, the Owner may clean up and charge the cost thereof to the respective Contractors in proportion to their responsibility. If a Contractor disputes the Owner's apportionment of clean-up costs, it shall be that Contractor's burden to demonstrate and prove the correct apportionment.
- S. REMOVAL OF DEBRIS: During and at completion of the Work, the Contractor shall prevent site soil erosion, the runoff of silt and/or debris carrying water from the site, and the blowing of debris off the site in accordance with the applicable requirements and standards of the Virginia Erosion and Sediment Control Handbook, latest edition, and of the Contract Documents.
- T. PROTECTION OF PERSONS AND PROPERTY
1. The Contractor expressly undertakes, both directly and through its Subcontractor(s), to take every precaution at all times for the protection of persons and property which may come on the building site or be affected by the Contractor's operation in connection with the Work.
 2. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.
 3. The provisions of all rules and regulations governing safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia, issued by the Department of Labor and Industry under Title 40.1 of the *Code of Virginia* shall apply to all work under this Contract.
 4. The Contractor shall continuously maintain adequate protection of all his work from damage and shall protect the Owner's property from injury or loss arising in connection with this Contract. He shall make good any such damage, injury or loss, except such as may be directly due to errors in the Contract Documents or caused by agents or employees of the Owner. He shall adequately protect adjacent property to prevent any damage to it or loss of use and enjoyment by its owners. He shall provide and maintain all passageways, guard fences, lights and other facilities for protection required by public authority, local conditions, any of the Contract Documents or erected for the fulfillment of his obligations for the protection of persons and property.

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- U. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT: If the Owner should fail to pay to the Contractor within thirty (30) days when no dispute exists as to the sum, then the Contractor may, upon ten (10) calendar days written notice to the Owner, stop work or terminate the Contract and recover from the Owner payment for the cost of the Work actually performed, together with overhead and profit thereon, but profit shall be recovered only to the extent that the Contractor can demonstrate that he would have had profit on the entire Contract if he had completed the Work. The Contractor may not receive profit or any other type of compensation for parts of the Work not performed. The Contractor may recover the cost of physically closing down the job site, but no other costs of termination. The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. In no event shall termination of the Contract by the Contractor terminate the obligations of the Contractor's surety on its payment and performance bonds.
- V. BREACH: In the event of breach by the Contractor, the Community Services Board shall have the right to immediately, or thereafter, terminate the contract. In the alternative, the Community Services Board may give written notice to the Contractor specifying the breach and providing a period of time in which such breach must be corrected. Should the Community Services Board find that the Contractor has failed to properly cure any breach after being provided with appropriate notification then the Community Services Board can cause the contractual agreement between the Contractor and the Community Services Board to be terminated for breach. All remedies provided by law will then apply to those orders or the agreement as a whole. The Community Services Board's failure to exercise its right to terminate for breach under this provision shall not be construed as a waiver of its right to terminate, rescind or revoke a contract in the event of any subsequent breach of any provisions of this Agreement.
- W. CANCELLATION OF CONTRACT: The Community Services Board reserves the right to cancel and terminate any resulting contract, in part or in whole, without penalty, upon 60 days written notice to the Contractor. Any contract cancellation notice shall not relieve the Contractor of the obligation to deliver and/or perform on all outstanding orders issued prior to the effective date of cancellation.
- X. OWNER'S RIGHT TO TERMINATE THE CONTRACT FOR CAUSE
1. If the Contractor should be adjudged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, the Owner may terminate the Contract. If the Contractor should persistently or repeatedly refuse or should fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or suppliers of material or labor, or persistently disregards laws, ordinances or the written instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner may terminate the Contract.
 2. Prior to termination of the Contract, the Owner shall give the Contractor and his surety ten (10) calendar days written notice, during which the Contractor and/or his surety may rectify the cause of the termination. If rectified to the satisfaction of the Owner within said ten (10) days, the Owner may rescind its notice of termination. If it does not, the termination for cause shall become effective at the end of the ten day (10) notice period. In the alternative, the Owner may postpone the effective date of the termination notice, at its sole discretion, if it should receive

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reassurances from the Contractor and/or its surety that the causes of termination will be remedied in a time and manner which the Owner finds acceptable. If at any time more than ten (10) days after the notice of termination, the Owner determines that Contractor and/or its surety has not or is not likely to rectify the causes of termination in an acceptable manner or within the time allowed, then the Owner may immediately terminate the Contract for cause by giving written notice to the Contractor and its surety. In no event shall termination for cause terminate the obligations of the Contractor's surety on its payment and performance bonds.

3. Notice of terminations, whether initial or given after a period of postponement, may be served upon the Contractor and the surety by mail or any other means at their last known places of business in Virginia or elsewhere, by delivery to any officer or management/supervisory employee of either wherever they may be found, or, if no such officer, employee or place of business is known or can be found by reasonable inquiry within three (3) days, by posting the notice at the job site. Failure to accept or pick up registered or certified mail addressed to the last known address shall be deemed to be delivery.
4. If it should be judicially determined that the Owner improperly terminated this Contract for cause, then the termination shall be deemed to be a termination for the convenience of the Owner.
5. Termination of the Contract under this section is without prejudice to any other right or remedy of the Owner.

Y. TERMINATION BY OWNER FOR CONVENIENCE

1. Owner may terminate this Contract at any time without cause, in whole or in part, upon giving the Contractor notice of such termination. Upon such termination, the Contractor shall immediately cease Work and remove from the project site all of its labor forces and such of its materials as Owner elects not to purchase or to assume in the manner hereinafter provided. Upon such termination, the Contractor shall take such steps as Owner may require to assign to the Owner the Contractor's interest in all Subcontracts and purchase orders designated by Owner. After all such steps have been taken to Owner's satisfaction, the Contractor shall receive as full compensation for termination and assignment the following:
 - a. All amounts then otherwise due under the terms of this Contract,
 - b. Amounts due for work performed subsequent to the latest Request for Payment through the date of termination,
 - c. Reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of such termination. The Contractor shall not be entitled to any compensation for lost profits or for any other type of contractual compensation or damage other than those provided by the preceding sentence. Upon payment of the forgoing, Owner shall have no further obligations to the Contractor of any nature.
2. In no event shall termination for the convenience of the Owner terminate the obligations of the Contractor's surety on its payment and performance bonds.

Z. GUARANTEE OF WORK

1. Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment or workmanship for one (1) year from the date of final acceptance of the entire project by the Owner in writing. Equipment and facilities, which have seasonal limitations

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- on their operation, shall be guaranteed for one (1) full year from the date of seasonally appropriate tests and acceptance, in writing, by the Owner.
2. If, within the guarantee period, defects are noticed by the Owner which require repairs or changes in connection with the guaranteed work, those repairs or changes being in the opinion of the Owner rendered necessary as the result of the use of materials, equipment or workmanship, which are defective, or inferior or not in accordance with the terms of the contract, then the Contractor shall, promptly upon receipt of notice from the Owner, such notice being given not more than two weeks after the guarantee period expires, and without expense to the Owner:
 - a. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects therein;
 - b. Make good all damage to the structure or site or equipment or contents thereof, which is the result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the terms of the contracts; and
 - c. Make good any work or materials or the equipment and contents of structures or the site disturbed in fulfilling any such guarantee.
 3. In any case, where in fulfilling the requirements of the Contract or any guarantee embraced in or required thereby, the Contractor disturbs any work guaranteed under contract, he shall restore such work to a condition satisfactory to the Owner and guarantee such restored work to the same extent as it was guaranteed under such other Contract.
 4. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected and the Contractor and his surety shall be liable for all expense incurred.
 5. All special guarantees applicable to definite parts of the work that may be stipulated in the specifications or other papers forming a part of the Contract shall be subject to the term of this section during the first year of the life of such special guarantee.
 6. Nothing contained in this section shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including liability for defective work under these additional terms and conditions. This paragraph relates only to the specific obligation of the Contractor contained in this section to correct the work and does not limit the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor of the time within which proceedings may be commenced to establish the Contractor's liability with respect to his other obligations under this Contract.
 7. In the event the work of the Contractor is to be modified by another Contractor, either before or after the Final Inspection, the first Contractor shall remain responsible in all respect under the Guarantee of Work and under any other warranties provided in the contract or by law. However, the Contractor shall not be responsible for any defects in material or workmanship introduced by the Contractor modifying its work. Both the first Contractor and the Contractor making the modifications shall each be responsible solely for the work done by each. The Contractor modifying the earlier work shall be responsible for any damage to or defect introduced into the work which it is modifying. If any Contractor shall claim that another Contractor has introduced defects of materials and/or workmanship into the work of the first, it shall be the burden of the Contractor making the claim to clearly demonstrate the nature and extend of such introduced defects and the

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responsibility of the other Contractor. Any Contractor modifying the work of another shall have the same burden if he asserts defects to have been caused by the Contractor whose work he is modifying.

End of Section

EarthCraft Multifamily New Construction Worksheet		Points	Planned	Status	Documentation
SITE PLANNING (SP)					
SP1: SITE SELECTION					
OPTIONAL AT ALL LEVELS					
SP 1.0 Type of site: 1. Brownfield site 2. Previously developed site 3. Infill site A. >50% B. >75%	Select all that apply:				Site Plan
	3				
	1	1			
	Select one:				
	1				
	2				
SP 1.1 Dwelling units per acre: 1 ≥ 15 dwelling units per acre 2 ≥ 20 dwelling units per acre 3 ≥ 25 dwelling units per acre	Select one:				Site Plan
	1				
	2	3			28 units / acre
	3				
SP 2: SITE DESIGN					
OPTIONAL AT ALL LEVELS					
SP 2.0 Connectivity to: 1. Walking distance to bus line (≤1/2 mile) A. Existing B. Planned	Select One:				Site Plan, Location
	2	2			
	1				
2. Walking distance to rail/rapid transit (≤1/2 mile) A. Existing B. Planned	Select One:				
	3		0		
	1				
3. Biking distance to bike path (≤1/2 mile) A. Existing B. Planned	Select One:				
	2		0		
	1				
4. Walking distance to public openspace or greenspace ≥3/4 acre in size (≤1/2 mile) A. Existing B. Planned	Select One:				
	2		0		
	1				
5. Walking distance to mixed uses (≤1/2 mile) A. 6 or more mixed uses B. 4 or more mixed uses	Select One:				
	2		0		
	1				
SP 2.1 Shade at least 50% of hardscape within 30' of building	2	0			Calculation
SP 2.2 Reduce light pollution - all exterior lights full cutoff	4	4			ELEC. POSSIBLY
SP 2.3 Permanent stormwater control: A. ≥25% of onsite impervious surface areas B. ≥50% of onsite impervious surface areas C. ≥75% of onsite impervious surface areas	Select one:				Calculation
	2				
	3		0		
	4				
SP 2.4 Street Trees are ≤ 40' on center at minimum	1	1			
SP 2.5 Connectivity to adjacent sites: 1. Vehicular access (2+ connections) 2. Dedicated pedestrian and bike access	Select all that apply:				
	1	1			
	1	0			
SP 2.6 Community Gardens	1	0			
SP 2.7 Outdoor Community gathering space	2	2			
SP 2.8 Install plant species that serve as pollinators on site for regional wildlife and/or local endangered species for a minimum of 20% of plantings	1	0			
SP 2.9 Parking reduced below local ordinance (1:1 ratio)	1				Local ordinance
SP 3: SITE PREPARATION AND PRESERVATION MEASURES					
REQUIRED AT ALL LEVELS					
SP 3.0 Workshop on erosion and sediment control	-	-			Certificate
SP 3.1 Site assessment identifying all greenspace and tree save potential	-	-			Greenspace/Tree survey
SP 3.2 Erosion and sedimentation control plan	-	-			E&S plan
SP 3.3 Do not install invasive plants on site	-	-			Plant list
SP 3.4 Comply with all federal, state, and local government erosion control and tree protection measures	-	-			
SP 3.5 Phase I environmental testing and remediation plan (if applicable)	-	-			Phase I
SP 3.6 On-call personnel designated for erosion control during rain events	-	-			Contact Person
SP 3.7 Downstream water quality testing (if applicable)	-	-			Test data
SP 3.8 Label all storm drains or storm inlets to discourage dumping of pollutants	-	-			Photographs
SP 3.9 Road/vehicle cleaning protocols posted and enforced	-	-			Photographs
OPTIONAL AT ALL LEVELS					
SP 3.10 Tree preservation and protection measures employed on site	2	2			Site plan
SP 3.11 Leave site undisturbed and protect greenspace from future development (min 25%)	2				Site plan
SP 3.12 Mill cleared logs (100%)	1	0			Contract
SP 3.13 Grind stumps and limbs for mulch (≥80%)	1	1			Photographs
SP 3.14 Tree planting (12 trees per acre; trees ≥ 2" diameter)	2	0			Site plan
SP 4: ALTERNATIVE TRANSPORTATION ACCOMODATIONS					
OPTIONAL AT ALL LEVELS					
SP 4.0 Bike racks	1	1			
SP 4.1 Covered bike storage facility	1	0			
SP 4.2 Tenant access to business center	1				
SP 4.3 Covered bus stop	2	2			
SP 4.4 Electric vehicle charging facility	2	2			
SITE PLANNING TOTAL			22	0	
CONSTRUCTION WASTE MANAGEMENT (CW)					
REQUIRED AT ALL LEVELS					
CW 1.0 No construction materials burned or buried on site	-	-			
CW 1.1 Only state-approved landfills may be utilized	-	-			
OPTIONAL AT ALL LEVELS					
					Waste manmt plan, pick up tickets

CW 1.2 Post waste management plan and divert 75% from landfill of: 1. Wood 2. Cardboard 3. Metal (including beverage containers) 4. Drywall (recycle or grind and spread on site) 5. Plastic (including beverage containers) 6. Shingles	Select all that apply:			Waste might, plan, pick up debris
	2	2		
	1	1		
	1	1		
	2			
	1	1		
CW 1.3 Central Cut Area	2	2		
CW 1.4 Previously developed site: divert ≥25% of demolition waste from landfill	2			
CONSTRUCTION WASTE MANAGEMENT TOTAL				9 0
RESOURCE EFFICIENCY (RE)				
RE 1: RESOURCE EFFICIENT DESIGN				
REQUIRED AT ALL LEVELS				
RE 1.0 Limit framing at all windows and doors	-	-		
RE 1.1 Engineered roof framing (90%)	-	-		
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED				
RE 1.2 Advanced Framing: 1. 2-stud corners where structurally feasible 2. Ladder T-walls where structurally feasible 3. Size headers for loads (non-structural headers in non-load bearing walls)	Select all that apply:			
	3	3		
	2	2		
	1	1		
OPTIONAL AT ALL LEVELS				
RE 1.3 Average floor area of unit: A. < 800 square feet B. 800-1100 square feet	Select one:			
	2	2		
RE 1.4 Floor joists are 24" on center (≥80%)	1	0		
RE 1.5 Non-load bearing wall studs are 24" on center	1	0		
RE 2: ADVANCED FRAMING PRODUCTS				
OPTIONAL AT ALL LEVELS				
RE 2.0 Precast insulated foundation walls (≥90%)	2	0		
RE 2.1 Insulated concrete forms or precast autoclaved aerated concrete (≥90%): 1. Foundation walls 2. Exterior walls	Select all that apply:			
	2	0		
	3			
RE 2.2 Engineered wall framing (≥90%)	1	0		
RE 2.3 Deliver panelized construction or SIPs to the site pre-framed (≥90%): 1. Floors 2. Exterior walls 3. Roof 4. Modular construction	Select all that apply:			
	2	0		
	2	2		
	2	0		
	2			
RE 2.4 Structural headers are steel or engineered wood (≥90%)	2	0		
RE 3: LOCAL, RECYCLED AND/OR NATURAL CONTENT MATERIALS				
OPTIONAL AT ALL LEVELS				
RE 3.0 Use recycled concrete or alternate material as aggregate in foundation	1			Product literature
RE 3.1 Replace ≥25% of cement in concrete with fly ash or slag: 1. Slab and/or foundation walls (100%) 2. Exterior cladding and trim (≥75%)	Select all that apply:			Product literature
	1	1		
	1	1		
RE 3.2 Lumber/Millwork/Flooring: Use No Tropical Wood	2	2		Product literature
RE 3.3 Use building materials extracted, processed and manufactured ≤500 miles from site (1 point per product maximum 5 points)	1-5	3		
RE 3.4 Reused, recycled, MDF with no added urea-formaldehyde, local species or FSC certified wood in all: 1. Cabinet faces 2. Countertops	Select all that apply:			Product literature
	2	2		
	2	2		
RE 3.5 Exterior cladding and trim (≥25% recycled content material on ≥75% area)	2			Product literature
RE 3.6 Insulation (≥25% recycled content material)	1	1		Product literature
RE 3.7 Flooring: 1. Cork, natural linoleum, sealed concrete or bamboo flooring (≥20% of total floor area) 2. Recycled content tiles (≥30% recycled content material on 100% of tile floor area) 3. Carpet (≥50% recycled content material on ≥50% of all carpeted floor area) 4. Biodegradable carpet and backing (≥50% of all carpeted floor area)	Select all that apply:			Product literature
	2			
	2			
	1	1		
	2			
RE 3.8 Engineered trim: 1. Interior (≥80%) 2. Exterior, including soffit, fascia and trim (≥75%)	Select all that apply:			Product literature
	1	0		
	1	0		
RE 3.9 Roofing material (≥50% recycled content material on ≥90% area)	2			Product literature
RE 4: BUILDING REUSE				
RE 4.0 Gut Rehab (project exposing wall cavities or removing exterior cladding) or Adaptive Reuse (for adaptive reuse see addendum to worksheet)	8			
RESOURCE EFFICIENCY TOTAL				23 0

DURABILITY AND MOISTURE MANAGEMENT (DU)				
DU 1: PRODUCTS AND APPLICATIONS				
REQUIRED AT ALL LEVELS				
DU 1.0	All roof valleys direct water away from walls, dormers, chimneys, etc.	-	-	
DU 1.1	Install drainage plane per manufacturer's specifications	-	-	
DU 1.2	Integrate drainage plane with:	All must comply:		
	1. Window and door pan flashing at sills and side flashing	-	-	
	2. Window and door head/top flashing	-	-	
DU 1.3	Double layer of building paper or house wrap behind cementitious stucco, stone veneer or synthetic stone veneer on framed walls	-	-	
DU 1.4	Roof gutters discharge water ≥5' from foundation	-	-	
DU 1.5	Flashing:	All must comply:		
	1. Self-sealing bituminous membrane or equivalent at valleys and roof deck penetrations	-	-	
	2. Step and kick-out flashing at wall/roof and wall/porch intersections, flashing ≥4" on wall surface and integrated with wall and roof/deck/porch drainage planes	-	-	
DU 1.6	Continuous foundation termite flashing (Required if slab edge is insulated)	-	-	
DU 1.7	Maintain 2" clearance between wall siding and roof surface	-	-	
DU 1.8	Install air conditioner condensing unit pad	-	-	
DU 1.9	Roof drip edge with ≥1/4" overhang	-	-	
DU 1.10	Drain pan for water heaters and washing machines	-	-	
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED				
DU 1.11	Enclosed crawlspace, if applicable to design	2		
DU 1.12	Moisture-resistant wallboard in bathrooms	2	2	
DU 1.13	Flashing at bottom of exterior walls integrated with drainage system	2	2	
OPTIONAL AT ALL LEVELS				
DU 1.14	Alternative termite treatment with no soil pretreatment	2	2	
DU 1.15	Non-toxic pest treatment:	Select all that apply:		
	1. All lumber in contact with foundation (≥36" above foundation)	1		
	2. All lumber	2		
	3. Mold inhibitor with warranty applied to all lumber	1		
DU 1.16	Vented rain screen behind exterior cladding	2	0	
DU 1.17	Install termite mesh system	3	3	
DU 1.18	Exterior cladding (≥75% facade) with ≥ 30-year warranty	2	2	Warranty
DU 1.19	Windows, doors and skylights with ≥25-year warranty	1		Warranty
DU 1.20	Insulate cold water pipes ≥R-2	1	1	POSSIBLE
DU 1.21	All entrance doors have overhang ≥3' depth	1	1	
DU 1.22	Roofing warranty:	Select one:		
	A. ≥40-year	1		
	B. ≥50-year	2	1	Warranty
DU 2: MOISTURE MANAGEMENT				
REQUIRED AT ALL LEVELS				
DU 2.0	Gravel bed (57's, no fines) beneath sub-grade slabs, on grade slabs, or raised slabs	-	-	Photographs
DU 2.1	100% coverage of ≥6mil vapor barrier beneath all slabs, in all crawlspaces	-	-	Photographs
DU 2.2	Foundation drain on top of sub-grade footing	-	-	
DU 2.3	Patio slabs, walks and driveways sloped ≥1/4" per 1' away from building for ≥10' or to the edge of the surface, whichever is less	-	-	
DU 2.4	Final site grade sloped ≥1/2" per 1' away from home for ≥10' or to the edge of the site, whichever is less	-	-	
DU 2.5	Do not install wet or water-damaged building materials	-	-	
DU 2.6	Capillary break between foundation and framing at exterior walls	-	-	
DU 2.7	Drainage board and damp proofing for below-grade walls	-	-	
DU 2.8	Design for additional dehumidification: rough-in electrical and plumbing for dehumidifier	-	-	
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED				
DU 2.9	Additional dehumidification system: Basement or sealed crawlspace system	2	2	
DU 2.10	Foundation drain at outside perimeter edge of footing surrounded with 6" clean gravel and fabric filter	2	2	Photographs
OPTIONAL AT ALL LEVELS				
DU 2.11	Install whole-house ENERGY STAR dehumidifier	4	4	Product literature
DU 2.12	Slab and crawlspace vapor barrier ≥10 mil or reinforced	1	1	Photographs
DU 2.13	Humidistat or thermidistat used with whole-house variable speed cooling system	2		Product literature
DU 2.14	Capillary break:	Select all that apply:		
	1. Between ground/footing or footing/foundation	2	2	
	2. Between foundation and framing for all walls	1	1	
DURABILITY AND MOISTURE MANAGEMENT TOTAL			26	0

INDOOR AIR QUALITY (IAQ)			
IAQ 1: COMBUSTION SAFETY			
REQUIRED AT ALL LEVELS			
IAQ 1.0	No unvented combustion fireplaces, appliances, or space heaters	-	-
IAQ 1.1	All fireplaces have outdoor combustion air supply and masonry-built fireplaces have gasketed doors	-	-
IAQ 1.2	No atmospherically vented water heaters or furnaces	-	-
IAQ 1.3	Sealed-combustion or electric water heater, must be installed in conditioned space	-	-
IAQ 1.4	Carbon monoxide detector required if combustion appliances exist	-	-
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED			
IAQ 1.5	If installed, all fireplaces meet indoor air quality guidelines and have gasketed doors	2	
IAQ 2: INDOOR POLLUTANT CONTROL			
REQUIRED AT ALL LEVELS			
IAQ 2.0	Protect all ducts until construction is complete	-	-
IAQ 2.1	Filter(s) easily accessible for property maintenance to service	-	-
IAQ 2.2	Provide rodent and corrosion proof screens with mesh ≤0.5" for all openings not fully sealed or caulked	-	-
IAQ 2.3	All outdoor supply air crosses filter prior to distribution	-	-
IAQ 2.4	All interior paints are ≤ 100g/L VOC content	-	-
IAQ 2.5	No carpet in below grade units	-	-
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED			
IAQ 2.6	Filters are ≥ MERV 8	1	1
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED			
IAQ 2.7	Certified low or no VOC materials:	Select all that apply:	
	1. Interior paints	1	1
	2. Stains and finishes on wood floors	2	
	3. Sealants and adhesives	2	
	4. Carpet	1	1
	5. Carpet pad	1	1
	6. Carpet pad adhesive	2	2
IAQ 2.8	Protect all bath fans until floor/wall finishing is complete	1	1
OPTIONAL AT ALL LEVELS			
IAQ 2.9	No added urea-formaldehyde:	Select all that apply	
	1. Insulation	1	1
	2. Subfloor	1	
	3. All cabinets, shelves, and countertops	2	2
IAQ 2.10	Seal all particle board surfaces with water-based sealant	1	1
IAQ 2.11	No carpet in all units	3	3
IAQ 2.12	No carpet in main living area of all units	1	1
IAQ 2.13	Permanent walk-off mats installed at main entrances	1	
INDOOR AIR QUALITY TOTAL		15	0
HIGH PERFORMANCE BUILDING ENVELOPE (BE)			
REQUIRED AT ALL LEVELS			
BE 0.1	IECC adopted by jurisdiction plus applicable state amendments	-	-
BE 0.2	Certified level projects must achieve a confirmed HERS Index ≤ 75	-	-
BE 0.3	Gold and Platinum level projects must achieve a confirmed HERS Index ≤ the ENERGY STAR Multifamily New Construction Target HERS Index (Adaptive Reuse Project must follow Adaptive Reuse Tab)	-	-
OPTIONAL AT ALL LEVELS			
BE 0.4	Confirmed HERS Index ≤ Zero Energy Ready Home Target HERS Index	5	5
BE 1: AIR SEALING MEASURES			
REQUIRED AT ALL LEVELS - DESIGN FOR UNIT COMPARTMENTALIZATION			
BE 1.0	Vapor barriers installed under slabs and crawls only and not on any vertical surfaces	-	-
BE 1.1	Seal bottom plates to subfloor or foundation for entire unit envelope	-	-
BE 1.2	Block and seal joists cavities:	All must comply:	
	1. Above supporting walls at cantilevered floors	-	-
	2. Under attic kneewalls	-	-
	3. Above attached garage walls	-	-
BE 1.3	Block stud cavities at change in ceiling height	-	-
BE 1.4	Install blocking and baffles in insulated and vented attics	-	-
BE 1.5	Seal penetrations through:	All must comply:	
	1. Foundations and exterior wall assemblies	-	-
	2. Top and bottom plates	-	-
	3. Band and rim joists	-	-
	4. Insulated subfloor	-	-
	5. Sheathing	-	-
	6. Walls and ceilings in attached garages	-	-
	7. All ceilings	-	-
BE 1.6	Seal penetrations around:	All must comply:	
	1. Shower, sinks, toilets and tub drains	-	-
	2. HVAC supply and return boots sealed to subfloor or drywall (floor, walls, or ceilings)	-	-
	3. Window and door rough openings	-	-
	4. All drywall penetrations (common walls between attached units included)	-	-
	5. Exhaust fans to drywall	-	-
	6. Attic pull-down stairs, scuttle holes and kneewall doors	-	-
	7. Chases	-	-
BE 1.7	Seal seams and gaps in:	All must comply:	
	1. Band joist sheathing	-	-
	2. Exterior wall sheathing	-	-
	3. All seams in SIP's	-	-

BE 1.8 Install rigid air barriers: 1. Behind tubs and showers on insulated walls 2. At attic kneewall on attic-side (including skylight shafts) 3. At chases in contact with the building envelope (including fireplace chases) 4. Along staircases on insulated walls 5. Along porch roofs 6. At dropped ceiling/soffit 7. At all band joists above unit separation walls	All must comply:		
	-	-	
	-	-	
	-	-	
	-	-	
	-	-	
	-	-	
	-	-	
BE 1.9 Install weather-stripping at: 1. All exterior doors (if not included in door assembly) 2. Attic kneewall doors, scuttle holes and pull down stairs	All must comply:		
	-	-	
BE 1.10 All recessed can lights must be air tight, gasketed at all floors and also IC-rated in insulated ceilings; in Climate Zone 4, insulate exterior surface of fixture to ≥R-10	-	-	
BE 1.11 Fire rated assemblies that do not use draft block in band areas must comply with Air Tight Drywall	-	-	
BE 1.12 Units adjacent to CMU walls: framing and sub-floor at unit envelope, including interstitial space, must be sealed to CMU	-	-	
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED			
BE 1.13 Seal top plate to drywall at the attic level	2	2	
OPTIONAL AT ALL LEVELS			
BE 1.14 Comply with Air tight drywall approach (required if band area draft blocking is not used)	4	4	
BE 1.15 Gypcrete on all framed floors separating unit envelopes	1	1	
BE 1.16 Two pour application of gypcrete to include areas blocked by drywall	1		
BE 1.17 Firewalls/party walls that eliminate air gap (UL-U370 or equivalent)	2		
BE 2: BLOWER DOOR TEST			
REQUIRED AT ALL LEVELS			
BE 2.0 Air Changes per Hour ≤ 5 ACH50	-	-	
OPTIONAL AT ALL LEVELS			
BE 2.1 Air Changes per Hour ≤ 4 ACH50	7		
BE 2.2 Air Changes per Hour ≤ 3 ACH50	10		
BE 3: INSULATION			
REQUIRED AT ALL LEVELS			
BE 3.0 Floors: 1. Framed ≥ R-19 2. Cantilevered ≥ R-30 3. Podium/Elevated Slab ≥ R-19	All must comply:		
	-	-	
	-	-	
	-	-	
BE 3.1 Walls: 1. Exterior walls and band joists ≥ R-15 2. Elevator walls adjacent to dwelling units ≥ R-13 3. Foundation walls ≥ R-10 continuous or ≥ R-13 cavity	All must comply:		
	-	-	
	-	-	
	-	-	
BE 3.2 Ceilings/Roof: 1. Vented: Climate Zone 4 ≥ R-49 2. Continuous Roof Deck: Climate Zone 4 ≥ R-30 3. Cathedral: Climate Zone 4 ≥ R-38	All must comply:		
	-	-	
	-	-	
	-	-	
BE 3.3 Attic/Roof: 1. Install wind baffles at eaves in every vented bay, or equivalent air barrier at edge of ceiling 2. Energy heel trusses or raised top plate 3. Attic platforms allow for full-depth insulation below	All must comply:		
	-	-	
	-	-	
	-	-	
BE 3.4 Attic kneewall: 1. Doors ≥ R-19 2. Insulation and attic-side air barrier ≥ R-19	All must comply:		
	-	-	
BE 3.5 Attic pull-down/scuttle hole ≥ R-49	-	-	
BE 3.6 When installing loose-fill attic insulation, card and rulers must be installed	-	-	
BE 3.7 Steel framed buildings require thermal break ≥ R-7.5	-	-	
BE 3.8 Grade II insulation quality at all building envelope locations	-	-	
BE 3.9 Slab edge insulation ≥ R-10	-	-	
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED			
BE 3.10 Insulation installation quality (floors, walls and ceilings): A. Grade I B. Grade II with insulated sheathing ≥ R-3 (100%)	Select one:		
	3	3	
	2		
BE 3.11 Corners ≥ R-6	1	1	
BE 3.12 Headers ≥ R-3	1	1	
BE 3.13 Fiberglass batts are unfaced/friction fit	1	1	
OPTIONAL AT ALL LEVELS			
BE 3.14 Insulate with foam: 1. Exterior walls including band area 2. Floor system over crawlspace, basement, or parking garage	Select all that apply:		
	4	0	
	2	0	
BE 3.15 Walls: 1. Seal and insulate crawlspace walls ≥ R-10 continuous 2. Insulate unfinished basement walls instead of ceiling 3. Insulate basement walls with continuous insulation 4. Insulate exterior walls and band joist ≥ R-19 5. Insulate with spray foam insulation: Flash and batt insulation including band area 6. Insulate exterior walls and band joist ≥ R-20 or ≥ R-13 cavity plus R-5 insulated sheathing	Select all that apply:		
	2		
	1		
	2		
	2	2	
	2		
	3	3	
BE 3.16 Continuous exterior insulation: 1. ≥R-3 2. ≥R-5	Select one:		
	5		
	7		
BE 3.17 Ceilings: 1. Flat Vented: Climate Zone 4 ≥ R-60	Select one:		
	2		

2.	Continuous Roof Deck: Climate Zone 4 ≥ R-35	2	2	
3.	Sloped: Climate Zone 4 ≥ R-49	2		
BE 3.18	Attic kneewall insulated ≥ R-22	2		
BE 4: WINDOWS				
REQUIRED AT ALL LEVELS				
BE 4.0	Door U-factors and SHGC:	All must comply:		
1.	U-factor ≤ 0.35	-	-	
2.	SHGC ≤ 0.30	-	-	
BE 4.1	Window U-factor and SHGC:	All must comply:		
1.	U-factor ≤ 0.35	-	-	
2.	SHGC ≤ 0.30	-	-	
BE 4.2	Skylight U-factor and SHGC:	All must comply:		
1.	U-factor ≤ 0.55	-	-	
2.	SHGC ≤ 0.30	-	-	
BE 4.3	NFRC certified doors, windows and skylights with label	-	-	
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED				
BE 4.4	Door U-factor:	Select all that apply:		
1.	Opaque door: U factor ≤ 0.21	2	2	
2.	Door with ≤ 50% glass: U-factor ≤ 0.27	1	1	
3.	Door with > 50% glass: U-factor ≤ 0.32	1	1	
BE 4.5	Window U-factor and SHGC:	Select all that apply:		
1.	U-factor ≤ 0.32	1	1	
2.	SHGC ≤ 0.27	2	2	
BE 4.6	Skylight U-factor and SHGC:	Select all that apply:		
1.	U-factor ≤ 0.50	1		
2.	SHGC ≤ 0.27	2		
OPTIONAL AT ALL LEVELS				
BE 4.7	Window U-factor and SHGC:	Select all that apply:		
1.	U-factor ≤ 0.25	2		
2.	SHGC ≤ 0.24	3		
BE 4.8	Skylight U-factor and SHGC:	Select all that apply:		
1.	U-factor ≤ 0.43	2		
2.	SHGC ≤ 0.24	3		
BE 4.9	Glazing facing:	Select all that apply:		
1.	West ≤ 2% of floor area	1		
2.	East ≤ 3% of floor area	1		
BE 4.10	1.5' overhangs over ≥ 80% of south windows	1		
BE 4.11	Solar shade screens (min all east and west windows)	2		
BE 4.12	Modeled passive solar design (25% load reduction)	4		
BE 4.13	Window area is ≤ 15% of conditioned floor area (all units)	2	2	
BE 5: ROOF				
REQUIRED AT GOLD, OPTIONAL AT CERTIFIED				
BE 5.0	If Ducts located in unconditioned attic:	Select one:		
A.	Attic Side Radiant Barrier	2	2	
B.	ENERGY STAR qualified roof (≥ 75% of total roof area)	2		
OPTIONAL AT ALL LEVELS				
BE 5.1	Install green roof system:	Select one:		
A.	≥ 20% of roof area	2		
B.	≥ 40% of roof area	3		
C.	≥ 60% or above	4		
HIGH PERFORMANCE BUILDING ENVELOPE TOTAL		36		0
ENERGY EFFICIENT SYSTEMS (ES)				
ES 1: HEATING AND COOLING EQUIPMENT				
REQUIRED AT ALL LEVELS				
ES 1.0	Size and select all HVAC equipment in accordance with ACCA Manuals J and S:	All must comply:		
1.	Complete Room by Room load calculation utilizing ACCA Manual J 8th Edition Software or later or current ASHRAE based software (Trane Trace or Carrier HAP) and submit to EarthCraft for review prior to issuing construction drawings. Loads must include detailed inputs.	-	-	
2.	Based on worst case unit orientation per unit type	-	-	
3.	Use 2009 ASHRAE Handbook of Fundamentals Climate Design Information or later for outdoor design temperatures	-	-	
4.	Indoor temperatures 70°F for heating and 75° for cooling	-	-	
5.	Base infiltration on project team selected infiltration goal	-	-	
6.	Use actual area, U-factor and SHGC for windows and doors, actual area and R-values of floors, walls, and ceilings	-	-	
7.	Base mechanical ventilation on ASHRAE 62.2- 2010 standard	-	-	
8.	Cooling equipment and/or single-stage heat pump between 95%-125%	-	-	
9.	Provide OEM data for each unique system type	-	-	
10.	Internal loads that reflect design and occupancy ≤ 2400 Btu/h	-	-	
ES 1.1	If programmable thermostat installed for heat pump, include adaptive recovery technology	-	-	
ES 1.2	AHRI performance match all indoor/outdoor coils	-	-	
ES 1.3	Non-CFC and non-HCFC refrigerant	-	-	
ES 1.4	No electric resistant heat as primary heat source or reheat	-	-	
ES 1.5	Heat pump efficiency ≥ 8.2 HSPF or equivalent COP	-	-	
ES 1.6	Furnace efficiency ≥ 90 AFUE	-	-	

Product Literature

Load Calculations

Product literature

AHRI Certificate

ES 1.7	Cooling equipment ≥ 14 SEER or 11 EER	-	-			
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED						
ES 1.8	Heating equipment efficiency:	Select one:				AHRI match
	A. ENERGY STAR qualified furnace(s) ≥95 AFUE and within 40% of load calculation	2	2			
	B. ENERGY STAR qualified heat pump(s) ≥8.5 HSPF and within 25% of load calculation	2				
ES 1.9	Verification of proper refrigerant charge with subcooling deviation ±3°F or superheat deviation ±5°F	1	1		Test results	
ES 1.10	ENERGY STAR qualified cooling equipment ≥SEER 15	2	2		ACCA Approved Software	
OPTIONAL AT ALL LEVELS						
ES 1.11	Use ACCA Approved Residential Load Calculation Software to produce loads	2	2			
ES 1.12	Load Calculations comply with ES 1.0 at first submission (no revision required)	2				
ES 1.13	Variable speed blower	2	2			
ES 1.14	Ground-source heat pump(s) ≥ EER 17	3				
ES 1.15	ENERGY STAR qualified cooling equipment ≥ SEER 16	3				
ES 1.16	Heat pump efficiency ≥9.0 HSPF	2				
ES 1.17	Dual-stage compressors	3				
ES 1.18	Condenser units are spaced 2 feet apart	2	2			
ES 1.19	Variable Refrigerant/Mini-Split system utilized for primary heating and cooling	6				
ES 2: DUCTWORK / AIR HANDLER						
REQUIRED AT ALL LEVELS						
ES 2.0	Seal air handlers and duct systems with mastic	-	-			
ES 2.1	Code approved solid connector for all flex-to-flex connections	-	-			
ES 2.2	Fully duct all supply and return ducts	-	-			
ES 2.3	Duct insulation:	All must comply:				
	1. ≥ R-6: Ducts in conditioned and interstitial spaces (between floors)	-	-			
	2. ≥ R-8: Ducts in unconditioned space	-	-			
ES 2.4	No ducts in exterior walls or vaulted ceilings and no plenum within 2' of roofline.	-	-			
ES 2.5	Locate all air handlers within conditioned space	-	-			
ES 2.6	Indoor coil protected until finished floor installed	-	-			
ES 2.7	Minimize pressure imbalance within units ≤ 6 Pa between bedroom and return	-	-			
ES 2.8	No duct take-offs within 6" of supply plenum or supply trunk cap	-	-			
ES 2.9	Design and construct mechanical closets accessible for service and maintenance requirements	-	-			
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED						
ES 2.10	Install ducts per ACCA Manual D duct design	3	3		Manual D	
ES 2.11	Minimize pressure imbalance within units:	Select all that apply:				
	1. Install fully ducted jumper ducts, transfer grills, or dedicated return for each bedroom	2	2			
	2. Measured pressure differential ≤ 3 Pa between bedroom and return	3			Test results	
ES 2.12	Install rigid duct work or pull all flex ducts with no pinches and support at intervals ≤ 5'	2	2			
ES 2.13	Measure and balance airflow for each duct run (±20% of design)	3				
ES 2.14	Verify supply and return duct static pressure	2	2			
ES 2.15	HVAC system and ductwork is dry and clean	1	1			
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED						
ES 2.16	Locate entire duct system within conditioned space	5	0			
OPTIONAL AT ALL LEVELS						
ES 2.17	Duct design and installation:	Select all that apply:				
	1. Rigid metal supply trunk	2	2			
	2. Space all supply duct take-offs ≥6" apart	1				
	3. Install rigid circular duct as supply plenum	2				
ES 2.18	Duct insulation in unconditioned spaces ≥R-10	1				
ES 2.19	Return plenum duct take-off free area is 120% of supply plenum duct take-off free area	2	2			
ES 3: DUCT LEAKAGE TEST RESULTS						
REQUIRED AT ALL LEVELS						
ES 3.0	Test duct leakage based on conditioned floor area (CFA):	All must comply:				Test results
	1. Leakage to outside ≤ 4%	-	-			
	2. Total leakage ≤ 6%	-	-			
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED						
ES 3.1	Test duct leakage based on conditioned floor area (CFA):	Select all that apply:				Test results
	1. Leakage to outside ≤ 2%	8				
	2. Total leakage ≤ 4%	8				
ES 4: VENTILATION						
REQUIRED AT ALL LEVELS						
ES 4.0	Install exhaust fans in all bathrooms and duct to outside	-	-		Test results	
ES 4.1	Gas kitchen range vented to exterior ≥100 cfm fan	-	-			
ES 4.2	Outside air ventilation strategy complies with ASHRAE 62.2-2010	-	-			
ES 4.3	When installed to achieve ES 4.2, design and install fresh air intakes:	All must comply:				
	1. ≥10' away from exhaust outlets, vehicle idling zones, parking garages	-	-			
	2. ≥ 2' above grade	-	-			
	3. When run to soffit the duct must be extended and affixed through the soffit vent	-	-			
	4. Fresh air duct may not be run to the roof	-	-			
	5. Fresh air shutoff may not be controlled by humidistat	-	-			
	6. Install rigid duct with insulation	-	-			
	7. All intakes must be ducted to exterior of building	-	-			
ES 4.4	Seal seams of all intake and exhaust ducts with mastic	-	-			
ES 4.5	Duct clothes dryers to outside	-	-			
ES 4.6	No power roof vents	-	-			
ES 4.7	Back-draft dampers for kitchen and bathroom exhaust	-	-			
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED						
ES 4.8	If installed, ceiling fans must be ENERGY STAR qualified (1/bedroom and 1 in living room)	1			Product literature	

ES 4.9	ENERGY STAR bath fans with properly sized ductwork and measured airflow ≥ 50 cfm	2	2			Test results																			
ES 4.10	Electric kitchen range vented to exterior ≥ 100 cfm fan	3	3			Test results																			
ES 4.11	Verify outdoor air supply ventilation airflow test within +/- 20% of design values	2	2			Test results																			
ES 4.12	Install and label accessible ventilation controls, with override controls for continuously operating ventilation fans	1	1																						
ES 4.13	Supply/exhaust fans rated at ≤ 3 sones (intermittent) and ≤ 1 sone (continuous)	1	1																						
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED																									
ES 4.14	Radon resistant construction:	Select all that apply:																							
	1. Passive, radon/soil gas vent system labeled on each floor	1	1																						
	2. Radon test of building prior to occupancy	1	1																						
ES 4.15	Exhaust fan wired with light in bathroom	1	1																						
ES 4.16	Duct all exhaust fans with rigid duct	1	1																						
OPTIONAL AT ALL LEVELS																									
ES 4.17	Automatic (timer and/or humidistat) bathroom exhaust fan controls	2																							
ES 4.18	Energy recovery ventilator	3																							
ES 4.19	Vent storage room to outside	1																							
ES 5: WATER HEATER																									
REQUIRED AT ALL LEVELS																									
ES 5.0	Water Heater must be installed in conditioned space. If gas, direct vent	-	-			AHRI Certificate																			
ES 5.1	Heat trap on all storage water heaters	-	-																						
ES 5.2	Water heater efficiencies:																								
	<table border="1"> <thead> <tr> <th>Tank Size</th> <th>Gas EF</th> <th>Electric EF</th> <th>Gas UEF</th> <th>Electric UEF</th> </tr> </thead> <tbody> <tr> <td>20- 55 gal</td> <td>0.65</td> <td>0.95</td> <td>0.61</td> <td>0.92</td> </tr> <tr> <td>55- 100 gal</td> <td>0.75</td> <td>1.97</td> <td>0.76</td> <td>2.03</td> </tr> <tr> <td>< 2 gal</td> <td>0.82</td> <td>0.93</td> <td>0.81</td> <td>0.91</td> </tr> </tbody> </table>	Tank Size	Gas EF	Electric EF	Gas UEF		Electric UEF	20- 55 gal	0.65	0.95	0.61	0.92	55- 100 gal	0.75	1.97	0.76	2.03	< 2 gal	0.82	0.93	0.81	0.91	-	-	
Tank Size	Gas EF	Electric EF	Gas UEF	Electric UEF																					
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< 2 gal	0.82	0.93	0.81	0.91																					
ES 5.3	Pipe insulation on first 2'	-	-																						
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED																									
ES 5.4	High efficiency storage water heater:	Select one from chart:					AHRI Certificate																		
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≤ 55 gallon	≥ 0.67	≥ 2.00	≥ 0.64	≥ 2.00																					
> 55 gallon	≥ 0.77	≥ 2.20	≥ 0.78	≥ 2.20																					
ES 5.5	Tankless gas water heater $\geq .90$ EF or $\geq .87$ UEF	4																							
OPTIONAL AT ALL LEVELS																									
ES 5.6	Type of water heater:	Select one:					Product literature																		
	A. Solar domestic ($\geq 40\%$ annual load based on unit demand)	6																							
	B. High efficiency tankless water heater ($\geq .92$ EF) with insulated buffer tank	4																							
	C. ENERGY STAR qualified heat pump hot water heater	4				AHRI Certificate																			
ES 5.7	Hot water piping insulation $\geq R-4$ (100%)	2																							
ES 6: LIGHTING/APPLIANCES																									
REQUIRED AT ALL LEVELS																									
ES 6.0	High-efficacy lighting in 100% of all permanent fixtures	-	-																						
ES 6.1	If installed, ENERGY STAR dishwasher	-	-			Product Literature																			
ES 6.2	If installed, ENERGY STAR refrigerator	-	-			Product Literature																			
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED																									
ES 6.3	If installed, ENERGY STAR qualified clothes washer	2	2			Product literature																			
ES 6.4	If installed, high efficiency clothes dryer with moisture sensor (not applicable to commercial dryers)	2	2			Product literature																			
OPTIONAL AT ALL LEVELS																									
ES 6.5	Fixtures and bulbs:	Select one:																							
	A. ENERGY STAR qualified compact fluorescent fixtures or LED bulbs (100%)	2	2																						
	B. Ballasted compact fluorescents or LED bulbs at all recessed light fixtures	1																							
ES 7: COMMON AREA LIGHTING/APPLIANCES																									
REQUIRED AT PLATINUM AND GOLD, OPTIONAL AT CERTIFIED																									
ES 7.0	100% LED bulbs in all corridor/breezeway and all common spaces	2	2																						
OPTIONAL AT ALL LEVELS																									
ES 7.1	Control systems:	Select all that apply:																							
	1. Automatic indoor lighting controls	2	2																						
	2. Automatic outdoor lighting controls	2																							
ES 7.2	High Efficiency Exterior Lighting:	Select all that apply:																							
	1. Design to Reach IES guidelines: Lighting For Exterior Environments	2																							
	2. Achieve 50% reduction based on Advanced Energy Design Guide (ASHRAE/IES)	1																							
	3. High efficiency exterior lighting using 100% LED bulbs	2	2																						
ES 7.3	High efficiency elevators	2																							
ENERGY EFFICIENT SYSTEMS TOTAL		52		0																					

WATER EFFICIENCY (WE)				
WE 1: INDOOR WATER USE				
REQUIRED AT ALL LEVELS				
WE 1.0	Meet National Energy Policy Act low flow standards for all fixtures	-	-	
WE 1.1	Detect no leaks at any water-using fixture, appliance or equipment	-	-	
WE 1.2	Low-flow fixtures (units and common facilities):	Select all that apply:		
1.	WaterSense labeled toilet (≤1.28 avg. gal/flush)	-	-	Product literature
2.	WaterSense labeled urinal (≤0.5 gal/flush)	-	-	
3.	WaterSense lavatory faucet and accessories (≤1.5 gpm at 60 psi)	-	-	
4.	WaterSense labeled Showerhead (≤2.0 gpm)	-	-	
REQUIRED AT PLATINUM , OPTIONAL AT GOLD AND CERTIFIED				
WE 1.3	If installed, water treatment system NSF certified, ≥85% efficient	2		
WE 1.4	If installed, water softeners certified to NSF/ANSI Standard 44	2		
WE 1.5	Store ≤0.5 gal of water between water heater and fixture (not applicable to central systems)	2		Test results
WE 1.6	WaterSense labeled Showerhead (1.75 gpm)	1		Product literature
OPTIONAL AT ALL LEVELS				
WE 1.7	Toilet (≤1.1 avg. gal/flush)	2		
WE 1.8	Waterless urinals in common areas	2		
WE 1.9	Greywater system for toilet flushing	4		
WE 1.10	Rainwater harvest system for indoor water use	4		
WE 1.11	Unit water pressure ≤60 psi	2		
WE 1.12	Hot water demand ≤0.13 gal of water between loop and fixture and ≤2 gal of water in loop between water heater and furthest fixture (not applicable to central systems)	2		Test results
WE 2: OUTDOOR WATER USE				
REQUIRED AT ALL LEVELS				
WE 2.0	Cover all exposed soil with 2"-3" mulch layer	-	-	
WE 2.1	Irrigation system:	All must comply:		
1.	Must have rain sensor shutoff switch	-	-	
2.	Provide operating manual to property management	-	-	
3.	Provide irrigation system layout to property management	-	-	
WE 2.2	If installed, ornamental water features must recirculate water and serve beneficial use	-	-	
WE 2.3	Install plants to maintain distance ≥2' from home at maturity	-	-	Landscape plan
REQUIRED AT PLATINUM, OPTIONAL AT GOLD AND CERTIFIED				
WE 2.4	Landscape design:	Select one:		
A.	Turf ≤ 40% of landscaped area	2		Landscape plan
B.	Use WaterSense water budget tool to design landscape	2		Calculator
WE 2.5	Vegetate slopes exceeding 4:1	1		Landscape plan
WE 2.6	If installed, irrigation system is: (Max 4 points)	Select all that apply:		
1.	Design, install, and audit irrigation system by WaterSense Irrigation Partner with no leaks	2		
2.	Micro-irrigation system (e.g., drip irrigation) includes pressure regulator, filter and flush end assemblies	2		
3.	Distribution uniformity ≥65% lower quarter	2		
4.	Install sprinklers only on turfgrass, pop-up height ≥4"	1		
5.	Establish grow-in phase and post landscape seasonal water schedules at irrigation controller	2		
WE 2.7	Drought-tolerant/native landscaping turf and plants	1		Plant list
OPTIONAL AT ALL LEVELS				
WE 2.8	Test and amend soil	1	0	Test results
WE 2.9	Irrigation: (Max 5 points)	Select all that apply:		
1.	Greywater irrigation system	3		
2.	Rainwater irrigation system	3		
3.	Zone irrigation system for specific water needs in each planting area	2		
4.	Provide weather station or soil moisture sensor on irrigation system	2		
WE 2.10	Timer on exterior water spigots	1		
WATER EFFICIENCY TOTAL			0	0

EDUCATION AND OPERATIONS (EO)				
EO 1: EDUCATION				
REQUIRED AT ALL LEVELS				
EO 1.0	Provide property manager with project-specific owner's manual	-	-	Copy
OPTIONAL AT ALL LEVELS				
EO 1.1	Local recycling contact	1		Contact
EO 1.2	Community Recycling Facility	2		Picture
EO 1.3	Household hazardous waste resources	1	1	
EO 2: OPERATIONS AND MANAGEMENT				
REQUIRED AT ALL LEVELS				
EO 2.0	Provide all subcontractors with EarthCraft Multifamily worksheet	-	-	
OPTIONAL AT ALL LEVELS				
EO 2.1	Property Maintenance Staff representative attends design review and/or kick off meeting	1	1	
EO 2.2	Market EarthCraft Multifamily program	1	1	Signage
EO 2.3	Provide pre-occupancy briefing for tenant	2	2	
EO 2.4	Project participates in post occupancy project debriefing	2	2	
EO 2.5	Environmental management and building maintenance guidelines for staff	2	2	Copy
EO 2.6	Landscape maintenance guide for maintenance and management personnel	2	2	
EO 3: THIRD PARTY PROGRAMS				
OPTIONAL AT ALL LEVELS				
EO 3.0	ENERGY STAR Multifamily New Construction	2	2	VERIFY
EO 3.1	Indoor airPLUS	2	2	
EO 3.2	Qualify for WaterSense New Homes	1		
EO 3.3	EarthCraft Community Certification	3		
EO 3.4	EarthCraft Light Commercial for Community Center	2		
EO 3.5	EarthCraft Light Commercial Ready Spaces	1		
EO 3.6	Zero Energy Ready Home Certification	1	1	
EDUCATION AND OPERATIONS TOTAL			16	0
INNOVATION (INV)				
OPTIONAL AT ALL LEVELS				
IN 1.0	On-site fuel cell or co-generation system	4		System design
IN 1.1	Solar-ready design	2		System design
IN 1.2	Wind and/or Solar electric system (10% of project requirements)	5		System design
IN 1.3	100% of stormwater kept on site and used for development operations	4		System design
IN 1.4	Common areas use solar and/or wind electric system (80% of demand)	4		System design
IN 1.5	Housing Affordability:	Select one:		
	A. ≥20% total units	1		
	B. ≥50% total units	2		
IN 1.6	Developer contracts for at least 12 months post construction energy monitoring	4	0	Unit Level Utility Data
IN 1.7	Project specific innovation points: builder submits specifications for innovative products or design features to EarthCraft prior to construction completion	TBD		
INNOVATION TOTAL			0	0
WORKSHEET TOTAL			199	0



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HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each building which includes system design for all unique unit plans and common spaces. For projects with multiple buildings, one National HVAC Design Report per building or per project is permitted. ¹
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder, architect, or Rater. ²
- Provide the completed National HVAC Design Report to the Rater and the person / company completing the National HVAC Functional Testing Checklist. ²

1. Design Overview

1.1 Designer name: _____ Designer company: _____ Date: _____
 1.2 Select which party you are providing these design services to: Builder / Developer FT Agent MEP / Credentialed HVAC contractor
 1.3 Name of company you are providing these design services to (if different than Item 1.1): _____
 1.4 Building address: _____ City: _____ State: _____ Zip code: _____

2a. Dwelling Unit & Common Space Mechanical Ventilation Design (“Vent System”) ³ & Inlets in Return Duct ^{4, 5, 6}

Designer Verified

Airflow:

2.1 Dwelling unit ventilation airflow design rate & run-time meet the requirements of Section 4 of ASHRAE 62.2 ⁷ – _____
 2.2 Common space outdoor airflow design rate meet the requirements of Section 6 of ASHRAE 62.1 ⁸ – _____
 ERI and Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%.
 2.3 Access points to measure airflow rate and inspect outdoor air dampers are provided and accessible by the Rater. ^{2, 9}

List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right: ¹⁰

2.4 # of bedrooms:						
2.5 Square footage:						
2.6 Ventilation airflow rate required by ASHRAE 62.2:						
2.7 Ventilation airflow rate designed:						
2.7.1 If applicable, run-time per cycle (minutes):						
2.7.2 If applicable, cycle time (minutes):						

List common space for which 62.1 ventilation rates were calculated in the spaces to the right: ^{9, 10, 11}

2.8 Ventilation airflow required by ASHRAE 62.1 (CFM):						
2.9 Ventilation airflow designed (CFM):						

System Type & Controls:

List Ventilation System ID in the spaces to the right: ¹⁰						
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.11 Manufacturer:						
2.12 Model Number:						
2.13 # installed in the building:						
2.14 Spaces each fan serves (i.e., single, multiple)						
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.16 Specified control location: (e.g., Master bath, utility):						
2.17 Specified controls allow the systems to operate automatically, without occupant intervention. A ventilation override control is specified and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). In townhouses only, this control must be readily accessible to the occupant. In all other multifamily dwelling units, the override control is not required to be readily accessible to the occupant. However, in such cases, EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.						<input type="checkbox"/>
2.18 For any outdoor air inlet designed to connect to the dwelling unit HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override. ^{6, 11}	<input type="checkbox"/>					<input type="checkbox"/> N/A

Sound:

2.19 If located in the dwelling unit, the fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 2 sones if continuous, or exempted. ¹³ N/A

Efficiency:

2.20 If dwelling-unit Vent System controller operates the dwelling unit HVAC fan, then HVAC fan operation is intermittent and either the fan type in Item 4.12 is ECM / ICM, or the controls will reduce the run-time by accounting for HVAC system is heating or cooling hours. ¹⁴ N/A
 2.21 If in-unit bathroom fans or in-line fans are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are ENERGY STAR certified. ¹⁵ N/A



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2.22 If central exhaust fans, ≤ 1 HP, are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are direct-drive, ECM, with variable speed controllers. If > 1 HP, they are specified to meet or exceed [efficiency standards for NEMA Premium™ Motors](#). N/A

Air Inlet Locations: (Complete this section if system has specified air inlet location(s); otherwise check "N/A".) ¹⁶ **Designer Verified**
 N/A

2.23 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.

2.24 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from dryer exhausts and sources exiting the roof.

2.25 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 inch mesh.

2b. Dwelling Unit Local Mechanical Exhaust Design – System(s) are designed that mechanically exhaust air from each dwelling unit kitchen and bathroom directly to the outdoors or to ventilation risers and meet the continuous and/or intermittent rates. ¹⁷

Location		Continuous Rate	Intermittent Rate ¹⁸	Exhaust Fan Type
Kitchen	Airflow	≥ 5 ACH, based on kitchen volume ^{19, 20, 21}	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume ^{19, 20, 21, 22}	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent <input type="checkbox"/> In-unit fan <input type="checkbox"/> Central / shared fan
	Sound	Recommended if in-unit: ≤ 1 sone	Recommended if in-unit: ≤ 3 sones	
Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM	
	Sound	Required if in-unit: ≤ 2 sones	Recommended if in-unit: ≤ 3 sones	

2c. Common Space and Garage Minimum Exhaust Rates – System(s) are designed that mechanically exhaust air from each common space, as required by ASHRAE 62.1-2010 (or later).

Location	ASHRAE 62.1 Rate	Design Rate	Location	ASHRAE 62.1 Rate	Design Rate
Janitor Room	1 cfm/ft ²		Common space kitchen ²³	50 cfm / 100 cfm	
Trash / Recycling Room	1 cfm/ft ²		Common space bathroom ²⁴	50 cfm per toilet / urinal	
Parking Garage	0.05 cfm/ft ² , standby 0.75 cfm/ft ² , full-on		<input type="checkbox"/> Shared garage exhaust fan controls include CO and NO ₂ sensors.		

3. Heating & Cooling Loads

Dwelling Unit Heating & Cooling Loads (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces.)²⁵ N/A

3.1 Loads calculated using: Unabridged ACCA Manual J v8 2013 / 2017 ASHRAE Fundamentals ASHRAE 183 Other per AHJ ²⁶
Townhouses only: Loads must be calculated room-by-room.

3.2 Check one box only to indicate whether the Dwelling Unit Loads is unit-specific or represents the design of more than one unit: ²⁷
 Unit-specific design Group design ²⁸ ____ total groups for this building, representing ____ units.
 Worst-case design (If the top floor unit with the greatest CFA and window area results in total heat gain <18 kBtuh, it may represent all other units if cooling system selected for all is single-speed & <20 kBtuh or two-speed / variable-speed & <25 kBtuh.

3.3 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling.

3.4 Outdoor design temperatures used in loads: (See Footnote 29 and www.energystar.gov/hvacdesigntemps.) ²⁷
 County & State, or US Territory selected: _____ Cooling season: _____°F Heating season: _____°F

List the unit plan for which Loads were calculated: ¹⁰									
3.5 Location of Unit: top, mid, bottom, corner, interior									
3.6 Number of occupants used in loads: ^{27, 30}									
3.7 Total occupant gains (Btuh): ²⁷									
3.8 Conditioned floor area used in loads: ^{27, 31}									
3.9 Window area used in loads: ^{27, 32}									
3.10 Predominant window SHGC used in loads: ^{27, 33}									
3.11 Infiltration (ACH / ACH50 / CFM) used in loads: ³⁴									
3.12 Mechanical ventilation (CFM) used in loads: ²⁷									
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): ²⁷									
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): ²⁸									
3.15 Sensible Heat Gain At Design Conditions (kBtuh): ²⁷									
3.16 Latent Heat Gain At Design Conditions (kBtuh):									
3.17 Total Heat Gain at Design Conditions (kBtuh): ²⁷									
3.18 Total Heat Loss at Design Conditions (kBtuh):									



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3.19 Common Space Heating & Cooling Loads ¹⁰ (required for all common space heating and cooling systems)	Designer Verified
	<input type="checkbox"/> N/A

Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)

3.20 Building Heating & Cooling Loads ¹⁰ (only required when shared systems such as central boilers or chillers are specified.) <input type="checkbox"/> N/A		
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)

4. Heating & Cooling Equipment Selection

4.1 Equipment selected per <input type="checkbox"/> ACCA Manual S, or where not applicable, <input type="checkbox"/> Other: _____ . (See Footnote 35)	<input type="checkbox"/>
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4.2 Prescriptive Path: Equipment serving dwelling units, common spaces, and garages meet the efficiency levels specified in the Exhibit X of the National Rater Field Checklist. Electric resistance space heating is not specified in dwelling units. ³⁶	<input type="checkbox"/>	<input type="checkbox"/> N/A
--	--------------------------	------------------------------

4.3 ERI Path: Equipment serving common spaces and garages but not serving dwelling units meet the efficiency levels specified in the Exhibit X of the National Rater Field Checklist. Also see Exhibit X for restrictions on electric space resistance. ³⁶	<input type="checkbox"/>	<input type="checkbox"/> N/A
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Cooling Equipment

¹⁰ (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) N/A

List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:								
4.4 Equipment type: (e.g., PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)								
4.5 Area / Space(s) that system serves:								
4.6 Chiller / condenser / outdoor unit manufacturer:								
4.7 Chiller / condenser / outdoor unit model #:								
4.8 Evaporator / indoor unit manufacturer:								
4.9 Evaporator / indoor unit model #:								
4.10 AHRI reference #: ³⁷								
4.11 Listed efficiency:								
4.12 Evaporator fan type: PSC, ECM / ICM, Other								
4.13 Compressor speed: Single, Two, Variable								
4.14 Turn down ratio (for variable speed equipment):								
4.15 Latent capacity at design conditions (kBtuh): ³⁸								
4.16 Sensible capacity at design conditions (kBtuh): ³⁸								
4.17 Total capacity at design conditions (kBtuh): ³⁸								
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5: ²⁵								
4.19 Meets cooling sizing limit: (see below for A, B, C, D or N/A) ^{25, 27}								
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): ³⁹								
4.21 If "B", calculate HDD / CDD ratio: ³⁹								

Equipment Type & Climate Condition	Compressor Type (Per Item 4.13)		
	Single-Speed	Two-Speed	Variable-Speed
A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate ³⁹	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%	Recommended: 90 – 130% Allowed: 90 – 160%
B: For Cooling Mode of Heat Pump in Condition B Climate ³⁹	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh
C: For low-load spaces (≤15 kBtuh) ⁴⁰	≤ 20 kBtuh		
D: For low-load spaces (≤18 kBtuh) ⁴⁰		≤ 25 kBtuh	≤ 25 kBtuh



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Heating Equipment ¹⁰ (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".)							Designer Verified
							<input type="checkbox"/> N/A
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.24 Area / Space(s) that system serves:							
4.25 Manufacturer:							
4.26 Model Number:							
4.27 AHRI reference #: ³⁷							
4.28 Listed efficiency:							
4.29 Equipment output capacity (kBtuh): ⁴¹							
4.30 Air-source heat pump output capacity (17°F) (kBtuh):							
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent ⁴²							
4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24: ²⁵							
4.33 Meets furnace sizing limit: (see below for A, B, C, or N/A) ²⁵							
A: For low-load spaces (≤ 10 kBtuh), furnace output capacity is ≤ 40 kBtuh							
B: When Used for Heating Only				C: When Paired With Cooling			
100 – 400%				Recommended: 100 – 140% Allowed: 100 – 400%			
Equipment Controls							
4.34 All equipment controls below have been included where applicable in the HVAC Design.							<input type="checkbox"/>
4.35 All heating and cooling systems serving a dwelling unit shall have thermostatic controls within the dwelling unit.							
4.35.1 Prescriptive Path: Dwelling unit thermostats are programmable.							
4.36 Stair and elevator shaft vents shall be equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems.							
4.37 Freeze protection systems, such as heat tracing of piping and heat exchangers, including self-regulating heat tracing, and garage / plenum heaters shall include automatic controls capable of shutting off the systems when pipe wall or garage / plenum temperatures are above 40°F. Where heat tracing is specified for freeze protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.							
4.38 Snow- and ice-melting systems shall include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible.							
Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit							<input type="checkbox"/> N/A
4.39 All hydronic distribution requirements below have been included where applicable in the HVAC Design.							<input type="checkbox"/>
4.40 All terminal heating and cooling distribution equipment must be separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.							
4.41 Terminal units must be equipped with pressure independent balancing valves or pressure independent control valves.							
4.42 Piping of a heating or cooling system (e.g., steam, hot or chilled water, brine, refrigerant) shall be thermally insulated in accordance with ASHRAE 90.1-2007, Table 6.8.3. Construction documents must account for piping total thickness including required insulation when passing through planks or any other penetrations and shall specify that the piping must be inspected before access is covered up: Heating System: Pipe size: ___ inches Insulation thickness: ___ inches Pipe size: ___ inches Insulation thickness: ___ inches Cooling System: Pipe size: ___ inches Insulation thickness: ___ inches Pipe size: ___ inches Insulation thickness: ___ inches							
4.43 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors shall meet or exceed efficiency standards for NEMA Premium™ motors. If 5 horse-power or larger, must also be specified with variable frequency drives.							
4.44 If a variable speed pumping system is installed, system designed to prevent "dead-heading" and a method of water flow bypass is provided, such as a minimum flow bypass valve or 3-way valves on specific terminal units.							
4.45 For shared boilers, chillers, and cooling towers, temperature and pressure gauges, air eliminator, expansion tank, and check valves are clearly shown on the drawings. A complete sequence of operations for all systems indicating recommendations for all setpoints is provided. For condensing boilers, design return temperature is indicated and system is designed to return water at a temperature that enables condensing.							



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5. Dwelling Unit Duct Design (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A".)				Designer Verified			
				<input type="checkbox"/> N/A			
5.1 Duct system designed for the equipment selected in Section 4, per <input type="checkbox"/> ACCA Manual D <input type="checkbox"/> Other: _____ Townhouses only: Duct system must be designed per ACCA Manual D.				<input type="checkbox"/>			
5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). ^{10, 43, 44}							
Name of the unit plan:		Name of the unit plan:					
Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM		Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM					
Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____		Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____					
Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC		Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC					
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)	
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
Total for all rooms				Total for all rooms			
6. Duct Quality Installation – Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, Unless Noted in Footnote							
6.1 Applicable duct quality installation requirements in 6.2 – 6.8 below have been included in the HVAC Design.				<input type="checkbox"/>			
6.2 Ductwork specified without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. ⁴⁸							
6.3 All supply and return ducts not in conditioned space, including connections to trunk ducts, are insulated to \geq R-6. ⁴⁹							
6.3.1 Prescriptive Path: Dwelling unit ductwork meets the location and insulation requirements specified in the ENERGY STAR MF Reference Design.							
Dwelling Unit							
6. MERV 6+ filter(s) specified for each ducted mechanical System serving an individual dwelling unit, designed so all return and mechanically supplied outdoor air passes through filter(s) prior to conditioning, and located to facilitate access & regular service by the occupant, building owner, or building maintenance staff. Filter access panel specified with a gasket or comparable sealing mechanism.							
6.5 Ductwork air-sealing specified such that Rater-measured total duct leakage is \leq 4 CFM25 per 100 ft ² of CFA at rough-in or \leq 8 CFM25 per 100 ft ² at final, or if there are no ducted returns, \leq 3 CFM25 per 100 ft ² of CFA at rough-in or \leq 6 CFM25 per 100 ft ² at final. ⁵⁰ Additionally, for Townhouses only, Rater-measured duct leakage to the outside is \leq 4 CFM25 per 100 ft ² of CFA or \leq 40 CFM25. ⁵¹							
6.6 All bedrooms provided with transfer grilles, jump ducts, dedicated return ducts, and/or undercut doors. Bedrooms with a design supply airflow \geq 150 CFM (as reported in Item 5.2) are specified to achieve a Rater-measured pressure differential \geq - 5 Pa and \leq 5 Pa with respect to the main body of the dwelling unit when all air handlers are operating. Townhouses only: In addition, bedrooms with a design supply airflow < 150 CFM are specified to achieve a Rater-measured pressure differential \geq - 3 Pa and \leq +3 Pa.							
Common Space and Central Exhaust							
6.7 Duct design specifies that all supply, return, and exhaust ductwork and all plenums serving common spaces shall be sealed at all transverse joints, longitudinal seams, and duct wall penetrations.							
6.8 Central exhaust systems (that serve four or more dwelling units): Ductwork air-sealing specified such that measured duct leakage does not exceed 25% of exhaust fan flow at rough-in (e.g., including trunks, branches, and take-offs) or 30% of exhaust fan flow at final (e.g., inclusive of all ductwork between the fan and the grilles). ⁵²							



Footnotes:

1. This report shall represent system design for all unique unit plans, common spaces, and where applicable, parking garages. The term ‘common space’ refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. As an alternative, for dwelling units, designers may instead choose to complete a Single-Family New Homes National HVAC Design Report for each unique unit plan, if room-by-room loads are calculated using Unabridged ACCA Manual J v8. Sections 4 and 5 must be completed in either Design Report unless exempted by this Report. All other systems, including all systems serving common spaces, must be documented in this Design Report. This report is designed to meet ASHRAE 62.1-2010 or later, ASHRAE 62.2-2010 or later, and ANSI / ACCA’s 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, system designs documented through the use of this report are not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
2. The term ‘Rater’ refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/mftraining.
3. As defined by ANSI / RESNET / ICC 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
4. The dwelling-unit mechanical ventilation system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of a dwelling-unit mechanical ventilation system. Designers may provide supplemental documentation as needed to document the system design.
5. In “Warm-Humid” climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at $\leq 60\%$.
6. Item 2.18 applies to any outdoor air inlet connected to the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.

In dwelling / sleeping units in multifamily buildings, but not townhouses, automatic restriction of airflow is exempted if a manual shutoff damper is used with a continuous exhaust ventilation system and is readily-accessible, labeled as the override, and not used as a balancing damper.

Note that a Rater will generally measure the ventilation rate at the highest HVAC fan speed applicable to ventilation mode (e.g., if the inlet only opens when the HVAC is in ‘fan-only’ mode, then test in this mode) to verify that it is ≤ 15 CFM or 15% above design value. If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
7. Airflow design rates and run-times shall be determined using ASHRAE 62.2-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided.
8. Airflow design rates shall be determined using ASHRAE 62.1-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided.
9. For permits on or before 01/01/2024, where outdoor air is supplied to a common space via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
10. If the tables provided cannot accommodate all the unit plans, spaces, or systems in the building, use the tables in Appendix A to supplement the Design Report.
11. List each individual common space separate from other spaces, such that when reporting airflow for Items 2.8 and 2.9, compliance for each space can be demonstrated. For example, list an office space separate from a community room, even if these spaces are served by the same system and even if the outdoor air rates required are the same. Similarly, where a space is repeated in the building, such as a corridor, report each space by floor (e.g., FL1 Corridor, FL2 Corridor). Rather than list these values in this report, as an alternative, the HVAC Designer is permitted to submit the values in a separate document or file.
12. In addition, consult manufacturer requirements to ensure return air temperature requirements are met.
13. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.7. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
14. Note that the ‘fan-on’ setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
15. Bathroom fans with a rated flow rate ≥ 500 CFM and heat/energy recovery ventilation fans are exempted from the requirement to be ENERGY STAR certified.



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16. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building maintenance staff.
17. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the design airflow rate. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the design airflow rate. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
18. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
19. Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume.
20. While not required, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 are recommended to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC.
21. As an alternative, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both dwelling unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 1.0 ACH50 or ≤ 0.05 CFM50 per ft^2 of Enclosure Area. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
22. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
23. For continuous system operation, the lower rate may be used. Otherwise, use the higher rate. Commercial kitchens shall be designed to provide a minimum continuous rate of 0.70 cfm/ft^2 .
24. As an alternative, for a toilet room intended to be occupied by one person at a time, a minimum continuous rate of 25 cfm is permitted.
25. This section / item applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtu/h with forced-air distribution systems and to furnaces up to 225 kBtu/h with forced-air distribution system serving individual dwelling units. Forced-air distribution systems are those that supply air through ductwork exceeding 0 ft. in length. This section / item is recommended, but not required for non-ducted systems, such as non-ducted mini-splits, multi-splits, PTHP's, or PTAC's.
26. Select "2013 / 2017 ASHRAE Fundamentals" if using Chapter 17 of the 2013 or 2017 ASHRAE Handbook of Fundamentals. Select "Other per AHJ" if the Authority Having Jurisdiction where the unit will be certified mandates the use of a load calculation methodology other than Unabridged ACCA Manual J v8 or 2013 or 2017 ASHRAE Handbook of Fundamentals.
27. Check the box for "unit-specific design" if the design was created for the specific plan configuration (i.e., elevation, option, orientation, and county) of the unit to be certified. Check the box for "group design" if designs were created for unit plans that are repeated throughout the building with potentially different configurations (i.e., different elevations and/or orientations). Check the box for "worst-case design" if loads for the unit with the largest heat gain in the building are less than 18 kBtu/h and are being used to represent all other units. Only one box may be checked. Regardless of the box checked, the system design as documented on this HVAC Design Report must fall within the following tolerances for the unit to be certified:
 - Item 3.4: The outdoor design temperature used in loads are within the limits defined at www.energystar.gov/hvacdesigntemps.
 - Item 3.6: The number of occupants used in loads is within ± 2 of the dwelling unit to be certified.
 - Item 3.7: Total occupant gains used in loads shall not exceed 645 Btu/h per occupant.
 - Item 3.8: The conditioned floor area used in loads is between 100 ft^2 smaller and 300 ft^2 larger than the dwelling unit to be certified.
 - Item 3.9: The window area used in loads is between 15 ft^2 smaller and 60 ft^2 larger than the dwelling unit to be certified, or for dwelling units with > 500 ft^2 of window area, between 3% smaller and 12% larger.
 - Item 3.10: The predominant window SHGC is within 0.1 of the predominant value in the dwelling unit to be certified.
 - Item 3.12: The mechanical ventilation rate used in loads is the same as the value in Section 2a for the given unit plan.
 - Item 3.13: The sum of the internal gains associated with lighting and appliances used in loads shall not exceed 3,600 Btu/h.
 - Items 3.15 & 3.17: The sensible & total heat gain are documented for the configuration of the dwelling unit to be certified.
 - Item 4.19: The cooling sizing % is within the cooling sizing limit selected.

Provide the National HVAC Design Report to the party you are providing these design services to (i.e., a builder / developer, Functional Testing Agent (FT Agent), and/or MEP / credentialed HVAC contractor) and to the Rater. The report is only required to be provided once per project / building. As long as a report has been provided that falls within these tolerances for the units to be certified, no additional work is required. However, if no report falls within these tolerances or if any aspect of the system design changes, then an additional report will need to be generated prior to certification.

Visit www.energystar.gov/hvacdesigntools for a tool to assist with group designs and for more information.

28. For each unique unit floorplan, document the loads for the configuration (e.g., level, orientation) that the dwelling unit might be built in. For example, if a unit plan will only be built in a specific level and orientation (e.g., top-floor, facing South), then the designer only needs to document the loads for this one configuration. To determine whether a unit floorplan is "unique", the guidance in ANSI 301-2019, Section 5.1.4.4.1 may be followed. Orientation represents the direction that the front door of the dwelling unit is facing. In Section 4, to calculate Cooling sizing % for each configuration of each unique floorplan, the same system may need to be duplicated in multiple columns.



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29. Visit www.energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR. For “County & State, or US Territory, selected”, select the County and State or US Territory (i.e., Guam, Northern Mariana Islands, Puerto Rico, or US Virgin Islands), where the unit is to be certified. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93°F, then the same report could be used in Fairfax County (which has a higher limit of 94°F) but not in Arlington County (which has a lower limit of 92°F). If a jurisdiction-specified design temperature is used that exceeds the limit in the ENERGY STAR Single-Family New Homes Design Temperature Limit Reference Guide, designers must submit a Design Temperature Exception Request. Visit www.energystar.gov/hvacdesigntemps for a copy of this form.
30. To determine the number of occupants among all HVAC systems in the dwelling unit, calculate the number of bedrooms, as defined below, and add one. This number of occupants must be within ± 2 of the dwelling unit to be certified.
- A bedroom is defined by ANSI / RESNET / ICC 301-2014 as a room or space 70 ft² or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 ft² or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.
- An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:
- have a sill height of not more than 44 inches above the floor; AND
 - have a minimum net clear opening of 5.7 ft²; AND
 - have a minimum net clear opening height of 24 in.; AND
 - have a minimum net clear opening width of 20 in.; AND
 - be operational from the inside of the room without the use of keys, tools or special knowledge.
31. The difference between the Conditioned Floor Area (CFA) used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 22, as verified by a Rater. Be advised, the Rater will calculate CFA using the definition in ANSI / RESNET / ICC 301-2019, which defines this value, in part, as the floor area of the Conditioned Space Volume within a building or Dwelling Unit, not including the floor area of attics, crawlspaces, and basements below air sealed and insulated floors. See www.codes.iccsafe.org/content/chapter/16185/ for the complete definition.
32. The difference between the window area used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 22, as verified by a Rater. Be advised, the Rater will calculate window area using the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC 301-2019, which instructs the Rater to measure the width and height of the rough opening for the window and round to the nearest inch, and then to use these measurements to calculate window area, rounding to the nearest tenth of a square foot. See www.codes.iccsafe.org/content/chapter/16191/ for the complete protocol.
33. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the dwelling unit.
34. Infiltration rate shall use “Tight” values for the cooling season infiltration rate and “Tight” values for the heating season infiltration rate, as defined by Table 5A or 5B of ACCA Manual J, Eighth Edition, Version Two. Alternatively, infiltration rate shall not exceed 0.24 air changes per hour.
35. Equipment shall be selected using the maximum total heat gain and the total heat loss in Section 3 per ACCA Manual S, Second Edition, except that cooling ranges above ACCA Manual S limits are temporarily allowed, per Item 4.19, and heating ranges above ACCA Manual S limits are allowed where heating and hot water are provided by the same equipment or where standby equipment is needed for redundancy, but only operate when the primary equipment is not operating. For equipment outside the scope of ACCA Manual S, “Other” may be indicated and the equipment sizing approach listed in the space provided.
36. These requirements apply to systems that provide primary space heating and cooling. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in Exhibit X. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 4.37, or stairwells where automatic thermostatic controls prevent operation above 50°F.
37. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency. For residential split air conditioners and heat pumps, the rated efficiency shall be for the specific combination of indoor and outdoor components of the air conditioner or heat pump, along with confirmation that the two components are designed to be used together. If the AHRI Reference # is reported in Item 4.10 (e.g., heat pumps), the AHRI Reference # does not need to be listed again in Item 4.27.
38. The full system capacity at design conditions, from OEM expanded performance data, shall be listed and shall include the capacity of all systems providing space cooling to the dwelling unit. For two-speed or variable-speed equipment, the full system capacity shall reflect the capacity at the maximum available compressor speed or when the compressor operates at the AHRI rating test speed, respectively.
39. Per ACCA Manual S, Second Edition, if the load sensible heat ratio is $\geq 95\%$ and the HDD / CDD ratio is ≥ 2.0 , then the Climate is Condition B, otherwise it is Condition A.
40. As an alternative for low-load dwelling units, a system match-up including a single-speed compressor with a total capacity ≤ 20 kBtu/h is permitted to be used in spaces with a total cooling load ≤ 15 kBtu/h. A system match-up including a two-speed or variable-speed compressor with a total capacity ≤ 25 kBtu/h is permitted to be used in spaces with a total cooling load ≤ 18 kBtu/h.
41. The full system capacity shall be listed for the heating system. For two-stage and modulating furnaces, the full system capacity shall reflect the maximum output available. For shared boilers, the full system capacity may exclude standby equipment needed for redundancy.
42. Per the 2009 International Mechanical Code, a direct-vent furnace or boiler is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under non-positive static vent pressure entirely by natural draft. Naturally drafted equipment is only allowed if located in a space outside the pressure



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boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed. For mechanically drafted boilers, make-up air sources must be mechanically closed when the boiler is not in operation.

43. Designers may provide supplemental documentation with room-by-room and total design airflows in lieu of completing Item 5.2. Sample supplemental documentation can be found at www.energystar.gov/hvacdesigntools.
44. Orientation-specific room-by-room design airflows are recommended, but not required, to distribute airflow proportional to load, thereby improving comfort and efficiency. While air-balancing of supply registers and return grilles is not required to be completed as part of HVAC Functional Testing, it is recommended that ducted HVAC systems be designed such that they can be balanced in the field (i.e. provide proper access to any and all balancing dampers, provide ducting and grille layouts such that accurate air measurements can be taken).
45. Design HVAC fan airflow is the design airflow for the blower in CFM, as determined using the manufacturer's expanded performance data. The Functional Testing Agent is required to measure the HVAC fan airflow using the mode with the higher airflow, within $\pm 15\%$ of design.
46. Design HVAC fan speed setting is the fan speed setting on the control board (e.g., low, medium, high) that corresponds with the Design HVAC fan airflow.
47. Design total external static pressure is the pressure corresponding to the Design HVAC fan airflow, inclusive of external components (e.g., evaporator coil, whole-house humidifier, or \geq MERV 6 filter).
48. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
49. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
50. Item 6.5 generally applies to the ducts of space heating, space cooling, and Dwelling Unit Mechanical Ventilation Systems. However, visual inspection is permitted in lieu of testing for the following system types: 1) a Dwelling Unit Mechanical Ventilation System not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves; 2) a space heating or space cooling system for which the ducts and air handler are in conditioned space and the total supply duct length of the system, including all supply trunks and branches, is ≤ 10 ft; and 3) a space heating or space cooling system that serves more than one dwelling unit. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
51. Duct leakage shall be determined and documented by a Rater in accordance with ANSI / RESNET / ICC 380. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis. For a duct system with one or two returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 4 CFM25 per 100 ft² of CFA or ≤ 40 CFM25 at 'rough-in' or the greater of ≤ 8 CFM25 per 100 ft² of CFA or ≤ 8 CFM25 at 'final'. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 6 CFM25 per 100 ft² of CFA or ≤ 60 CFM25 at 'rough-in' or the greater of ≤ 12 CFM25 per 100 ft² of CFA or ≤ 120 CFM25 at 'final'. For a duct system without any ducted returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 3 CFM25 per 100 ft² of CFA or ≤ 30 CFM25 at 'rough-in' or the greater of ≤ 6 CFM25 per 100 ft² of CFA or ≤ 60 CFM25 at 'final' and, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is ≤ 5 Pa. For systems > 1 ton, increase by 1 Pa per half ton.
52. For the purpose of computing leakage allowance, exhaust fan flow shall be the lesser of the rated fan flow and at rough-in, 133% of the sum of the design exhaust airflow of the dwelling units that are exhausted by that central fan or at final, 143% of the sum of the design exhaust airflow of the dwelling units that are exhausted by that central fan. Measured fan flow (either at the fan itself or the total airflow measured from all exhaust grilles served by the fan) may be used in lieu of the rated fan flow to determine the leakage allowance. This test is not required of central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.



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Appendix A – Supplementary tables for Section 2 and 3

2a. Dwelling Unit & Common Space Mechanical Ventilation Design ^{4, 5}

List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right:							
2.4 # of bedrooms:							
2.5 Square footage:							
2.6 Ventilation airflow rate required by ASHRAE 62.2:							
2.7 Ventilation airflow rate designed:							
2.7.1 If applicable, run-time per cycle (minutes):							
2.7.2 If applicable, cycle time (minutes):							

List common space for which 62.1 ventilation rates were calculated in the spaces to the right:							
2.8 Ventilation airflow rate required by ASHRAE 62.1:							
2.9 Ventilation airflow rate designed:							

System Type & Controls:

List Ventilation System ID in the spaces to the right:							
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)							
2.11 Manufacturer:							
2.12 Model Number:							
2.13 # installed in the building:							
2.14 Spaces each fan serves (i.e., single, multiple)							
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)							
2.16 Specified control location: (e.g., Master bath, utility):							

3. Heating & Cooling Loads

Dwelling Unit Heating & Cooling Loads (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces) ²⁴ N/A

List the unit plan for which Loads were calculated:							
3.5 Location of Unit: top, mid, bottom, corner, interior							
3.6 Number of occupants used in loads: ^{27, 30}							
3.7 Total occupant gains (Btuh): ²⁷							
3.8 Conditioned floor area used in loads: ^{27, 31}							
3.9 Window area used in loads: ^{27, 32}							
3.10 Predominant window SHGC used in loads: ^{27, 33}							
3.11 Infiltration (ACH / ACH50) used in loads: ³⁴							
3.12 Mechanical ventilation (CFM) used in loads:							
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): ²⁷							
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): ²⁸							
3.15 Sensible Heat Gain At Design Conditions (kBtuh): ²⁷							
3.16 Latent Heat Gain At Design Conditions (kBtuh):							
3.17 Total Heat Gain at Design Conditions (kBtuh): ²⁷							
3.18 Total Heat Loss at Design Conditions (kBtuh):							



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Appendix A – Supplementary tables for Section 3

3.19 Common Space Heating & Cooling Loads (required for all common space heating and cooling systems)		
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
Common Space Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)

3.20 Building Heating & Cooling Loads (only required when shared systems such as central boilers or chillers are specified)		
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)	Total Heat Loss: _____ (kBtuh)



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Appendix A – Supplementary tables for Section 4

4. Heating & Cooling Equipment Selection							
Cooling Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) <input type="checkbox"/> N/A							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.4 Equipment type: (PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.5 Area / Space(s) that system serves:							
4.6 Chiller / condenser / outdoor unit manufacturer:							
4.7 Chiller / condenser / outdoor unit model #:							
4.8 Evaporator / indoor unit manufacturer:							
4.9 Evaporator / indoor unit model #:							
4.10 AHRI reference #: ³⁷							
4.11 Listed efficiency:							
4.12 Evaporator fan type: PSC, ECM / ICM Other:							
4.13 Compressor speed: Single, Two, Variable							
4.14 Turn down ratio (for variable speed equipment):							
4.15 Latent capacity at design conditions (kBtuh): ³⁸							
4.16 Sensible capacity at design conditions (kBtuh): ³⁸							
4.17 Total capacity at design conditions (kBtuh): ³⁸							
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5:							
4.19 Meets cooling sizing limit: (A, B, C, D or N/A) ^{25, 27}							
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): ³⁵							
4.21 If "B", calculate HDD / CDD ratio: ³⁹							
Equipment Type & Climate Condition	Compressor Type (Per Item 4.13)						
	Single-Speed	Two-Speed		Variable-Speed			
	A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate ³⁹	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%		Recommended: 90 – 130% Allowed: 90 – 160%		
	B: For Cooling Mode of Heat Pump in Condition B Climate ³⁹	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh		90% - 100%, plus 15 kBtuh		
	C: For low-load spaces (≤15 kBtuh) ⁴⁰	≤ 20 kBtuh					
D: For low-load spaces (≤18 kBtuh) ⁴⁰		≤ 25 kBtuh		≤ 25 kBtuh			
Heating Equipment (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".) <input type="checkbox"/> N/A							
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.24 Area / Space(s) that system serves:							
4.25 Manufacturer:							
4.26 Model Number:							
4.27 AHRI reference #: ³⁷							
4.28 Listed efficiency:							
4.29 Equipment output capacity (kBtuh):							
4.30 Air-source heat pump output capacity (kBtuh) (17°F):							
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent ⁴²							



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4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24:							
4.33 Meets furnace sizing limit: (A, B, C, or N/A) ²⁵							
A: For low-load spaces (≤ 10 kBtuh), furnace output capacity is ≤ 40 kBtuh							
B: When Used for Heating Only				C: When Paired With Cooling			
100 – 400%				Recommended: 100 – 140%		Allowed: 100 – 400%	

Appendix A – Supplementary tables for Section 5

5. Dwelling-Unit Duct Design

5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). ^{10, 43, 44}

Name of the unit plan:				Name of the unit plan:			
Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM				Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM			
Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____				Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____			
Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC				Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC			
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)	
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
Total for all rooms				Total for all rooms			

Name of the unit plan:				Name of the unit plan:			
Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM				Design HVAC fan airflow: ⁴⁵ Cooling mode _____ CFM Heating mode _____ CFM			
Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____				Design HVAC fan speed setting (e.g., low, medium, high): ⁴⁶ Cooling mode _____ Heating mode _____			
Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC				Design total external static pressure (corresponding to the mode with the higher airflow above): ⁴⁷ _____ IWC			
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)	
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
Total for all rooms				Total for all rooms			



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The program requirements in this checklist must be verified based on as-built conditions for both Performance and Prescriptive path projects, unless noted otherwise. Project teams are strongly encouraged to also use this checklist during the project design phase. Raters are reminded that these checklist items must be completed in addition to the items required by Indoor airPLUS and the applicable ENERGY STAR Multifamily New Construction program version. Overlapping requirements are not repeated in this checklist. Raters are also reminded that under Version 1, Revision 9.0, all dwelling units in the building must be certified in order for each individual unit to earn certification.

DOE Zero Energy Ready Home National Rater Checklist					
Version 1, Revision 9.0					
Home Address:	City:	State:	Permit Date:		
1. Partnership Status			Must Correct	Rater¹ Verified	Exception or Alternate Used ² (enter endnote #)
1.1 Rater has verified that builder is a registered DOE ZERH Builder Partner and identified the builder's Partner ID. ³					
1.2 Rater has verified and documented that their company has a ZERH partnership agreement using the ZERH Partner Locator . ⁴					
1.3 Rater(s) signing checklists attest that they are credentialed by a Home Certification Organization for ZERH (HCO for ZERH) or meet the credential requirements of a Multifamily Review Organization for the Zero Energy Ready Home program (MRO for ZERH).					
2. ENERGY STAR Multifamily New Construction Baseline					
2.1 Dwelling unit is certified under applicable ENERGY STAR Multifamily New Construction program version, based on location. ⁵					
<ul style="list-style-type: none"> ▪ Version 1.1 National or Version 1.2 National for projects in all states except Washington and Oregon. ▪ Version 1.2 Washington/Oregon or Version 1.2 National for projects in WA and OR 					
3. Building Envelope					
3.1 Dwelling unit windows meet high performance requirements based on climate zone. ⁶					
3.2 Dwelling unit ceiling, wall, floor, and slab insulation meets or exceeds 2015 IECC levels. ^{7, 8}					
4. Duct System					
4.1 All in-unit heating and cooling system distribution ducts are located within the dwelling unit's thermal and air barrier boundary. ⁹					
4.2 All in-unit heating and cooling system air-handling equipment is located within the dwelling unit's thermal and air barrier boundary.					
5. Water Heating Efficiency (comply with 5.1 or 5.2; mark the other line N/A)					
5.1 Hot water delivery systems meet efficient design requirements. ¹⁰					
5.2 Water heater and fixtures meet efficiency criteria. ¹¹					
6. Lighting & Appliances					
6.1 All builder-installed, in-unit refrigerators, dishwasher, and clothes washer are ENERGY STAR certified. ¹²					



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6.2 80% of builder-installed, in-unit lighting fixtures are LEDs or LED lamps (bulbs) in minimum of 80% of sockets.			
6.3 All builder-installed, in-unit bathroom ventilation fans are ENERGY STAR certified. ¹³			
7. Indoor Air Quality			
7.1 Certified under EPA Indoor airPLUS Version 1. ¹⁴			
8. Renewable Ready			
8.1 Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 1, Revision 9.0 are completed. ¹⁵			
9. Performance Path Efficiency Threshold (if using Prescriptive path, mark N/A)			
9.1 Dwelling unit's ERI value ≤ DOE ZERH Target Dwelling ERI.			
10. Prescriptive Path Eligibility (if using Performance path, mark N/A)			
10.1 The CFA of the dwelling unit is ≤ the CFA of the benchmark dwelling unit. ¹⁶			
10.2 The Prescriptive path Efficiency Specifications table (below) is complete, and all dwelling unit specifications are equal to or exceed the performance of the Target Dwelling Design (Table 2, National Program Requirements).			

Prescriptive Path Efficiency Specifications					
(if using Performance path, mark N/A here and do not complete this table) → _____					
Builder's ZERH Partner ID (found on ZERH Partner Locator webpage): _____					
Program Element	ZERH Prescriptive Specification			As-Built Specification	Specification does not apply ¹⁷
Climate Zone (2015 IECC)	Hot Climates (Zones 1–2)	Mixed Climates (Zones 3 – 4, except Marine)	Cold Climates (Zones 4 Marine and 5 – 8)	Project located in 2015 IECC Climate Zone: _____	
1. HVAC Equipment (in-dwelling, unless stated otherwise)					
Fossil Fuel Furnace	80% AFUE	90% AFUE	94% AFUE	_____% AFUE	
Heat Pump (heating)	8.2 HSPF	9.0 HSPF	10.0	____ HSPF	
Heat Pump (heating, where rated using HSPF2)	Target based on conversion table ¹⁸ : ____ HSPF2			____ HSPF2	
Heat Pump (cooling) or A/C	18 SEER	15 SEER	13 SEER	____ SEER	
Heat Pump (cooling) or A/C (where rated using SEER2)	Target based on conversion table ¹⁹ : ____ SEER2			____ SEER2	
Geothermal Heat Pump	ENERGY STAR EER and COP Criteria based on system type: ____ EER ____ COP			____ EER ____ COP	
Central HVAC Systems ²⁰	Heating target based on endnote: _____			_____	
	Cooling target based on endnote: _____			_____	



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Whole-Dwelling Mechanical Ventilation System	2.8 cfm/W (% SRE n/a)	1.2 cfm/W; heat exchange with 60% SRE	____ cfm/W	
			____ %SRE	
2. Infiltration				
Dwelling Unit Infiltration	3.0 ACH50		____ ACH50	
3. Windows (if dwelling unit's window area to floor area ratio is $\leq 15\%$, mark all items in this section N/A)				
Window to floor area percentage: _____ %				
SHGC	Target value from Table 2 (NPRs): _____ SHGC		SHGC: _____	
	Adjusted target value (see endnote) ²¹ : _____ SHGC			
U-Value	Target U-value from Table 2 (NPRs): _____		U-value: _____	
	Adjusted target U-value (see endnote) ²¹ : _____			
4. Domestic Water Heating (in-dwelling, unless stated otherwise)				
Gas/propane systems	≤ 55 gallons: EF = 0.67		EF = _____	
	> 55 gallons: EF = 0.77		EF = _____	
Electric Systems	EF = 1.50		EF = _____	
Central Water Heating Systems	Meet applicable requirements of ESMFNC Version 1.1 National Rater Field Checklist Item 11.1 (Domestic Hot Water, Prescriptive Path). Target based on above requirement: _____ E _t		_____ E _t	

Inspection Signoffs		
Rater Name: _____ Rater Company Name: _____	Rater Pre-Drywall Inspection ²² Date(s): _____	Rater Initials: _____
Rater Name: _____ Rater Company Name: _____	Rater Final Inspection Date(s): _____	Rater Initials: _____

Endnotes

¹ The Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a DOE-recognized Home Certification Organization for ZERH (HCO for ZERH).

² If an exception for a program requirement or an alternate compliance method is used, enter the number of the corresponding endnote from this document that lists the exception or alternate.



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³ The DOE ZERH Partner ID number for the builder must be entered in the energy rating software used for ZERH certification for Performance path projects.

⁴ Raters are only required to document the partnership status of their company once, for the first home that the Rater certifies for them.

⁵ Sampling of those requirements for ENERGY STAR Multifamily New Construction (ESMFNC) and Indoor airPLUS certification is allowed only to the extent permitted by their respective program requirements and allowances for sampling. Sampling of these ZERH program requirements may be allowed if the Multifamily Review Organization (MRO) for ZERH or Home Certification Organization (HCO) for ZERH overseeing the project's certification has a sampling protocol approved by DOE as part of the MRO/HCO for ZERH approval process.

⁶ Windows shall meet the product criteria listed in this table.

Window Specs Required for DOE Zero Energy Ready Home Projects	Hot Climates IECC CZ 1-2		Mixed Climates IECC CZ 3-4 except Marine		Cold Climates IECC CZ 5-8 and 4 Marine	
	U-factor	SHGC	U-factor	SHGC	U-factor	SHGC
	≤ 0.40	≤ 0.25	[CZ 3] ≤ 0.30 [CZ 4] ≤ 0.30	[CZ 3] ≤ 0.25 [CZ 4] ≤ 0.40	≤ 0.30 = 0.31 = 0.32	Any ≥ 0.35 ≥ 0.40

The following exceptions apply:

- An area-weighted average of windows shall be permitted to satisfy the U-factor requirements.
- An area-weighted average of windows ≥ 50% glazed shall be permitted to satisfy the SHGC requirements.
- 15 square feet of windows per dwelling unit shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above.
- Windows utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity > 20 btu / ft³×°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.

⁷ Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2015 International Residential Code (IRC).

⁸ Insulation levels in a dwelling unit shall meet or exceed the component insulation requirements in the 2015 International Energy Conservation Code (IECC) – Table R402.1.2. The following exceptions apply:

- Steel-frame ceilings, walls, and floors shall meet the insulation requirements of the 2015 IECC – Table 402.2.6.
- For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used.
- For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 sq. ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used.



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- d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows: An assembly with a U-factor equal to or less than specified in Table 402.1.4 of the 2015 IECC complies. A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.4 also complies. The insulation levels of the dwelling unit's fenestration, ceilings, walls, floors, and slabs can be traded off using the UA approach under both the Prescriptive and Performance paths. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.

⁹ Exceptions and alternative compliance paths to locating 100% of forced-air distribution ducts for in-dwelling heating/cooling systems within dwelling unit's thermal and air barrier boundary are:

- a. Up to 10' of total duct length is permitted to be outside of the dwelling unit's thermal and air barrier boundary.
- b. Ducts are located in an unvented attic, regardless of whether this space is conditioned with a supply register
- c. Ducts are located in a vented attic with all of the following characteristics:
 - i. In Moist climates (Zones 1A, 2A, 3A, 4A, 5A, 6A and 7A per 2015 IECC Figure R301.1) and Marine climates (all "C" Zones per 2015 IECC Figure R301.1), minimum R-8 duct insulation with an additional minimum 1.5" of closed-cell spray foam insulation encapsulating the ducts; duct leakage to outdoors ≤ 3 CFM25 per 100 ft² of conditioned floor area (in addition to meeting *total* duct leakage requirements from the ENERGY STAR HVAC Report/Checklist); and ductwork buried under at least 2" of blown-in insulation.
 - ii. In Dry climates (all "B" Zones per 2015 IECC Figure R301.1), minimum R-8 duct insulation; duct leakage to outdoors ≤ 3 CFM25 per 100 ft² of conditioned floor area (in addition to meeting *total* duct leakage requirements from the ENERGY STAR HVAC Report/Checklist); and ductwork buried under at least 3.5" of blown-in insulation.

Note that in either of these designs the HVAC equipment must still be located within the home's thermal and air barrier boundary.

- d. Systems which meet the criteria for "Ducts Located in Conditioned Space" as defined by the 2018 IECC Section R403.3.7 or 2021 IECC Section R403.3.2.
- e. Jump ducts which do not directly deliver conditioned air from the HVAC unit may be located in attics if all joints, including boot-to-drywall, are fully air sealed with mastic or foam, and the jump duct is fully buried under the attic insulation.
- f. Ducts are located within an unvented crawl space.
- g. Ducts are located in a basement which is within the home's thermal boundary.
- h. Ductless HVAC system is used.

This provision does not apply to equipment or ductwork that only provides ventilation.

¹⁰ Hot water delivery systems for a water heater serving an individual dwelling unit meet the following efficiency requirements:

To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. In the case of on-demand recirculation systems, the 0.5 gallon (1.9 liter) storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop, to the fixture itself. To verify that the system stores no more than 0.5 gallons (1.9 liters), verifiers shall 1) calculate the stored volume using the piping or tubing inside diameter and the length of the piping/tubing, **or** 2) perform the field verification



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described below. System options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and on-demand recirculation systems. The following requirements apply to recirculation systems:

- a. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater.
- b. Recirculation systems which operate based on “adaptive” scheduling, meaning that they “learn” the hot water demand profile in the dwelling unit and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
- c. Recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

Field Verification: No more than 0.6 gallons (2.3 liters) of water shall be collected from the hot water fixture before hot water is delivered. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field verify that the system meets the 0.6 gallon (2.3 liter) limit, verifiers shall first initiate operation of on-demand recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 0.6 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 0.6 gallons (approximately 24 seconds for a lavatory faucet), the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F. Under the DOE Zero Energy Ready Home program, the approved verifier may confirm compliance with these requirements.

These provisions do not apply to buildings with central hot water delivery systems. These project types must instead satisfy the applicable efficiency criteria for domestic hot water systems in the next endnote (parts b and c).

¹¹ Systems meet the following requirements:

- a. Individual (in-unit) water heaters serving a single dwelling unit meet the following efficiency criteria:
 - i. Gas water heaters, if present, shall have an Energy Factor ≥ 0.90 or a Uniform Energy Factor ≥ 0.87
 - ii. Electric water heaters, if present, shall have an Energy Factor ≥ 2.2 or a Uniform Energy Factor ≥ 2.2
 - iii. Solar water heating systems, if present, shall have a minimum solar fraction, as follows:

2021 IECC Climate Zone	1, 2	3, 4A, 4B	4C, 5, 6	7, 8
Minimum Solar Fraction (SF)	0.80	0.64	0.47	0.28

- The solar water heating system’s Solar Fraction (SF) must be documented by an OG-300 certification. Alternatively, projects may find an equivalent system in the [OG-300 directory](#) which contains the same OG-100 elements as the chosen system and meets or exceeds the minimum required solar fraction. In this situation, documentation of the OG-100 elements and the comparable OG-300 system must be provided. All systems must be made up of OG-100 tested components.
 - When a solar water heating system meeting these specifications is used, gas and electric water heaters used for backup are exempt from the Uniform Energy Factor (in the two prior sub-items) requirements of 0.87 and 2.2, respectively.
- b. All in-unit showerheads and bathroom sink faucets shall be WaterSense labeled. WaterSense labelling of products may be verified in one of two ways:
 - i. A cut sheet for the installed product indicates that it is WaterSense labeled and field verification shows that the installed product is the one described on the cut sheet.
 - ii. The installed product can be found in the most recent WaterSense Product Search tool (<https://lookforwatersense.epa.gov/products/>) and field verification shows that the installed product matches the product described in the search tool.



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- c. The hot water distribution system shall store no more than 1.8 gallons between the hot water source and the furthest fixture. The hot water source is either the water heater or the point where the branch feeding the furthest fixture branches off the recirculation loop, if present. This shall be verified by either:
 - i. A calculation using the piping or tubing interior diameter and the system length based on plans, or
 - ii. A field verification test, using the protocol described in the previous endnote, which demonstrates a minimum temperature rise of 10 °F by the time 2.0 gallons of water is delivered to the furthest hot water fixture.

¹² For products in categories which are not covered by ENERGY STAR product criteria these products are exempt.

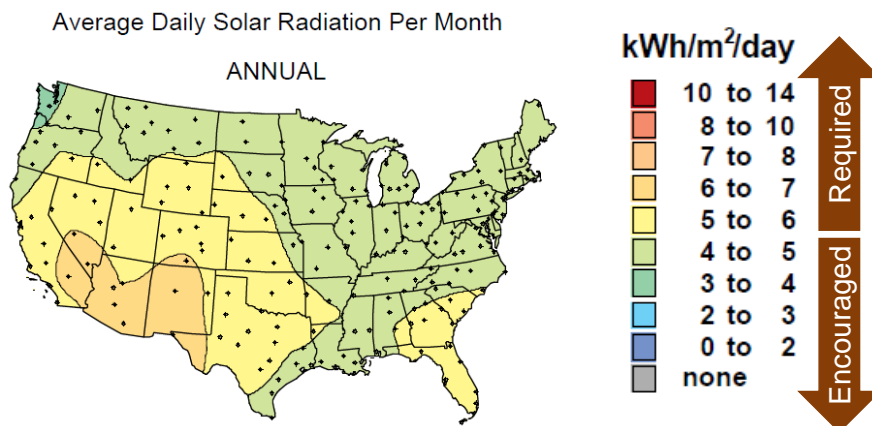
¹³ ENERGY STAR product certification must be verified with a visual confirmation that installed product is listed in the online ENERGY STAR product registry.

¹⁴ Buildings permitted on or before 12/31/2024 must certify under the Indoor airPLUS Version 1 program requirements. For buildings permitted after 12/31/2024, DOE will consider a revision to these program requirements that specifies if an updated version of Indoor airPLUS must be used. See the Indoor airPLUS program site for information on program updates: <https://www.epa.gov/indoorairplus/indoor-airplus-program-documents>

¹⁵ DOE Zero Energy Ready Home requires that the provisions of the Version 1 Rev 9.0 PV-Ready Checklist are completed based on the requirements and allowances in this endnote. For multifamily buildings, the PV-Ready provisions may be applied to the electric service for the building’s common space instead of being applied to dwelling units.

The PV-Ready Checklist only applies when all of the following conditions (a through d) below are satisfied. Dwelling units or buildings for which the PV-Ready Checklist does not apply based on these criteria may still qualify for DOE Zero Energy Ready Home certification if all other program requirements are satisfied.

- a. The building does not already include a PV system. This could include installed community solar systems which contribute some amount of offset to the building’s electrical usage. In order for a community solar system to be recognized as providing renewable energy to the building there must be a legally binding agreement in place for the provision of this energy to the building with a duration ≥ 15 years and written to survive a full or partial transfer of ownership of the property. Documentation of this agreement must be retained by the rater.
- b. Location, based on zip code, has at least 5 kWh/m²/day average daily solar radiation based on annual solar insolation using this online tool: <https://pvwatts.nrel.gov/>. Users should enter the project location zip code, use the System Info default settings, and then proceed to the “Results” tab on the tool to see the Average Annual Solar Radiation value in kWh/m²/day.





DOE Zero Energy Ready Home National Rater Checklist Version 1, Revision 9.0

- c. Location does not have significant natural shading (e.g., trees, tall buildings on the south-facing roof).
- d. Building as designed has the minimum free roof area within +/- 45° of true south as noted in the table below.

Conditioned Floor Area of Dwelling Unit (ft ²)	Minimum Roof Area within +/- 45° of True South for PV-Ready Checklist to Apply (ft ²)
≤ 2000	110
≤ 4000	220
≤ 6000	330
>6000	440

¹⁶ The average-size dwelling unit for a specific number of bedrooms is termed “Benchmark Dwelling Unit”. The conditioned floor area for a Benchmark Dwelling Unit (CFA Benchmark Dwelling Unit) is determined by selecting the appropriate value from the table below. For dwelling units with more than 8 bedrooms, the CFA Benchmark Dwelling Unit shall be determined by multiplying 600 sq. ft. times the total number of bedrooms and adding 400 sq. ft.

Example 10-Bedroom Dwelling Unit: Benchmark Dwelling Unit = (600 sq. ft. x 10) + 400 sq. ft. = 6,400 sq. ft.

Bedrooms in Dwelling Unit to be Built	0	1	2	3	4	5	6	7
Conditioned Floor Area Benchmark Dwelling Unit (ft ²)	1,000	1,000	1,600	2,200	2,800	3,400	4,000	4,600

¹⁷ Mark N/A for items that are not applicable to the as-built dwelling (i.e., a dwelling using only heat pumps for heating and cooling would mark AFUE as N/A).

¹⁸ Where equipment is rated in HSPF2, the following table shall be used to determine the required efficiency specification. The first row shows the efficiency listed in Exhibit 2 of the National Program Requirements, and below are rows for the converted metric by equipment type.

Efficiency as listed in Exhibit 2	HSPF		
		8.2	9.0
Equipment Type	HSPF2		
Ductless System	7.3	8.0	8.9
Ducted Split System	6.9	7.6	8.4
Ducted Single Packaged System	6.8	7.5	8.3

¹⁹ Where equipment is rated in SEER2, the following table shall be used to determine the required efficiency specification. The first row shows the efficiency listed in Exhibit 2 of the National Program Requirements, and below are rows for the converted metric by equipment type.

Efficiency as listed in Exhibit 2	SEER		
		13.0	15.0
Equipment Type	SEER2		
Ductless System	13.0	15.0	18.0
Ducted Split System	12.4	14.3	17.1
Ducted Single Packaged System	12.4	14.3	17.1



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²⁰ For dwelling units served by central systems, the central system must meet the applicable requirements of ESMFNC Version 1.1's Exhibit X (see ESMFNC Rater Field Checklist).

Exceptions:

1. Hot water boilers ($\geq 300,000$ Btu/h) must be $\geq 90\%$ E_t
2. Where Exhibit X lists the Minimum Efficiency as "See Reference Design," the project must instead meet applicable efficiency specification found in ZERH V1 Rev 9.0 Exhibit 2.

²¹ All decorative glass and skylight window areas count toward the dwelling unit's total window area to above-grade conditioned floor area (WFA) ratio. For homes using the Prescriptive path that have a WFA ratio $> 15\%$, the following additional requirements apply:

- a. In Climate Zones 1, 2, and 3, an improved window SHGC is required and is determined by:

$$\text{Improved SHGC} = [0.15 / \text{WFA}] \times [\text{Target SHGC}]$$

Where the Target SHGC is the maximum allowable SHGC in Exhibit 2 of the National Program Requirements for the Climate Zone where the dwelling unit will be built.

- b. In Climate Zones 4, 5, 6, 7, and 8, an improved window U-Value is required and is determined by:

$$\text{Improved U-Value} = [0.15 / \text{WFA}] \times [\text{Target U-Value}]$$

Where the Target U-Value is the maximum allowable U-Value in Exhibit 2 of the National Program Requirements for the Climate Zone where the dwelling unit will be built.

Dwelling units following the Prescriptive path may apply the same exceptions available for compliance with the mandatory window requirements to these U and SHGC requirements.

²² Any Item that will be concealed by drywall (e.g., wall insulation) must be verified during the pre-drywall inspection. If drywall is installed prior to the inspection, then it must be entirely removed to fully verify all Items. It is not sufficient to remove only portions of drywall to inspect a subset of areas. Additional information is available in the ENERGY STAR Technical Bulletin: Pre-Drywall Inspection Is Always Required. Some Items can typically only be verified at a later stage of construction than when the pre-drywall inspection occurs (e.g., bath fan airflow). Any Item that has not been verified during the pre-drywall inspection must be verified prior to or during the final inspection.

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**U.S. DEPARTMENT OF HOUSING & URBAN DEVELOPMENT
 OFFICE OF FAIR HOUSING & EQUAL OPPORTUNITY
 UFAS ACCESSIBILITY CHECKLIST**

NOTE:

1. This checklist is to be used in conjunction with the Uniform Federal Accessibility Standards (UFAS), 24 C.F.R. § 40, Appendix A. (www.access-board.gov/ufas/ufas.pdf)
2. This checklist is intended for accessibility reviews of properties owned, operated and/or managed by recipients of Federal financial assistance. See Section 504 of the Rehabilitation Act of 1973 (Section 504), 29 U.S.C. § 794; 24 C.F.R. Part 8. However, the properties may also be subject to the Fair Housing Act (42 U.S.C. §§ 3601-20; 24 C.F.R. Part 100); and/or the Americans with Disabilities Act of 1990 (42 U.S.C. §§ 12101 *et seq.*)
3. This checklist is not all-inclusive. Please make additions, as necessary, depending on elements reviewed at each site. Reviewer is responsible for verification of each UFAS citation; all UFAS cites [including scoping requirements] for a particular element may not be referenced on this checklist.

Required Equipment: Tape Measure; Smart Level; Door Pressure Gauge; Camera

Photographs:

1. If element is compliant, then photograph area.
2. If element is not compliant, then photograph the area and zoom in to photograph the measurements

Exterior and Interior Common Use Elements:

	Page		Page
Accessible Parking	2	Clothes Lines, Picnic Areas, Play Equipment, Other	29 – 30
Accessible Route	3 – 5	Misc: Community Kitchen; Telephones; Assistive Listening System	31 – 32
Ramps	6		
Signage	7	<u>Dwelling Unit:</u>	
Doors	8 – 9	Entrance	33 – 34
Public Offices, Mtg. Rms/Rec/Community Rm., Etc.	10 – 15	Accessible Route	34
Public Restrooms	16 – 20	Bedrooms	35 – 36
Elevators/Platform Lift	21 – 22	Outdoor Spaces	36 – 37
Drinking Fountains/Water Coolers	23	Bathroom	38 – 43
Mailboxes	24	Kitchen	44 – 45
Laundry Facilities	25 – 26	Washer/Dryer, Utility Room	45
Dumpsters and Trash Chutes	27 – 28	Other Controls	46

* Place asterisk in column for findings of non-compliance.
 ** Insert Photograph numbers for all elements and areas of non-compliance.

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	ACCESSIBLE PARKING:			
	NOTE: Photograph building sign before starting the survey.			
	Accessible Parking Location:			
4.6.1; 4.1.1(5)(d)	1. Where parking is provided for all residents , is there one accessible space for each accessible dwelling unit? 2. For all Other Parking : a. Count and record the total number of spaces. b. Record the number of designated accessible parking spaces.	_____ _____ _____ _____		
4.6.2;	Is designated accessible parking spaces the closest parking to the nearest accessible entrance, on an accessible route?			
4.6.3; Fig. 9;	(Measure from centerline of marking to centerline of marking) 1. Is parking space at least 96" wide ? 2. Is access aisle the full length of the parking space and at least 60" wide ? 3. If there is no access aisle , is the parking space at least 156" wide ?	_____ _____ _____ _____		
4.6.3;	Is the slope and cross-slope of parking space & access aisle no more than 2% in all directions?			
4.6.4; 4.30.5; 4.1.1(7);	Does each designated accessible parking space have a sign with the International Symbol of Accessibility mounted at least 60" above the space to the bottom of the signage?	_____ _____		
4.6.3; 4.5.1; 4.3.6;	Surface is firm, stable and slip-resistant?			
4.3.3	Can legally parked vehicles block access to the curb ramp?			

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	ACCESSIBLE ROUTE:			
4.3.2(1)	Accessible Route Location: From public street? From parking? From bus stop on site? From another common use facility on site such as a community center, clothes line poles, dumpsters, mail boxes, laundries, playground, or park?	_____ _____ _____ _____		
4.5.2	Is a curb ramp needed but not provided?			
4.7.2; 4.8.2; 4.8.6; 4.7.3; 4.7.4; 4.5.1; 4.7.5; Figs. 12 & 13	Curb Ramps: 1. Slope does not exceed 8.33%? 2. Cross slope no more than 2%? 3. Gutter slope no more than 5% in the opposite direction? 4. Is the transition between gutter and curb ramp smooth ? 5. At least 36" wide , excluding flared sides? 6. Surface is firm, stable and slip-resistant? 7. If the sides of curb ramp are not blocked, are there flared sides with slopes no more than 10%?	_____ _____ _____ _____ _____ _____ _____		
4.3.3	Can legally parked vehicles block access to the curb ramp?			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e);	1. Minimum clear width at least 36" (width may be reduced to 32" for a length of no more than 24")? 2. Can legally parked cars overhang the path such that the accessible route is less the 36" wide?	_____ _____		
4.5.1; 4.3.8; 4.5.2;	Surface: 1. Firm, stable and slip-resistant? 2. Changes in level between ¼" – ½" shall be beveled ? 3. Changes in level greater than ½" shall be ramped?	_____ _____		
4.3.7;	Slope of accessible ramp is 5% or less (if slope is greater than 5% and it has ramp features, survey it as a ramp)?			

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	ACCESSIBLE ROUTE:			
4.3.7;	Cross-slope is no more than 2%?			
4.5.4; Fig. 8(g) & (h)	Openings in Grates are no more than 1/2" in the direction of travel?	_____ _____		
4.5.2	Must stairs be used as part of the accessible route? (" <i>Yes</i> " is a <i>barrier</i> .)			
4.4.1; 4.4.2; Fig. 8(a); Fig. 8(b);	Protruding Objects: (<i>can be fire extinguishers, underside of stairs, signs, shelves, cabinets, tree branches, etc.</i>) 1. Does a telephone, sign, shelf, or other object project more than 4" into the circulation path and have the leading edge begin more than 27" and less than 80" above the floor? (" <i>Yes</i> " is a violation.) 2. Do pipes, signs, or other objects hang from above to less than 80" above the circulation path? 3. If post mounted , is the leading edge more than 27" above the floor and projects more than 12" into the circulation path?	_____ _____ _____ _____ _____ _____		
4.1.2(12); 4.27	Controls: (<i>Can be found on rent drop boxes, light switches, dumpsters, trash chutes, fire alarms, intercoms, fixed vending machines, etc.</i>) 1. Does each have a clear floor space of 30" x 48"? a. _____ b. _____ c. _____ 2. Is the Highest and Lowest Operable Part within reach? (identify the approach): a. Forward approach (Fig. 5(a)): 15" to 48". b. Side approach (Fig. 6(b)): 9" to 54". c. Forward approach over an obstruction less than 20" deep (Fig. 5(b)): no higher than 48" . d. Forward approach over an obstruction 20" to 25" deep (Fig. 5(b)): no higher than 44" . e. Side reach over an obstruction no more than 10" deep (Fig. 6(b)): no higher than 54" . f. Side reach over an obstruction 10" to 24" deep (Fig. 6(c)): no higher than 46" . 3. Is it operable with one hand without tight grasping, pinching, or twisting of the wrist?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____		

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ACCESSIBLE ROUTE:				
4.1.2(11); 4.25	<p>Storage: (Of those serving each accessible dwelling unit, one of each type.) (<i>Can be mail boxes, clothes lines, fixed coat racks, etc.</i>)</p> <ol style="list-style-type: none"> 1. Does each have a clear floor space of 30" x 48"? <ol style="list-style-type: none"> a. _____ b. _____ c. _____ 2. Is the Highest and Lowest Operable Part within reach? (Identify the approach. See "Controls" above for descriptions.): <ol style="list-style-type: none"> a. _____ b. _____ c. _____ 3. Is it operable with one hand without tight grasping, pinching, or twisting of the wrist? 	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____		
4.1.2(17); 4.32.3; 4.32.4	<p>Fixed or built-in tables and work surfaces: (<i>Can be tables in laundry rooms, counters in recreation spaces, etc.</i>)</p> <ol style="list-style-type: none"> 1. Top is between 28" and 34" above the floor? 2. Clear floor space is 30" by 48" that extends 19" under the table or work surface? 3. Knee space is at least 27" high? 	_____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	RAMPS:			
	Ramp Location:			
4.8.3;	Ramp is at least 36" wide between handrails?			
4.8.2;	Slope is no more than 8.33% ?			
4.8.6;	Cross-slope (slope of ramp that is perpendicular to the direction of travel) is no more than 2% ?			
4.8.6; 4.5.1;	Ramp surface is firm, stable and slip-resistant?			
4.8.4;	Landings: Ramps must have landings at the top and bottom, at turns, and must have intermediate landings whenever the rise is more than 30". (A 30-foot ramp sloping at 8.33% has a 30-inch rise.) 1. Slopes no more than 2% ? 2. At least as wide as ramp and at least 60" long ? 3. If ramps change direction at landings, is the landing at least 60" x 60" ?	_____ _____ _____ _____		
4.8.5; 4.8.7; Fig. 17	1. If ramp is longer than 72" , then are handrails provided on both sides? 2. If ramp or landings have drop-offs , are there curbs, walls, railings or projecting surfaces that prevent people from slipping off? 3. If a curb is provided, is it at least 2" high ?	_____ _____ _____		
4.8.8;	Can water accumulate on walking surface?			
4.26.2; 4.8.5(2), (3), (5), & (6);	Handrails: 1. Diameter of gripping surface between 1 1/4" to 1 1/2" ? 2. Clear space between the handrail and the wall shall be 1 1/2" exactly ? 3. If handrails are not continuous , do they extend at least 12" beyond the top and bottom of each segment? 4. Ends of handrails are either rounded or returned smoothly to the floor, wall or post? 5. Top of handrail gripping surface shall be mounted between 30" and 34" above the ramp surfaces?	_____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	ENTRANCE TO FACILITY:			
	Location:			
4.1.1(7); 4.30.5	Entrance Signage: If not all common use entrances are accessible: 1. If this is the accessible entrance , is it identified by an International Symbol of Accessibility?			
	INTERIOR SIGNS:			
4.1.2(15); 4.30.4; 4.30.3; 4.30.6;	Survey Signage designating permanent rooms and spaces (including exit signs at doors, elevators, restrooms, room numbers, and interior apartment numbers): 1. Does the text contrast with the background? 2. Is the text raised or incised? 3. Are the characters at least 5/8" but no more than 2" tall ? 4. Is the sign mounted to the latch side of the door ? 5. Is the centerline of the sign mounted between 54" and 66" above the floor?	_____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DOORS AND GATES:			
	Location:			
4.13.2;	Revolving doors or turnstiles cannot be used as accessible doors.			
4.13.6	Maneuvering Space: (Automatic or power-assisted doors do not require any minimum maneuvering clearance.)			
4.13.6	The maneuvering space slopes no more than 2% in either direction?			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (Fig. 25(a): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (Fig. 25(b): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (Fig. 25(c): Is there at least 24" to the latch side ? Is depth at least 48" (54" if door has a closer)?	_____ _____ _____ _____ _____ _____ _____ _____		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (Fig. 25(a): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (Fig. 25(b): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)? 3. Approaching the latch side of the door (Fig. 25(c): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DOORS AND GATES:			
4.13.6; Fig. 25(d); Fig. 25(e); Fig. 25(f);	Sliding Doors (Choose one for each side) 1. Approaching the door head-on (Fig. 25(d)): Is the depth at least 48" ? 2. Approaching the slide side of the door (Fig. 25(e)): Is there at least 18" to the slide side ? Is the depth at least 42" ? 3. Approaching the latch side of the door (Fig. 25(f)): Is there at least 24" to the latch side ? Is the depth at least 42" ?	_____ _____ _____ _____		
4.13.7; Fig. 26	Two Doors in a Series (Vestibule): Between the doors, is there at least 48" beyond the swing of the doors?			
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)			
4.13.10;	Does the door take more than 3 seconds to close ? (<i>From an open position of 70° to a point 3" from the latch</i>)			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	_____ _____ _____ _____		
4.13.8;	Thresholds: 1. For exterior sliding doors, the threshold is no higher than 3/4" ? 2. For all other doors, the threshold is no higher than 3/4" (1/2" in New Construction)? 3. Is the threshold beveled ?	_____ _____ _____		

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	PUBLIC OFFICES/MTG ROOMS/REC. ROOMS/LOBBIES, ETC.:			
	Location of Public Offices, Etc.:			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e)	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.4.1; 4.4.2; Fig. 8(a); Fig. 8(b);	Protruding Objects: 1. Does a telephone, sign, shelf, or other object project more than 4" into the circulation path and have the leading edge begin more than 27" and less than 80" above the floor? ("Yes" is a violation.) 2. Do pipes, signs, or other objects hang from above to less than 80" above the circulation path? 3. If post mounted , is the leading edge more than 27" above the floor and projects more than 12" into the circulation path?	_____ _____ _____ _____ _____		
	Door:			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (Fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (Fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (Fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	PUBLIC OFFICES/MTG ROOMS/REC. ROOMS/LOBBIES, ETC.:			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (Fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (Fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)? 3. Approaching the latch side of the door (Fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction)? 2. Is the threshold beveled ?	<hr/> <hr/>		
7.2; 4.32.4;	Business/Transactional Counter: If the counter is more than 36" above the floor: 1. Is there an auxiliary counter (in close proximity to the main counter), or a portion of the main counter, that is no higher than 34" ?	<hr/> <hr/> <hr/>		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	OFFICE/MEETING ROOM/REC ROOM #2			
	Location of Public Offices, Etc.:			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e);	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.4.1; 4.4.2; Fig. 8(a); Fig. 8(b);	Protruding Objects: 1. Does a telephone, sign, shelf, or other object project more than 4" into the circulation path and have the leading edge begin more than 27" and less than 80" above the floor? ("Yes" is a violation). 2. Do pipes, signs, or other objects hang from above to less than 80" above the circulation path?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
	Door:			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (Fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (Fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (Fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (Fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (Fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)? 3. Approaching the latch side of the door (Fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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** Insert Photograph numbers for all elements and areas of non-compliance.

Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32”? <i>(Measured from the door face to the opposite stop when the door is open 90°.)</i> <i>(At double doors, measure using only one door.)</i>			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48” above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds?	_____ _____ _____ _____		
4.13.8;	Thresholds: 1. The threshold is no higher than ¾” (1/2” in New Construction)? 2. Is the threshold beveled?	_____ _____		
7.2; 4.32.4;	Business/Transactional Counter: If the counter is more than 36” above the floor: 1. Is there an auxiliary counter (in close proximity to the main counter), or a portion of the main counter, that is no higher than 34”?	_____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	OFFICE/MEETING ROOM/REC ROOM #3			
	Location of Public Offices, Etc.:			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e)	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.4.1; 4.4.2; Fig. 8(a); Fig. 8(b);	Protruding Objects: 1. Does a telephone, sign, shelf, or other object project more than 4" into the circulation path and have the leading edge begin more than 27" and less than 80" above the floor? ("Yes" is a violation.) 2. Do pipes, signs, or other objects hang from above to less than 80" above the circulation path?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
	Door:			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)? 3. Approaching the latch side of the door (fig. 25(c): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32”? <i>(Measured from the door face to the opposite stop when the door is open 90°.)</i> <i>(At double doors, measure using only one door.)</i>			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48” above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds?	_____ _____ _____ _____		
4.13.8;	Thresholds: 1. The threshold is no higher than 3/4” (1/2” in New Construction)? 2. Is the threshold beveled?	_____ _____		
7.2; 4.32.4;	Business/Transactional Counter: If the counter is more than 36” above the floor: 1. Is there an auxiliary counter (in close proximity to the main counter), or a portion of the main counter, that is no higher than 34”?	_____ _____ _____		

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 (Any structure built after July 11, 1988 is considered New Construction)

Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments		N/C Finding *	Picture No. **
		WOMEN	MEN		
	PUBLIC RESTROOMS:				
	Public Restroom Location:				
4.22.1; 4.1.2(10); 4.1.6(4)(e)	If public restrooms are provided, is at least one (1) accessible and on an accessible route (All restrooms if New Construction)?				
4.1.1(7); 4.30.5	Sign: Is it identified by an International Symbol of Accessibility?				
4.1.2(15); 4.30.4; 4.30.3; 4.30.6;	Survey Signage designating permanent rooms and spaces (including exit signs at doors, elevators, restrooms and room numbers): 1. Does the text contrast with the background? 2. Is the text raised or incised? 3. Are characters at least 5/8" but no more than 2" tall ? 4. Is the sign mounted to the latch side of the door ? 5. Is the sign mounted between 54" and 66" above the floor?	_____ _____ _____ _____	_____ _____ _____ _____		
	Doors:				
4.13.6	Maneuvering Space: (Automatic or power-assisted doors do not require any minimum maneuvering clearance.)				
4.13.6	The maneuvering space slopes no more than 2% in either direction?				
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments		N/C Finding *	Picture No. **
		WOMEN	MEN		
	PUBLIC RESTROOMS:				
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____			
4.13.7; Fig. 26	Two Doors in a Series (Vestibule): Between the doors, is there at least 48" beyond the swing of the doors?				
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)				
4.13.10;	Does the door take more than 3 seconds to close ? (<i>From an open position of 70° to a point 3" from the latch</i>)	_____			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	_____ _____ _____ _____			
4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction)? 2. Is the threshold beveled ?	_____ _____			
4.18.2; 4.18.3; 4.18.4;	Urinals: 1. Elongated rim no more than 17" above the floor? 2. Clear floor space is at least 30" x 48" ? 3. Flush control is automatic or no more than 44" above the floor?	_____ _____ _____			

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PUBLIC RESTROOMS:		WOMEN	MEN		
4.22.6; 4.19.2; 4.19.3; 4.19.4; Fig. 31; Fig. 32;	Lavatory (a.k.a. Sink): 1. Top of the rim is no more than 34" above the floor? 2. Bottom of apron is at least 29" above the floor? 3. At a point 8" back from the front edge of the lavatory, is the clear knee space at least 27" high (excluding the dip of the overflow)? 4. Is the clear floor space at least 30" wide x 48" deep (must extend 17" to 19" under the lavatory)? 5. Are the drain and hot water supply pipes insulated ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.19.5; 4.27.4;	Faucet Controls automatic or easily operated with one hand and don't require tight gripping, pinching or twisting of the wrist?				
4.22.6; 4.19.6;	Is the Mirror mounted with bottom edge of the reflecting surface no more than 40" above the floor?				
4.22.7; 4.27; 4.2.5; 4.2.6;	Dispensers/Other Elements: 1. Does each have a clear floor space of 30" x 48"? a. Soap Dispenser b. Paper Towels c. Trash Receptacle d. Coat Hooks e. Feminine Hygiene d. Others 2. Is the Highest Operable Part within reach? (48" for forward approach or 54" for a side approach) a. Soap Dispenser b. Paper Towels c. Trash Receptacle d. Coat Hooks e. Feminine Hygiene f. Others. 3. Is it operable with one hand without tight grasping, pinching, or twisting of the wrist?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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		WOMEN	MEN		
	PUBLIC RESTROOMS:				
4.22.3; 4.2.3; Fig. 3;	Unobstructed Turning Space: 1. If there is only one lavatory (a.k.a. sink) and one toilet , is there a 30" x 60" clear floor space beyond the swing of the door? (May overlap accessible route and clear floor spaces at fixtures.) 2. In all other toilet rooms , is there an unobstructed turning space (a 60" diameter circle or T-shape)? (May overlap the accessible route, maneuvering space at the door, and clear floor spaces at fixtures.)	_____	_____		
4.16.3; 4.16.2; Fig. 28	ALL Toilets (Whether in Stall or Not): 1. Top of seat is 17" to 19" above the floor ? 2. Is the centerline exactly 18" from the closest side wall?	_____	_____		
4.16.6; Fig. 29(b);	Toilet Paper Dispenser: 1. Centerline is at least 19" above the floor? 2. Starting at the edge farthest from the back wall, is it no more than 36" from the back wall? 3. Allows continuous paper delivery?	_____	_____		
4.16.5	Flush Control: 1. Flush control is automatic or no more than 44" above the floor? 2. Flush control is on the wide side (clear space side) of the toilet?	_____	_____		
4.17.5; 4.13; 4.17.3; Fig. 30(a); Fig. 29; 4.17.6; Fig. 30; 4.26.2;	Toilet in a Stall: 1. Stall door clear opening width is at least 32" ? 2. Hardware does not require tight grasping or twisting of the wrist? 3. Maneuvering space outside stall door: a. If door swings out and the maneuvering space has a front approach (fig. 25(a)), is there 18" to the latch side ? b. For all other door approaches is the maneuvering space at least 42" deep ? 4. Facing toilet - If toilet is wall-mounted , is stall at least 56" deep x 60" wide ? 5. Facing toilet - If toilet is floor-mounted , is stall at least 59" deep x 60" wide ?	_____	_____		

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	PUBLIC RESTROOMS:	WOMEN	MEN		
	<p>6. Side Grab Bar:</p> <ul style="list-style-type: none"> a. Is centerline of grab bar mounted between 33” and 36” above the floor? b. Is grab bar between 1 ¼” and 1 ½” in diameter? c. Is the space between the grab bar and the wall 1 ½” exactly? d. Is the grab bar no more than 12” of the back wall and at least 40” long? <p>7. Back Grab Bar:</p> <ul style="list-style-type: none"> a. Is centerline of grab bar mounted between 33” and 36” above the floor? b. Is grab bar between 1 ¼” and 1 ½” in diameter? c. Is the space between the grab bar and the wall 1 ½” exactly? d. Is the grab bar no more than 6” of the side wall and at least 36” long? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>			
4.23.3; 4.16; Fig. 28; 4.16.4; Fig. 29; 4.26.2; 4.16.5;	<p>Toilet NOT in a Stall (unisex or single-user restroom)</p> <ol style="list-style-type: none"> 1. If there is a side approach, is clear floor space at least 56” deep x 48” wide (a wall-hung lavatory may overhang the width up to 12”)? 2. If there is only a front approach, is clear floor space at least 66” deep x 48” wide (a wall-hung lavatory may overhang the width up to 12”)? 3. Side Grab Bar: <ul style="list-style-type: none"> a. Is centerline of grab bar mounted between 33” and 36” above the floor? b. Is grab bar between 1 ¼” and 1 ½” in diameter? c. Is the space between the grab bar and the wall 1 ½” exactly? d. Is grab bar no more than 12” of the back wall and at least 42” long with the front edge at least 54” from the back wall? 4. Back Grab Bar: <ul style="list-style-type: none"> a. Is centerline of grab bar mounted between 33” and 36” above the floor? b. Is grab bar between 1 ¼” and 1 ½” in diameter? d. Is the space between the grab bar and the wall 1 ½” exactly? e. Is the grab bar no more than 6” of the side wall and at least 36” long? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>			

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	ELEVATOR/PLATFORM LIFT:			
	Elevator/Platform Lift Location: <i>(Survey all elevator cars)</i>			
4.10.1; 4.3.3; 4.4.1; Fig. 7; Fig. 8(e)	Is the minimum clear width of the accessible route to the elevators at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.10.3; Fig. 20;	Hall Call Buttons (outside elevators): 1. Centered at 42" above the floor? 2. Have visual signals to indicate when each call is registered and when each call is answered? 3. Not less than 3/4" in diameter? 4. Buttons are raised or flush?	_____ _____ _____ _____		
4.10.4; Fig. 20;	Hall Lanterns (outside elevators): 1. Above each elevator door is there a visible and audible signal that indicates which car is answering a call? (Can be in-car lanterns if they are visible from the vicinity of the hall call buttons when the doors open.) 2. Do audible signals sound once for the "up" and twice for the "down" or have verbal annunciators? 3. Visible signals: a. Centerline is at least 72" above the lobby floor? b. Elements at least 2 1/2" tall?	_____ _____ _____ _____ _____ _____ _____ _____		
4.10.5; 4.30; Fig. 20;	Raised Characters on Hoistway Entrances: 1. Provided on both jambs? 2. Centerline mounted 60" exactly above the floor? 3. The characters at least 2" high?	_____ _____		
4.10.6;	Door Protective & Reopening Device: 1. Door reopens when obstructed without requiring contact? 2. While obstructed and without contact, door stays open at least 20 seconds?	_____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	ELEVATOR/PLATFORM LIFT:			
4.10.2	Does the car self-level to within 1/2" ?			
4.10.9; Fig. 22	Floor Plan of Elevator Cars (Choose only one): 1. If door is centered , is the car at least 51" deep and 80" wide (<i>measured from panel to panel</i>)? 2. If door is to one side , is the car at least 51" deep and 68" wide (<i>measured from panel to panel</i>)? 3. If elevator cars are existing (installed before July 11, 1988) and do not comply with either of the questions above, is car at least 48" by 48" ?	<hr/> <hr/> <hr/> <hr/>		
4.10.12; 4.30; Fig. 23(a)&(b)	Car Controls (Inside Elevator): 1. All floor buttons are no higher than 48" ? 2. Smallest dimension is at least 3/4" ? 3. Buttons are raised or flush ? 4. All buttons have a raised character/symbols mounted to the left of the button ? 5. Raised star to the left of the main floor button? 6. Do floor buttons alight when pushed and stay lit until the call is answered?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.10.12(3); Figs. 23(a) & (b)	Emergency Controls (Inside Elevator): Controls, including the emergency alarm and emergency stop, are grouped at the bottom of the panel with centerlines no less than 35" above the floor (Figs. 23(a) and (b))?	<hr/> <hr/> <hr/>		
4.10.13;	Car Position Indicators (Inside Elevator): Is it visual and mounted above the car control panel or over the door?	<hr/>		
4.10.14; 4.30; 4.27;	Elevators – Emergency Communications: If a two-way communication system is provided: 1. Mounted between 15" and 48" above the floor? 2. Characters and symbols are raised or incised and at least 5/8" tall? 3. If there is a handset, is the cord at least 29" long? 4. Controls operable with one hand without tight grasping or twisting? 5. Does not require voice communication?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.11; 4.11.2; 4.2.4; 4.11.3;	PLATFORM LIFTS: 1. Is platform at least 48" deep and 36" wide? 2. Can one enter and exit without assistance ? (Is it on an accessible route, have compliant maneuvering space at the doors, and have compliant door hardware?)	<hr/> <hr/> <hr/>		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DRINKING FOUNTAINS/WATER COOLERS:			
	Drinking Fountain Location:			
4.15.5(2); 4.15.5(5); Fig. 27;	1. If free-standing or built-in, is there a 30" x 48" clear floor space for a parallel approach? 2. If wall- and post-mounted: a. Knee clearance at least 27" high? b. 30" by 48" clear floor space for a forward approach? c. Clear floor space extends 17" to 19" under the drinking fountain?	_____ _____ _____ _____ _____		
4.15.2; 4.15.3;	Spout: 1. Is no more than 36" above the floor? 2. Near front? 3. Water flow height is at least 4"?	_____ _____		
4.15.4; 4.27.4;	Controls: 1. Mounted on the front or on the side near the front? 2. Operable with one hand and does not require tight grasping, pinching, or twisting of the wrist?	_____ _____		
4.4.1; Fig. 8(a); Fig. 8(b);	Protruding Object: Is leading edge of the drinking fountain more than 27" above the floor and projects more than 4" into the circulation path? ("Yes" is a violation.)	_____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	MAILBOXES:			
	Mailbox Location:			
	NOTE: Residents with disabilities can request the U.S. Postal Service to accommodate their disability by assigning them a mailbox on the bottom row.			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e);	Is the minimum clear width of the accessible route to the mailboxes at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.2; 4.1; 4.2.5; 4.2.6; 4.2.4	<ol style="list-style-type: none"> Clear floor space at least 30" wide x 48" deep? <i>(Survey the boxes for the accessible unit. For more reach range options, see "Controls" on page 4.)</i> Front approach (fig. 5(a)): mounted no higher than 48" above the floor? Side approach (fig. 6(b)): mounted no higher than 54" above the floor? 	<hr/> <hr/> <hr/> <hr/>		
4.27.4;	Is it operable with one hand without tight grasping, pinching, or twisting of the wrist?			

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
LAUNDRY FACILITIES:				
Laundry Location:				
4.3.3; 4.4.1; Fig. 7; Fig. 8(e)	Is the minimum clear width of the accessible route to the laundry facility at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
Maneuvering Space at Door: (Automatic or power-assisted doors do not require any minimum maneuvering clearance.)				
4.13.6	The maneuvering space slopes no more than 2% in either direction?			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____ _____		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)?	_____ _____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	LAUNDRY FACILITIES:			
	3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" (48" if the door has a closer)?			
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)	_____		
4.13.10;	Does the door take more than 3 seconds to close ? (<i>From an open position of 70° to a point 3" from the latch</i>)	_____		
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	_____ _____ _____		
4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction)? 2. Is the threshold beveled ?	_____ _____		
4.34.7.2;	Minimum of 1 front-loading washer and dryer?			
4.2.5; 4.2.6	1. Clear floor space at least 30" wide x 48" deep? (<i>For more reach range options, see "Controls" on page 4.</i>) 2. Front approach (fig. 5(a)): mounted no higher than 48" above the floor? 3. Side approach (fig. 6(b)): mounted no higher than 54" above the floor?	_____ _____ _____		
4.27.4; 4.34.7.3;	Are machine controls operable with one hand without tight grasping, pinching, or twisting of the wrist?			
4.1.2(17); 4.32.3; 4.32.4	Fixed or built-in tables and work surfaces: 1. Top is between 28" and 34" above the floor? 2. Clear floor space is 30" by 48" that extends 19" under the table or work surface? 3. Knee space is at least 27" high?	_____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
DUMPSTERS AND TRASH CHUTES:				
Location:				
4.3.3; 4.4.1; Fig. 7; Fig. 8(e)	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.13.6	Maneuvering Space at door or gate: (Automatic or power-assisted doors do not require maneuvering space.)			
4.13.6	The maneuvering space slows no more than 2% in either direction?			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" (54" if the door has a closer)?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____		

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 ** Insert Photograph numbers for all elements and areas of non-compliance.

Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DUMPSTERS AND TRASH CHUTES:			
	3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is depth at least 42" (48" if door has a closer)?			
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)			
4.13.10;	Does the door take more than 3 seconds to close ? (<i>From an open position of 70° to a point 3" from the latch</i>)			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	_____ _____ _____ _____		
4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction) ? 2. Is the threshold beveled ?	_____ _____		
4.2.5; 4.2.6;	Controls: 1. Clear floor space at least 30" wide x 48" deep? (<i>For more reach range options, see "Controls" on page 4.</i>) 2. Front approach (fig. 5(a)): mounted no higher than 48" above the floor? 3. Side approach (fig. 6(b)): mounted no higher than 54" above the floor?	_____ _____ _____		
4.27.4;	Are machine controls operable with one hand without tight grasping, pinching, or twisting of the wrist?			

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	CLOTHES LINES, PICNIC AREA, PLAY EQUIPMENT, OTHER:			
	Location:			
4.3.3; 4.4.1; Fig. 7; Fig. 8(e);	Is the minimum clear width of the accessible route to this space at least 36" wide, with no step (width may be reduced to 32" for a length of no more than 24")?			
4.13.6	Maneuvering Space at door or gate: (Automatic or power-assisted doors do not require maneuvering space.)			
4.13.6	The maneuvering space slopes no more than 2% in either direction?			
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is depth at least 48" (54" if door has a closer)?	_____ _____ _____ _____ _____ _____ _____		
4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)?	_____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	CLOTHES LINES, PICNIC AREA, PLAY EQUIPMENT, OTHER:			
	3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is depth at least 42" (48" if door has a closer)?			
4.13.5; Fig. 24; 4.13.4;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>) (<i>At double doors, measure using only one door.</i>)			
4.13.10;	Does the door take more than 3 seconds to close ? (<i>From an open position of 70° to a point 3" from the latch</i>)			
4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including common use dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	<hr/> <hr/> <hr/> <hr/>		
4.13.8;	Thresholds: 1. For all other doors, the threshold is no higher than ¾" (1/2" in New Construction)? 2. Is the threshold beveled ?	<hr/> <hr/>		
4.2.5; 4.2.6;	Controls: 1. Clear floor space at least 30" wide x 48" deep? (<i>For more reach range options, see "Controls" on page 4.</i>) 2. Front approach (fig. 5(a)): mounted no higher than 48" above the floor? 3. Side approach (fig. 6(b)): mounted no higher than 54" above the floor?	<hr/> <hr/> <hr/>		
4.27.4;	Are machine controls operable with one hand without tight grasping, pinching, or twisting of the wrist?			

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	MISCELLANEOUS:			
	Misc. Location:			
	Community Kitchen: <i>(If existing construction (built before July 11, 1988), survey only the portions that residents and their guests use.)</i>			
4.1.2(12); 4.2.4.1; 4.2.5; 4.2.6; 4.24.3; 4.27	Community Kitchen Sink Controls: 1. Are controls operable with one hand without tight grasping or twisting ? 2. Is the clear floor space at least 30" x 48" ? 3. If forward reach, a. Is the maximum height for the controls no more than 44" ? b. Are the controls no more than 25" from the front edge? 4. If side reach, a. Is the sink counter no higher than 34" ? b. Are the controls no more than 24" from the front edge ?	_____ _____ _____ _____ _____ _____ _____ _____ _____		
4.1.2(17); 4.32.4	Is the portion of the work surface no higher than 34" ?			
4.1.2(11); 4.2.5; 4.2.6; 4.27	Community Kitchen Storage: <i>(survey one of each type.)</i> 1. Are controls operable with one hand without tight grasping or twisting ? 2. Is the clear floor space at least 30" x 48" ? 3. If forward reach, is the operating hardware and at least one shelf between 15" and 48" (44" if reaching over an obstruction that's at least 20" deep)? 4. If side reach, is the operating hardware and at least one shelf between 9" and 54" (46" if reaching over an obstruction no higher than 34" and more than 10" deep. Cannot reach over an obstruction more than 34" tall.)?	_____ _____ _____ _____ _____ _____ _____ _____ _____		

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Citation	EXTERIOR AND INTERIOR COMMON USE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	MISCELLANEOUS:			
4.1.2(16);	Telephones: <i>(At least one accessible telephone must be provided at each bank of telephones and individual telephone location)</i>			
4.31.2;	Clear Floor Space at least 30" x 48" for a parallel approach or a forward approach.)			
4.31.3; 4.2.5; 4.2.6;	Telephone Mount Height: 1. The highest operable part of phone is no higher than 54" if a parallel approach site impracticality used or 48" if a forward approach is used? 2. On a single floor or on the site, if there are two or more groups of telephones, if there at least one telephone that provides a forward approach?	_____ _____ _____ _____		
4.1.2(16)(b) ; 4.31.5;	Is there at least one telephone with Volume Control ?			
4.31.8;	Telephone Cord at least 29" long?			
4.4.1; Fig. 8(a) & (b)	Protruding Object: 1. If wall mounted , is the leading edge of the telephone more than 27" above the floor and projects more than 4" into the circulation path? ("Yes" is a violation.) 2. If post mounted , is the leading edge of the telephone more than 27" above the floor and projects more than 12" into the circulation path?	_____ _____ _____ _____		
4.33.7;	Assistive Listening Systems (public meeting rooms); 1. Assistive Listening System provided? 2. If so, what type(s)? 3. How are these made available?	_____ _____		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	<i>(Includes private outdoor spaces such as balconies, patios, clothes lines, trash receptacle areas, etc.) (Use pages 2 – 32 for all common use elements.)</i>			
	Route Location:			
	ENTRANCE DOOR			
4.13.6	Maneuvering Space: (Automatic or power-assisted doors do not require any minimum maneuvering clearance.)			
4.34.2(6); 4.13.6	The maneuvering space slopes no more than 2% in either direction?			
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is depth at least 48" (54" if door has a closer)?	_____ _____ _____ _____ _____ _____		
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" (48" if the door has both a closer and latch)?	_____ _____ _____ _____ _____ _____		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is depth at least 42" (48" if door has a closer)?			
4.34.2(6); 4.13.5; Fig. 24;	Clear Door Width is at least 32" ? (Measured from the door face to the opposite stop when the door is open 90°.)			
4.34.2(6); 4.13.10;	Does the door take more than 3 seconds to close ? (From an open position of 70° to a point 3" from the latch)			
4.34.2(6); 4.13.9; 4.13.11;	Door Hardware: 1. Does not require tight grasping or twisting to operate? (Lever or push/pulls are acceptable types.) 2. Mounted no higher than 48" above the floor? (Including dead bolts.) 3. For interior doors only, opening force is no more than 5 pounds ?	_____ _____ _____ _____		
4.34.2(6); 4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction) ? 2. Is the threshold beveled ?	_____ _____		
4.34.2(3)	ACCESSIBLE ROUTE (Must connect the entrance door to the living spaces, kitchen, the accessible bathroom, the accessible bedrooms, and all the dwelling unit outdoor spaces such patios, balconies, clothes lines, and trash receptacles.)			
4.34.2(3); 4.3.3; 4.4.1; Fig. 8(e);	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?	_____ _____ _____		
4.34.2(2); 4.5.1; 4.3.8; 4.5.2;	Surface: 1. Firm, stable and slip-resistant? 2. Changes in level between 1/4" – 1/2" shall be beveled ? 3. Changes in level greater than 1/2" are ramped?	_____ _____		
4.34.2(2); 4.5.2	Must stairs be used as part of the accessible route? ("Yes" is a barrier.)			

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	BEDROOM(S) <i>(Survey no more than two bedrooms)</i>			
4.34.2(15); 4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" ?	Bedroom #1 Bedroom #2 <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.2(6); 4.13.5; Fig. 24;	Clear Door Width is at least 32" ? <i>(Measured from the door face to the opposite stop when the door is open 90°.)</i>			
4.13.5; 4.25.2; 4.2.4; 4.25.3; 4.2.5; 4.2.6;	Closets: 1. Doors: a. If closet is deeper than 24" , survey this door the same way as the bedroom door. b. If closet is no deeper than 24" , then is the clear opening at least 20" ? <i>(For reaching-in only.)</i> 2. Clear floor space of 30" wide x 48" deep in front of clothes rod?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **														
	DWELLING UNIT/ACCESSIBLE ROUTE:																	
	3. Is a clothes rod no more than 54" above the floor, or adjustable to that height? 4. If there is a shelf : a. If side reach, no more than 54" above floor? b. If forward reach, no more than 48" above the floor? 5. If closet is at least 48" deep is there a turning space (a 60" diameter circle or T-shape)? (May extend under clothes rods.)	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;">Bedroom #1</td> <td style="width: 50%; text-align: center;">Bedroom #2</td> </tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td></tr> </table>	Bedroom #1	Bedroom #2	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____		
Bedroom #1	Bedroom #2																	
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4.34.2(15)	<p style="text-align: center;">OUTDOOR SPACES</p> <p><i>(Dwelling unit outdoor spaces such as patios, balconies, clothes lines, and trash receptacles must be on an accessible route.)</i></p> <p>Door:</p>	_____ _____ _____																
4.13.6	The maneuvering space slopes no more than 2% in either direction?																	
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	<p>Swinging Doors - Pull side (Choose only one)</p> 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" ?	_____ _____ _____ _____ _____ _____ _____ _____																
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	<p>Swinging Doors - Push side (Choose only one)</p> 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is Both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" ?	_____ _____ _____ _____ _____ _____																

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" ?			
4.13.6; Fig. 25(d); Fig. 25(e); Fig. 25(f);	Sliding Doors (Choose one for each side) 1. Approaching the door head-on (fig. 25(d)): Is the depth at least 48" ? 2. Approaching the slide side of the door (fig. 25(e)): Is there at least 18" to the slide side ? Is the depth at least 42" ? 3. Approaching the latch side of the door (fig. 25(f)): Is there at least 24" to the latch side ? Is the depth at least 42" ?	_____ _____ _____ _____		
4.34.2(6); 4.13.5; Fig. 24;	Clear Door Width is at least 32" ?			
4.34.2(6); 4.13.8;	Thresholds: 1. For exterior sliding doors , the threshold is no higher than 3/4" ? 2. The threshold is no higher than 3/4" (1/2" in New Construction)? 3. Is the threshold beveled ?	_____ _____ _____		
4.34.2(2); 4.2.3; Fig. 3;	Is there a turning space (a 60" diameter circle or T-shape)?			
4.34.2(3); 4.3.3; 4.4.1; Fig. 8(e);	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.34.2(2); 4.5.1; 4.3.8; 4.5.2;	Surface: 1. Firm, stable and slip-resistant? 2. Changes in level between 1/4" – 1/2" shall be beveled ? 3. Changes in level greater than 1/2" are ramped?	_____ _____		
4.34.2(2); 4.5.2	Must stairs be used as part of the accessible route? (" Yes " is a barrier.)			
4.34.2(2); 4.3.7;	Slope is 5% or less (if slope is greater than 5% and it has ramp features, survey it as a ramp)?			
4.34.2(2); 4.3.7;	Cross-slope is no more than 2% ;			

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	BATHROOMS <i>(Only one must comply.)</i>			
4.34.5; 4.3.3; 4.4.1; Fig. 8(e);	Is the minimum clear width of the accessible route to this space at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Pull side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 18" to the latch side ? Is the depth at least 60" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 36" to the latch side (42" if the depth is less than 60")? Is the depth at least 54" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 48" ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.2(6); 4.13.6; Fig. 25(a); Fig. 25(b); Fig. 25(c);	Swinging Doors - Push side (Choose only one) 1. Approaching the door head-on (fig. 25(a)): Is there at least 12" to the latch side when there is both a closer and latch side? If no closer and latch, there is no requirement. Is the depth at least 48" ? 2. Approaching the hinge side of the door (fig. 25(b)): Is there at least 18" to the hinge side ? Is the depth at least 42" ? 3. Approaching the latch side of the door (fig. 25(c)): Is there at least 24" to the latch side ? Is the depth at least 42" ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.2(6); 4.13.5; Fig. 24;	Clear Door Width is at least 32" ? (<i>Measured from the door face to the opposite stop when the door is open 90°.</i>)			
4.34.2(6); 4.13.8;	Thresholds: 1. The threshold is no higher than 3/4" (1/2" in New Construction)? 2. Is the threshold beveled ?	<hr/> <hr/>		
4.34.5.2(2); Fig. 47(a);	Toilet: 1. Is top of toilet seat between 15" and 19" above the floor? 2. Is centerline exactly 18" from the closest side wall?	<hr/> <hr/> <hr/>		

* Place asterisk in column for findings of non-compliance.
** Insert Photograph numbers for all elements and areas of non-compliance.

Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	3. If there is a side approach , is the clear floor space at least 56" deep x 48" wide (a wall-hung lavatory may overhang the width up to 12")? (fig. 47(a) middle) 4. If there is only a front approach , is the clear floor space at least 66" deep x 48" wide (a wall-hung lavatory may overhang the width up to 12")? (fig. 47(a) left)	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.5.2(3); 4.26; Fig. 29;	Grab Bars at Toilet: Side Grab Bar: <ol style="list-style-type: none"> 1. Is centerline of grab bar mounted between 33" and 36" above the floor? 2. Is grab bar between 1 ¼" and 1 ½" in diameter? 3. Is the space between the grab bar and the wall 1 ½" exactly? (<i>Make a note if the grab bar is fold-down or floor-mounted type.</i>) 4. Is the grab bar no more than 12" of the back wall and at least 42" long? Back Grab Bar: <ol style="list-style-type: none"> 1. Is centerline of grab bar mounted between 33" and 36" above the floor? 2. Is grab bar between 1 ¼" and 1 ½" in diameter? 3. Is the space between the grab bar and the wall 1 ½" exactly? 4. Is the grab bar no more than 6" of the side wall and at least 36" long? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.5.2(4); Fig. 47(b);	Toilet Paper Dispenser: <ol style="list-style-type: none"> 1. Centerline is at least 19" above the floor? 2. Starting at the edge farthest from the back wall, is it no more than 36" from the back wall? 3. Mounted on the side grab bar wall? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.2(2); 4.2.3; Fig. 3	Unobstructed Turning Space: Is there an unobstructed turning space (a 60" diameter circle or T-shaped space)?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.5.3(1); 4.22.6; 4.19.2; 4.19.3; Fig. 31; 4.19.4;	Lavatory (a.k.a. Sink): <ol style="list-style-type: none"> 1. Top of the rim is no more than 34" above the floor? 2. Bottom of apron is at least 29" above the floor? 3. At a point 8" back from the front edge of the lavatory, is the clear knee space at least 27" high (excluding the dip of the overflow)? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	4. Is the clear floor space at least 30" x 48" deep (that extends 17" to 19" under the lavatory)? 5. Are the drain and hot water supply pipes insulated ?	_____ _____ _____		
4.34.5.3(1); 4.22.6; 4.19.5; 4.27.4;	Lavatory (a.k.a. Sink) Controls: Operable with one hand; and does not require tight grasping, twisting or pinching of the wrist to operate;			
4.34.5.3(1); 4.22.6; 4.19.6;	Mirror: Bottom edge of reflective surface is no more than 40" above the floor?			
4.34.5.3(3);	Medicine Cabinet: Bottom shelf no more than 44" above the floor?			
	Bathtub:			
4.34.5.4(1) Fig. 33;	Clear Floor Space: (A wall-hung lavatory may overlap the clear floor space only on the control wall (foot) side.) 1. If forward approach , is the clear floor space 48" deep x 60" wide? 2. If side approach , is the clear floor space 30" x 60"?	_____ _____		
4.34.5.4(5);	Tub Shower Spray Unit: 1. Can the shower head be fixed and handheld ? 2. Is there a hose and is it at least 60" long (59" is acceptable) ?	_____ _____		
4.34.5.4(4); 4.27.4; Fig. 34;	Tub Faucet Controls: 1. Operable w/ one hand and not require tight grasping or twisting of the wrist? 2. Located below the grab bar and between the open side and the centerline of the tub?	_____ _____		
4.34.5.4(2); 4.26.3; Fig. 33; Fig. 34;	Tub – Seat 1. Is a securely-mounted in-tub seat provided?	_____ _____		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	Shower:			
4.34.5.5(1); Fig. 35(a) or Fig. 35(b); 4.21.7;	Shower Stalls: Which shower type? (Choose one) 1. Transfer: 36" deep by 36" wide? If there is a curb , is it less than 1/2" ? a. Clear floor space at least 36" by 48"? 2. Roll-in: 30" deep by 60" (58 1/2" is acceptable) wide? Is there a curb? ("Yes" is a barrier.) a. Clear floor space at least 36" by 60"?	_____ _____ _____ _____		
4.34.5.5(2); Fig. 35(a); Fig. 35(b); 4.26.3;	If a transfer shower , is there a seat? 1. Between 17" and 19" above the floor? 2. Extends the full depth of the stall? 3. Located on wall opposite the controls? 4. Mounted securely?	_____ _____ _____		
4.34.5.5(5);	Tub Shower Spray Unit: 1. Can the shower head be fixed and handheld? 2. Is there a hose and is it at least 60" long? (59" is acceptable.)	_____ _____		
4.34.5.5(4); Fig. 37; 4.21.5;	Shower Controls: 1. Mounted between 38" and 48" above the floor? 2. Located between the open side and the centerline of the shower? 3. Operable w/ one hand and not require tight grasping or twisting of the wrist?	_____ _____ _____ _____		
4.34.5.5(3); 4.26.2; Fig. 37; Fig. 39(e);	Grab Bars: (Choose Whether Transfer or Roll-In Shower and Answer Those Questions) TRANSFER SHOWER (36" x 36"): <u>Back Wall</u> 1. Is centerline mounted between 33" and 36" above the floor? 2. Between 1 1/4" and 1 1/2" in diameter? 3. Is the space between the grab bar and the wall 1 1/2" exactly? 4. 18" long positioned between the centerline of the stall and the control wall?	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
	KITCHEN			
4.34.6; 4.34.2(13); 4.3.3; Fig 7; Fig. 8(e);	Is the minimum clear width of the accessible route to the kitchen at least 36" wide, with no steps (width may be reduced to 32" for a length of no more than 24")?			
4.34.6.1;	Clearance between all opposing cabinets, counters, appliances or walls: (Choose One) 1. If U-shaped kitchen , is there at least 60"? 2. In all other layouts , is there at least 40"?	_____ _____		
4.34.2(2); 4.2.3; Fig. 3;	Is there an unobstructed turning space (a 60" diameter circle or T-shape)? <i>(May include knee space under work surface or sink if it is at least 36" wide)</i>	_____		
4.34.6.2;	Clear Floor Space: With either forward reach or side reach, is there at least 30" x 48" at the following types of appliances: Oven; Range; Cook top; Dishwasher; Refrigerator; Counter; Storage Facilities, Etc.	_____ _____ _____ _____		
4.34.6.4(1); 4.34.6.4(2) 4.34.6.4(3); 4.34.6.4(4); Fig. 50; 4.2.4.1;	Kitchen Counter Work Surface: 1. At least one 30" section of the counter with knee clearance at least 27" high ? 2. Surface no more than 34" above the floor? 3. If a removable base cabinet is provided, once removed: a. Is the floor finished underneath ? b. Will the opening be at least 30" wide and 27" high ?	_____ _____ _____ _____ _____ _____		
4.34.6.5; Fig. 51;	Kitchen Sink & Surrounding Counter: 1. Knee clearance is at least 30" wide and at least 27" high ? 2. Sink rim and counter surface are no more than 34" above the floor? 3. If a removable base cabinet is provided, once removed: a. Is the floor finished underneath ? b. Is the opening at least 30" wide and 27" high ? 4. Sink is no deeper than 6 1/2" ?	_____ _____ _____ _____ _____ _____		

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Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
4.34.6.5(8);	Kitchen Pipes must be insulated or wrapped?			
4.34.6.7; Fig. 52;	Kitchen Oven: 1. If oven is not self-cleaning , is it adjacent to an accessible 34" high (or adjustable) kitchen counter work surface? 2. Controls: a. Located on the front panel ? b. Can be operated with one hand and not require twisting of the wrist or tight grasping?	<hr/> <hr/> <hr/> <hr/>		
4.34.6.6; 4.27;	Kitchen Range/Cook-tops Controls: 1. Usable without reaching across burners? 2. Including the range hood controls, are the controls within reach? (<i>For a complete listing of reach range, see "Other Controls" below.</i>) 3. Can be operated with one hand and not require twisting of the wrist or tight grasping?	<hr/> <hr/> <hr/> <hr/>		
4.34.6.9; 4.34.6.3; 4.27;	Dishwasher: 1. Controls operable with one hand and not require tight grasping, pinching, or twisting of the wrist to operate;	<hr/> <hr/>		
.34.6.10; 4.25.2; 4.25.3; 4.2.5; 4.2.6; Fig. 50;	Kitchen Storage: 1. Operable hardware for all cabinets: a. For wall cabinets, are located near the bottom ? b. For base cabinets, are located near the top ? c. Is it operable with one hand without tight grasping, pinching, or twisting of the wrist? 2. For the wall cabinet above the work surface: a. Is the bottom shelf no more than 48" above the floor?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
4.34.7;	WASHER/DRYER, UTILITY ROOM			
4.34.7; 4.34.2(2); 4.2.3; Fig. 3;	Washer/Dryer, Utility Room: 1. Is there an unobstructed turning space (a 60" diameter circle or T-shape)? 2. For either a forward or side approach, is the clear floor space at least 30" x 48" ? 3. If machines are provided by management: a. Are controls on the front panel ? b. Operable with one hand and not require twisting of the wrist or tight grasping? c. Front-loading ?	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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** Insert Photograph numbers for all elements and areas of non-compliance.

Citation	DWELLING UNIT ACCESSIBLE ELEMENTS	Measurements/Comments	N/C Finding *	Picture No. **
	DWELLING UNIT/ACCESSIBLE ROUTE:			
4.34.2(9); 4.1.2(12)	OTHER CONTROLS			
4.2.4; Fig. 4; 4.34.2(9); 4.27; 4.2.5; 4.2.6	<p>Other Controls:</p> <ol style="list-style-type: none"> 1. Does each have a clear floor space of 30" x 48"? <ol style="list-style-type: none"> a. thermostats b. heating/air conditioning c. light switches d. electrical wall outlets (<i>cannot be lower than 15"</i>) e. _____ f. _____ 2. Is the Highest and Lowest Operable Part within reach? (identify the approach): <ol style="list-style-type: none"> a. Forward approach (Fig. 5(a)): 15" to 48". b. Side approach (Fig. 6(b)): 9" to 54". c. Forward approach over an obstruction less than 20" deep (Fig. 5(b)): no higher than 48". d. Forward approach over an obstruction 20 to 25" deep (Fig. 5(b)): no higher than 44". e. Side reach over an obstruction no more than 10" deep (Fig. 6(b)): no higher than 54". f. Side reach over an obstruction 10" to 24" deep (Fig. 6(c)): no higher than 46". 3. Is it operable with one hand without tight grasping, pinching, or twisting of the wrist? 	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		

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VERSION 1 (REV. 04)

Indoor airPLUS

CONSTRUCTION SPECIFICATIONS





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About the Indoor airPLUS Construction Specifications

These specifications were developed by the U.S. Environmental Protection Agency (EPA) to recognize new homes equipped with a comprehensive set of indoor air quality (IAQ) features. They were developed with significant input from stakeholders, based on best available science and information about risks associated with IAQ problems, and balanced with practical issues of cost, builder production process compatibility, and verifiability.

The Indoor airPLUS Program fully integrates ENERGY STAR Certified Home requirements as a prerequisite. In addition, both the ENERGY STAR Certified Home label and the Indoor airPLUS label are prerequisites for the Department of Energy’s Zero Energy Ready Home Program and the PHIUS+ certification by Passive House Institute US, both of which are additional certification options in building high performance, sustainable homes.

In addition to these Construction Specifications, the Indoor airPLUS Program periodically publishes a Policy Record document. The Policy Record is used to provide updates on the resolution of issues, including clarifications, refinements, and/or changes to program requirements. Policy Record updates may be made more frequently than revisions to the Construction Specifications. As such, the Policy Record should be referenced alongside the Construction Specifications for the most current program requirements and interpretations.

The Construction Specifications, Policy Record, and other program documents can be found at www.epa.gov/indoorairplus/indoor-airplus-program-documents.

NOTE: Although these measures are designed to help improve IAQ in new homes compared with homes built to minimum code, they alone cannot prevent all IAQ problems. For example, occupant behavior, such as smoking indoors, and system maintenance are also important.

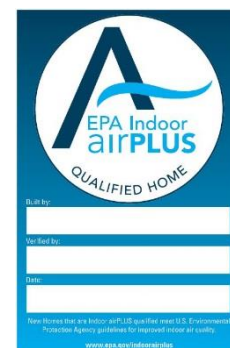
What’s New in Version 1 (Rev. 04)?

Indoor airPLUS V1 (Rev. 04) revises the Construction Specifications to incorporate Policy Record updates recorded since the release of Revision 03 in October 2015. Although Indoor airPLUS Revision 4 does not increase program stringency from previous revisions, it adds clarification and/or refinement to some requirements. Additionally, this revision updates or eliminates various referenced standards as the industry continues to make improvements on consensus-based best practices in high performance construction techniques.

Homes permitted starting 05/01/2018 are required to use Revision 4 of the Construction Specifications for qualification. For homes permitted before 05/01/2018, partners can use either Revision 3 or Revision 4 if desired. The Rater may define “permit date” as either the date that the permit was issued or the date of the contract on the home.

Eligibility and Verification Requirements

For a home to earn the Indoor airPLUS label, it must also earn the ENERGY STAR Certified Homes label. Requirements for both programs can be verified and homes can be reported simultaneously. Verification can be completed during the ENERGY STAR inspection process and must be conducted by a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by a Verification Oversight Organization, such as the Residential Energy Services Network (RESNET). The home must also comply with all applicable state and local codes and standards. Instructions for Indoor airPLUS verification are listed below in the Verification Checklist.



Qualified homes earn the Indoor airPLUS label. Place it next to the ENERGY STAR label.

Terms Used in This Document

- **EXCEPTIONS** to the requirements described in these construction specifications are noted as appropriate. For climate exceptions, refer to the 2015 International Energy Conservation Code (IECC) Climate Zone map (Figure 301.1). Climate Zone names may include a number for the temperature zone and a letter for the moisture zone (e.g., Zone 3C refers to coastal California only).
- **NOTES** provide additional information to clarify specification requirements.
- **ADVISORIES** provide additional guidance to be considered, but are not specification requirements.
- **ENERGY STAR Certified Homes**– Complete Mandatory Measures Checklists:

Rater – D [Rater Design Review Checklist](#)

Rater – F [Rater Field Checklist](#)

Builder – W [Water Management System Builder Requirements](#)

HVAC – D [HVAC Design Report](#)

HVAC – C [HVAC Commissioning Checklist](#)

Indoor airPLUS Version 1 (Rev. 04) Verification Checklist



Home Address:		City:	State:	Zip:		
Climate Zone (1-6):		Radon Zone (1-3):				
Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A	
ENERGY STAR V3	Note: The Rev. 04 checklist reflects only the additional Indoor airPLUS requirements and their corresponding section numbers that must be met after completing the ENERGY STAR requirements. ENERGY STAR remains a prerequisite for Indoor airPLUS qualification.					
	ENERGY STAR Version 3 (or 3.1, 3.2) Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	<input type="checkbox"/>		<input type="checkbox"/>		
Moisture Control	1.1 Drain or sump pump installed in basements and crawlspaces. In EPA Radon Zone 1, check valve also installed. Exception Applied: <input type="checkbox"/> Slab-on-grade foundation <input type="checkbox"/> Free-draining soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.2 Layer of aggregate or sand (4 in.) with geotextile matting installed below slabs AND radon techniques used in EPA Radon Zone 1. Exception Applied: <input type="checkbox"/> Slab-on-grade foundation <input type="checkbox"/> Free-draining soils <input type="checkbox"/> Dry climate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.4 Basements/crawlspaces insulated, sealed and conditioned. Exception Applied: <input type="checkbox"/> 100-year flood zone <input type="checkbox"/> Marine climate <input type="checkbox"/> Dry climate <input type="checkbox"/> Crawlspace sealed with capillary break and active dehumidification <input type="checkbox"/> Raised pier foundation with no walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.7 Protection from water splash damage if no gutters. Exception Applied: <input type="checkbox"/> Rainwater harvesting system <input type="checkbox"/> Dry climates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.11 Supply piping in exterior walls insulated with pipe wrap. Exception Applied: <input type="checkbox"/> Dry climate AND climate zone 1-3 <input type="checkbox"/> Air barrier insulation in wall cavity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.14 Hard-surface flooring in kitchens, baths, entry, laundry, and utility rooms.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Radon	2.1 Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1. Exception Applied: <input type="checkbox"/> Perimeter pipe loop in lieu of full aggregate (dry climate) <input type="checkbox"/> Manufactured home with raised pier foundation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Pests	3.2 Corrosion-proof rodent/bird screens installed at all openings that cannot be fully sealed. (Not required for clothes dryer vents.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HVAC Systems	4.1 Equipment selected to keep relative humidity < 60% in "Warm-Humid" climates. Exception Applied: <input type="checkbox"/> Climate zones 4-8, 3B, 3C and portions of 3A and 2B		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Duct systems protected from construction debris AND no building cavities used as air supplies or returns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	4.3 No air-handling equipment or ductwork installed in garage.	<input type="checkbox"/>		<input type="checkbox"/>		
	4.6 Clothes dryers vented to the outdoors or plumbed to a drain according to manufacturer's instructions.	<input type="checkbox"/>		<input type="checkbox"/>		
	4.7 Central forced-air HVAC system(s) have minimum MERV 8 filter AND no ozone generators in home. Temporary filter installed to protect unit from construction dust.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Combustion Pollutants	Emissions standards met for fuel-burning and space-heating appliances.	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	5.1 Identify appliance type: <input type="checkbox"/> Masonry heater <input type="checkbox"/> Factory-built wood-burning fireplace <input type="checkbox"/> Wood stove <input type="checkbox"/> Pellet stove <input type="checkbox"/> Natural gas/propane fireplace Appliance model name/number: _____	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	5.2 CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	5.3 Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	5.4 Attached garages: Door closer installed on all connecting doors. Attached garages: In homes with exhaust-only whole-house ventilation EITHER <input type="checkbox"/> 70 cfm exhaust fan installed in garage OR <input type="checkbox"/> Pressure test conducted to verify the effectiveness of the garage-to-house air barrier.	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	

Materials	6.1	All composite wood products certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6.2	Interior paints and finishes certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6.3	Carpet, carpet adhesives, and carpet cushion certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Final	7.1	HVAC system and ductwork verified to be dry and clean AND new filter installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	7.2	Home ventilated before occupancy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	7.3	Equipment manuals, Indoor airPLUS label, and certificate provided for owner/occupant.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rater Company: _____			Builder Company: _____			
Rater Employee: _____			Builder Employee: _____			
Rater Signature: _____ Date: _____			Builder Signature: _____ Date: _____			

Guidance for Completing the Indoor airPLUS Verification Checklist:

- Only ENERGY STAR certified homes verified to comply with these specifications can earn the Indoor airPLUS label. See Indoor airPLUS Construction Specifications for full descriptions of the requirements, terms, exceptions, abbreviations, references and climate map used in this checklist. Verification is not complete until this checklist is completed in full and signed.

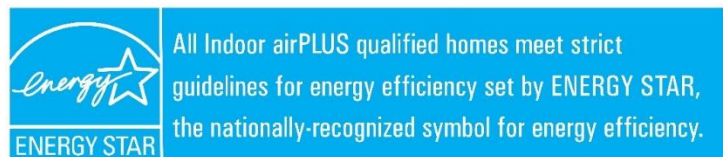
Note: ENERGY STAR footnotes and exceptions will always be utilized unless otherwise noted in the Indoor airPLUS Construction Specifications. In some cases, Indoor airPLUS modifies or excludes certain ENERGY STAR exceptions or alternate pathways.

- Check one box per line. Check “N/A” for specifications that do not apply for specific conditions (e.g., climate) according to the exceptions described in the Indoor airPLUS Construction Specifications. Check either “Builder Verified” or “Rater Verified” for all other items to indicate who verified each item. Items may be verified visually on site during construction, by reviewing photographs taken during construction, by checking documentation, or through equivalent methods as appropriate.
- The Rater who conducted the verification, or a responsible party from the Rater’s company, must sign the completed verification checklist. The builder must also sign the checklist if any items in the “Builder Verified” column are checked, and by so doing accepts full responsibility for verifying that those items meet Indoor airPLUS requirements.
- The Rater shall retain the rating documentation, all required ENERGY STAR Certified Homes documentation, and the Indoor airPLUS Verification Checklist for the home for a minimum of 2 years from final verification. The Rater shall coordinate with the Provider and/or builder to provide an Indoor airPLUS label and certificate for each qualified home.
- Raters who operate under a Sampling Provider are permitted to use a RESNET-approved sampling protocol for Indoor airPLUS homes located outside California, and a sampling protocol approved by the California Energy Commission for homes located in California, to verify any item designated “Rater Verified.” For example, if the approved sampling protocol requires rating one in seven homes, then the checklist will be completed for the one home that was rated. Only Raters are permitted to use sampling. All items verified by the builder shall be verified for each qualified home or unit within a multifamily building. For example, if a Rater verifies 10 items on the Indoor airPLUS Checklist and the builder verifies the remaining checklist items, then an approved sampling protocol is permitted to be used only on the 10 Rater-verified items.

However, the builder may provide the Rater with a single signed copy of the checklist for an entire building or group of units with builder-verified items under the condition that all units within the building or group utilize: 1) the same HVAC system type (i.e. ductless mini-split, forced air, hydronic); 2) the same combustion appliances and combustion pollutant controls; and 3) the same low-emission materials certification/standard for all products (within their respective categories) verified in Section 6 of the Indoor airPLUS Construction Specifications. If there are no builder-verified items, the Rater may also utilize one checklist per group of units if the above criteria are met. Groups of units with any of the following conditions will require a separate and unique checklist to be completed and signed by the Rater and builder:

- Any units with differing HVAC system type (i.e., ductless mini-split, forced air, hydronic);
- Any units with differing combustion appliance types (e.g., masonry heater, pellet stove, wood-burning fireplace) stove, factory-built, etc.) or combustion pollutant controls; or Any units/groups with low-emission materials or finishes addressed in Section 6 that are compliant based on different certifications/standards within their product category.
- Exception: Builders and Raters may use a single checklist for units utilizing low-emission materials certified to different labels or standards, provided that documentation of the certifications for those materials are retained by the builder and available for inspection upon request.

For further information on the Indoor airPLUS program, visit www.epa.gov/indoorairplus.



Indoor airPLUS Construction Specifications

Version 1 (Rev. 04)



ENERGY STAR certification is a pre-requisite for a home to achieve Indoor airPLUS qualification. ENERGY STAR checklist items that satisfy Indoor airPLUS requirements are only summarized below. Please refer to the [ENERGY STAR National Program Requirements](#) and the checklists under *Complete Mandatory Measures* for more information and the full description of the requirement. Depending on your state, newer versions of the ENERGY STAR Program Requirements may be in effect (e.g. V3.1, V3.2). States under newer versions of the ENERGY STAR Program Requirements can be found listed with other individual [Regional Specifications](#).

1. Moisture Control

1.1 Site and Foundation Drainage

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Slope patio slabs, walks and driveway; tamp back-fill to prevent settling; AND slope the final grade away from the foundation (Builder-W 1.1 and 1.2).
- ✓ Swales or drains designed to carry water away from the foundation are permitted to be provided as an alternative to the slope requirements for any home, and shall be provided for a home where setbacks limit space to less than 10 ft. (Builder-W 1.1 and 1.2).
- ✓ Install protected drain tile at the footings of basement and crawlspace walls. Surround each drain tile pipe with washed or clean gravel wrapped with fabric cloth, or install an approved Composite Foundation Drainage System (CFDS) (Builder-W 1.8).

Additional Indoor airPLUS Requirements:

- Install a drain or sump pump in basement and crawlspace floors, discharging to daylight at least 10 ft. outside the foundation or into an approved sewer system.

Exceptions:

- Slab-on-grade foundations.
- In areas of free-draining soils — identified as Group 1 (Table R405.1, 2015 IRC) by a certified hydrologist, soil scientist, or engineer through a site visit — installation of a drain or sump pump is not required.
- In EPA Radon Zone 1, if a drain tile discharges to daylight install a backwater valve (check valve) at the drain tile outfall (see Specification 2.1 for additional radon measures).

1.2 Capillary Break Installation

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Install polyethylene sheeting or extruded polystyrene (XPS) insulation beneath concrete slabs, including basement floors. Ensure sheeting is in direct contact with the concrete slab above (Builder-W 1.3).
- ✓ Install a capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6 to 12 in. (Builder-W 1.4).

Additional Indoor airPLUS Requirements:

- Under the polyethylene sheeting or extruded polystyrene (XPS), insulation installed to meet ENERGY STAR Water Management System Builder Checklist Item 1.3:
 - Install a 4 in. layer of 1/2 in. diameter or greater clean aggregate; **OR**

- Install a 4 in. uniform layer of sand, overlain with either a layer of geotextile drainage matting throughout or strips of geotextile drainage matting along the perimeter installed according to the manufacturer's instructions.

Exceptions to the aggregate OR sand requirement:

(Not applicable in EPA Radon Zone 1)

- Dry climates, as defined by 2015 IECC Figure 301.1.
- Areas with free-draining soils – identified as Group 1 (Table R405.1, 2015 IRC) by a certified hydrologist, soil scientist, or engineer through a site visit.
- Slab-on-grade foundations.

Alternative path for gut-rehabs:

- For an existing slab in a home undergoing a gut rehabilitation in Radon Zones 2 and 3, the alternate slab treatment in the ENERGY STAR Water Management System Builder Checklist, footnote 5, shall apply as an alternative to polyethylene and aggregate or sand under the slab. Homes undergoing gut rehabilitation in Radon Zone 1 must also install an active radon system utilizing sub-slab depressurization, and radon levels shall be verified upon final inspection to be below the EPA action level (4pCi/l) to receive qualification.

Note: In EPA Radon Zone 1 (see Specification 2.1):

- Polyethylene sheeting must be installed and overlapped by 6 to 12 in. at the seams.
- ENERGY STAR staking method for poly sheeting may not be used in crawlspaces with no slab.
- ENERGY STAR exceptions for capillary break (polyethylene) under slabs do not apply. Poly is required in Radon Zone 1.

Advisory: 10 mil polyethylene is recommended if crawlspace floors are not covered with a concrete slab.

1.3 Damp-Proofing and Waterproofing Below-Grade Exterior Walls

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Finish all masonry and concrete walls (e.g., poured concrete, concrete masonry, insulated concrete forms) with a damp-proof coating (Builder-W 1.5).
- ✓ Finish all wood-framed walls with polyethylene and adhesive or other equivalent waterproofing (Builder-W 1.5).

No additional Indoor airPLUS Requirements

1.4 Basement and Crawlspace Insulation and Conditioned Air

Indoor airPLUS Requirements:

- Seal crawlspace and basement perimeter walls to prevent outside air infiltration.
- Insulate crawlspace and basement perimeter walls according to the prescriptive values determined by local code or R-5, whichever is greater.
- Provide conditioned air at a rate not less than 1 cfm per 50 sq. ft. of horizontal floor area. This can be achieved by a dedicated supply (2015 IRC section R408.3.2.2) or through crawl-space exhaust (2015 IRC section R408.3.2.1). However, if radon-resistant features are required (see Specification 2.1), do not use the crawlspace exhaust method.

Exceptions:

- Homes built in areas designated as 100-year flood zones. (Conditioned crawlspaces are not recommended for use in flood zones. For more information on designated 100-year flood zones, see FEMA's definition of Special Flood Hazard Areas: <https://www.fema.gov/flood-zones>).
- Raised pier foundations with no walls.
- Dry climates, as defined by 2015 IECC Figure 301.1.
- Marine climates, as defined by 2015 IECC Figure 301.1, if no air handler or return ducts are installed in the crawlspace.

Additional Exceptions:

- In lieu of perimeter wall insulation and conditioned air, crawlspaces that utilize a capillary break on the floor and that are well-sealed to prevent outside air infiltration are permitted to utilize active dehumidification with sufficient latent capacity to maintain relative humidity (RH) at or below 60 percent. The dehumidifier shall be drained to the outside or to a sump pump. With this exception, ENERGY STAR Certified Homes Water Management System Builder Requirements Item 1.4.3 staking method for poly sheeting may not be used in crawlspaces with no slab.

1.5 Drainage Plane and Drainage System

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Install a continuous drainage plane behind exterior wall cladding that overlaps flashing and is fully sealed at all penetrations (Builder-W 2.2).
- ✓ Install flashing or an equivalent drainage system at the bottom of exterior walls to direct water away from the drainage plane and foundation (Builder-W 2.1).

No additional Indoor airPLUS Requirements

1.6 Window and Door Openings

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Fully flash all window and door openings, including pan flashing over the rough sill framing, side flashing that extends over pan flashing and top flashing that extends over side flashing (Builder-W 2.3).

No additional Indoor airPLUS Requirements

1.7 Gutters, Downspouts and Site Drainage

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Direct roof water away from the house using gutters and downspouts that empty into lateral piping on a sloping finish grade (Builder-W 3.2); OR
- ✓ Direct roof water to an underground catchment system not connected to the foundation drain system that discharges water ≥ 10 ft. from foundation (Builder-W 3.2).

Additional Indoor airPLUS Requirements:

- Provide extra protection for water splash damage on homes meeting one of the following ENERGY STAR exceptions for gutters and downspouts: slab on grade homes, homes that deposit rainwater to a grade-level rock bed with a waterproof liner and drain pipe, or homes that use a continuous rubber membrane system. Protection for water splash damage shall be met by one of the following:
 - Extend the foundation walls at least 16 in. above final grade; **OR**
 - Provide a drip line at eaves that is horizontally 16 in. away from the edge of the foundation wall; **OR**
 - Use cladding materials that are decay and rot resistant and can tolerate regular wetting extending at least 16 in. above final grade and install a well-sealed, continuous drainage plane per manufacturer's instructions.

Advisory: The use of self-adhering moisture membranes directly on exterior sheathing should be limited in these applications to encourage drying potential of moisture vapor through the wall assembly. A moisture resistant, non-perforated, and vapor permeable housewrap is preferred. (However, this may not be true for all wall assemblies where 50% or more of the insulation is outboard the structural assembly.)

Exceptions:

- Dry climates, as defined by 2015 IECC Figure 301.1.
- Homes with rainwater harvesting systems that are designed to properly drain overflow, meeting discharge-distance requirements outlined in ENERGY STAR Builder-W Item number 3.2.

1.8 Roof to Wall Intersections and Roof Penetrations

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Fully flash all roof-to-wall intersections and all roof penetrations using step flashing for conventional roofs or continuous flashing for metal and rubber membrane roofs (Builder-W 3.1).
- ✓ Install "kick-out" flashing at the low end of roof-to-wall intersections (Builder-W 3.1).

No additional Indoor airPLUS Requirements

1.9 Roof Valleys and Decking

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Install a self-sealing bituminous membrane or the equivalent at all valleys and roof decking penetrations for durability at potential failure points (Builder-W 3.3).

No additional Indoor airPLUS Requirements

1.10 Roof Eaves

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Install ice flashing over the sheathing at eaves to provide protection from ice dams in climate zones 5 and higher (Builder-W 3.4).
- ✓ Extend a self-sealing bituminous membrane or the equivalent ("ice flashing") from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall (Builder-W 3.4).

No additional Indoor airPLUS Requirements

1.11 Moisture-Protective Systems

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Install moisture-resistant backing material behind tub and shower enclosures (Builder-W 4.2).
- ✓ Install a corrosion-resistant drain pan properly draining to a conspicuous point of disposal (Builder-W 4.6).

Additional Indoor airPLUS Requirements:

- Insulate water supply pipes in exterior walls with pipe wrap.

Exceptions:

- Climate zones 1-3 located in dry climates, as defined by 2015 IECC Figure 301.1.
- When insulation in the wall cavity qualifies as an air barrier and pipes are located within the interior 50% of the wall cavity.

Advisory: Pipes should be installed as close as possible to conditioned space while maintaining Grade 1 insulation installation to reduce risk of freezing and/or condensation.

1.12 Class 1 Vapor Retarders

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Do not install Class 1 vapor retarders on the interior side of vapor permeable insulation in below-grade exterior walls or in any exterior walls in Warm-Humid climates (Builder-W 1.6 and 4.3). Footnote: Class 1 vapor retarders, such as mirrors, may be used if mounted with clips or other spacers that allow air to circulate behind them.

No additional Indoor airPLUS Requirements

1.13 Materials with Signs of Water Damage or Mold

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Building materials with visible signs of water damage or mold not installed or allowed to remain. If mold is present, effort should be made to remove all visible signs of mold (e.g., by damp wipe with water and detergent). If removal methods are not effective, then the material shall be replaced. However, stains that remain after damp wipe are acceptable. Lumber with "sap stain fungi" is exempt from this item as long as the lumber is structurally intact. (Builder-W 4.4).
- ✓ Do not enclose (e.g., with drywall) framing members and insulation products having high moisture content. (Note: Lumber should not exceed 18 percent moisture) (Builder-W 4.5).
- ✓ For wet-applied insulation, follow the manufacturer's drying recommendations (Builder-W 4.5).

No additional Indoor airPLUS Requirements

1.14 Moisture-Resistant Materials

Indoor airPLUS Requirements:

- Install only water-resistant hard-surface flooring in kitchens, bathrooms, entryways, laundry areas and utility rooms.

Note: Wood flooring, either pre-finished or site-finished, can be utilized in these areas, as long as any composite wood material or site-applied finish comply with Items 6.1 and 6.2, respectively.

2. Radon

2.1 Radon-Resistant Construction

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Air seal all sump covers (Builder-W 1.7).

Additional Indoor airPLUS Requirements:

- Construct homes in EPA Radon Zone 1 (see www.epa.gov/radon/zonemap.html) with radon-resistant features (a passive system at minimum). EPA recommends that radon-resistant features are installed according to ANSI/AARST CCAH for 1-2 family dwellings and townhouses (max. total foundation area of 2500 sq. ft.) OR ANSI/AARST CC-1000 for larger foundations.

Visually verify the following requirements:

- Capillary break installed according to Specification 1.2, irrespective of climate zone.

Exception: In dry climates as defined by 2015 IECC Figure 301.1, a "pipe loop" in a trench of clean aggregate along the entire inside perimeter of the foundation (installed according to ANSI/AARST CCAH 403.1.1) can be used in lieu of a uniform layer of aggregate under the entire slab.

- A 3 or 4 in. diameter gas-tight vertical vent pipe, clearly labeled as a component of a radon reduction system. The vent pipe shall be connected to an open T-fitting in the aggregate layer (or connected to geotextile drainage matting according to the manufacturer's instructions) beneath the polyethylene sheeting, extending up through the conditioned spaces and terminating a minimum of 12 in. above the roof opening. At least 10 ft. of horizontal perforated drain tile is to be attached to the T-fitting beneath the polyethylene sheeting placed over earthen crawlspaces and below concrete slabs. Note: suction points are not permitted on sump lids.
- Radon fan (i.e., an active system) OR an electrical receptacle installed in an accessible attic location near the radon vent pipe (i.e., a passive system) to facilitate future fan installation if needed. A space surrounding the radon pipe, having a vertical height of not less than 48 inches and a diameter of not less than 21 inches, shall be provided in the attic area where the radon fan can be installed, if required.
- Homes with no accessible attic location for a fan must utilize another exterior location or a garage that is not below conditioned space per ANSI/AARST CCAH. The branch circuit supply shall be labeled at the electrical panel indicating its intended use.
- Foundation air sealing with polyurethane caulk or the equivalent at all slab openings, penetrations and control or expansion joints.

Exception to Item 2.1: Manufactured homes with raised-pier foundations (i.e. no solid perimeter foundation wall).

Alternative path for gut-rehabs:

- For homes with an existing slab undergoing gut rehabilitation in Radon Zone 1, an active radon system utilizing sub-slab depressurization must be installed, and radon levels shall be verified upon final inspection to be below the EPA action level (4pCi/l) to receive qualification. The alternate slab treatment in the ENERGY STAR Water Management System Builder Checklist, footnote 5, shall apply as an alternative to polyethylene and aggregate or sand under the slab.

Note: Larger buildings and multifamily properties may share mitigation systems across multiple units or may require multiple soil gas vent systems to accommodate large building footprints. See ANSI/AARST CC-1000 for electric metering requirements in shared (collateral) mitigation systems, as well as for maximum nominal sizes of soil gas collection plenums and corresponding pipe sizes.

Note: Consult local building codes to determine whether additional radon requirements apply. Also consult EPA's "Building Radon Out" (EPA 402-K-01-002) for general guidance on installing radon-resistant features.

Advisories:

1. Elevated levels of radon have been found in homes built in all three zones on EPA's Map of Radon Zones. Consult your state radon program for current information about radon in your area. Go to www.epa.gov/radon/whereyoulive.html and click on your state for contact information.
2. EPA recommends, but does not require, that all homes built with radon-resistant features in EPA Radon Zone 1 include a radon vent fan. EPA also recommends radon-resistant features for homes built in EPA Radon Zones 2 and 3, and that all homes with or without radon-resistant features be tested for radon prior to occupancy. A radon vent fan should be installed when the test result is 4 pCi/L (the EPA action level) or more.
3. Provide buyers with EPA's Citizen's Guide to Radon, encourage them to test for radon and refer them to www.epa.gov/radon for more information.
4. If soil or groundwater contamination is suspected on or near the building site (e.g., former industrial sites), volatile chemical contaminants from soil gas or vapor intrusion into a building may pose an IAQ risk. In such cases, EPA recommends radon-resistant features consistent with Specification 2.1, which can minimize or prevent the vapor intrusion into a house. See the EPA Vapor Intrusion Primer or ASTM E2600 for more information. You should also consult your state, tribal, or local environmental regulatory agency for information on the location of contaminated sites, including those subject to Superfund (CERCLA), Resource Conservation and Recovery Act (RCRA) cleanup requirements, or the Brownfields program. Visit EPA's "Where You Live" for more information.

3. Pest Barriers

3.1 Minimize Pathways for Pest Entry

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Seal all penetrations and joints between the foundation and exterior wall assemblies (Rater-F 4.1 and 4.3).
- ✓ Air seal all sump covers (Builder-W 1.7).

No additional Indoor airPLUS Requirements

Advisories:

1. When sealing larger gaps that provide potential points of entry for rodents, copper or stainless steel wool is recommended in addition to sealant.
2. Additional precautions should be taken in areas classified as "Moderate to Heavy" termite infestation probability (as identified by 2015 IRC Figure R301.2 [6]):
 - Foundation walls should be solid concrete or masonry with a top course of solid block, bond beam, or concrete-filled block.
 - Interior concrete slabs should be constructed with 6 x 6 in. welded wire fabric, or the equivalent, and concrete walls should be constructed with reinforcing rods to reduce cracking.
 - Sill plates should be made of metal or preservative-treated wood.
3. Additional precautions should be taken in areas classified as "Very Heavy" termite infestation probability (as identified by 2015 IRC Figure R301.2[6]) i.e., Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina and parts of California and Texas:
 - Foam plastic insulation should not be installed on the exterior face of below-grade foundation walls or under slabs.
 - Foam plastic insulation installed on the exterior of above-grade foundation walls should be kept a minimum of 6 in. above the final grade and any landscape bedding materials and should be covered with moisture-resistant, pest-proof material (e.g., fiber cement board or galvanized insect screen at the bottom-edge of openings).
 - Foam plastic insulation applied to the interior side of conditioned crawlspace walls should be kept a minimum of 3 in. below the sill plate.

3.2 Rodent/Bird Screens for Building Openings

Indoor airPLUS Requirements:

- Provide corrosion-proof rodent/bird screens (e.g., copper or stainless steel mesh) for all building openings that cannot be fully sealed and caulked (e.g., ventilation system intake/exhaust outlets and attic vent openings).

Exception: This requirement does not apply to clothes dryer vents.

4. HVAC Systems

4.1 HVAC Sizing and Design

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Calculate room-by-room heating and cooling design loads using Unabridged ACCA Manual J, 2013 ASHRAE Fundamentals, or other methodology per the Authority Having Jurisdiction (HVAC-D 3).
- ✓ Select all heating and cooling equipment to accommodate the calculated heating and cooling design loads using ACCA Manual S and ENERGY STAR allowances, inclusive of the pressure drop from all specified filters (HVAC-D 4).

Additional Indoor airPLUS Requirements:

- In "Warm-Humid" climates as defined by Section 301 of the 2015 IECC (i.e., Climate Zone 1 and portions of Zones 2 and 3A below the white line), equipment shall be installed with sufficient latent capacity to maintain indoor relative humidity (RH) at or below 60 percent. This requirement shall be met by either:
 - Additional dehumidification system(s), **OR**
 - A central HVAC system equipped with additional controls to operate in dehumidification mode.

Exception: Climate Zones 4-8, 3B, 3C and the portions of 3A and 2B above the white line as shown by 2015 IECC Figure 301.1.

Advisory: Although not required to meet this specification, independent dehumidification is recommended in Climate Zones 4A and 3A above the white line as shown in 2015 IECC Figure 301.1.

4.2 Duct System Design and Installation

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Design all duct systems according to ACCA Manual D (HVAC-D 5).
- ✓ Ensure that all duct systems are installed to be substantially airtight (Rater-F 6.4 and 6.2).

Additional Indoor airPLUS Requirements:

- Do not use building cavities as part of the forced air supply or return systems.
- Either cover duct openings throughout construction to protect from construction debris or vacuum out ducts thoroughly prior to installing registers, grilles and diffusers (see Specification 7.1).

Advisory: Seams in the HVAC cabinet, plenum and adjacent ductwork should be sealed with mastic systems, tape that meets the applicable requirements of UL 181a or UL 181b, or gasket systems.

4.3 Location of Air-Handling Equipment and Ductwork

Indoor airPLUS Requirement:

- Do not locate air-handling equipment or ductwork in garages.

Note: Ducts and equipment may be located in framing spaces or building cavities adjacent to garage walls or ceilings if they are separated from the garage space with a continuous air barrier.

4.4 Room Pressure Differentials

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Minimize room pressure differentials for any bedroom (as defined by RESNET's Mortgage Industry National Home Energy Rating Systems Standards (the RESNET Standard) that does not have a dedicated return (Rater-F 6.2).

No additional Indoor airPLUS Requirements

4.5 Mechanical Whole-Dwelling Ventilation

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Provide mechanical whole-dwelling ventilation meeting all requirements of ASHRAE 62.2-2010 or later (HVAC-D 2).
- ✓ Test airflows to ensure they meet ASHRAE 62.2-2010 or later minimum requirements (Rater-F 7.1).
- ✓ Visually verify the following requirements:
 - Transfer air is not used to meet ventilation requirements (Rater-F 7.7.1).
 - Outdoor air inlets are located a minimum of 10 ft. from contaminant sources (Rater-F 7.7.2).

No additional Indoor airPLUS Requirements

Advisory: Outdoor air ducts connected to the return side of an air handler should be used as supply ventilation only if the manufacturers' requirements for return air temperature are met (e.g., most manufacturers recommend a minimum of 60 degrees Fahrenheit air flow across furnace heat exchangers). EPA also recommends filtering air inlets with a filter rated at MERV 13 or higher to minimize outdoor particles entering the home.

4.6 Local Exhaust for Known Pollutant Sources

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Provide local mechanical exhaust ventilation to the outdoors in each bathroom and kitchen, meeting ASHRAE 62.2-2010 Section 5 requirements (Rater-F 8.1 and 8.2).

Additional Indoor airPLUS Requirements:

- Conventional clothes dryers shall be vented to the outdoors. Electric condensing dryers shall be plumbed to a drain according to manufacturer's instructions.

4.7 Filtration for Central Forced-Air HVAC Systems

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Equip all filter access panels with gasket material or comparable sealing mechanism and ensure access panels fit snugly against the exposed edge of the installed filter when closed to prevent bypass (Rater-F 9.3).

Additional Indoor airPLUS Requirements:

- Install only HVAC filters that are rated MERV 8 or higher according to ASHRAE 52.2-2007 (at approximately 295 fpm).

Advisory: EPA recommends, but does not require, filters rated at MERV 13 or higher to reduce exposure to fine particles. Filters perform best when the filter rack design includes the following features, which are also included in some manufacturers' filter media boxes:

- Flexible, air-tight (e.g., closed-cell foam) gasket material on the surface that contacts the air-leaving (downstream) side of the filter.
- Friction fit or spring clips installed on the upstream side of the filter to hold it firmly in place.

- Upon installation of the air handling unit, include a filter for the remainder of construction activity to protect the unit and/or coil from construction debris and dust. Filter should be clean upon final inspection following construction (see Specification 7.1).

Advisory: To reduce the likelihood of construction dust contaminating the ducts and air handler, limit use of the HVAC system during activities with increased dust (e.g. drywall sanding, floor sanding).

- Do not install any air-cleaning equipment designed to produce ozone (i.e., ozone generators).

5. Combustion Pollutant Control

5.1 Combustion Equipment Located in Conditioned Spaces

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirements:

- ✓ Mechanically draft or direct vent all gas- and oil-fired furnaces, boilers and water heaters located in conditioned spaces. Naturally drafted equipment is allowed in Climate Zones 1-3 if the Rater has followed the combustion safety test procedures in Section 805 of the RESNET Standard. (Rater-F 10.1).
- ✓ Fireplaces that are not mechanically drafted or direct-vented to the outdoors must meet maximum allowed exhaust flow (Rater-F 10.2).

Additional Indoor airPLUS Requirements:

- Do not install any unvented combustion space-heating or decorative appliances within conditioned space.
- Ensure that all fireplaces and other fuel-burning and space-heating appliances located in conditioned spaces are vented to the outdoors and supplied with adequate combustion and ventilation air according to the manufacturers' installation instructions.
- Meet the following energy efficiency and emissions standards and restrictions for all fireplaces and other fuel-burning and space-heating appliances located in conditioned spaces:
 - Traditional masonry fireplaces designed for open fires are not permitted, with the exception of "masonry heaters" as defined by ASTM E1602 and section 2112.1 of the 2012 International Building Code (i.e., fireplaces engineered to store and release substantial portions of heat generated from a rapid burn).
 - Factory-built wood-burning fireplaces shall meet the certification requirements of UL 127 and shall have tight-fitting, gasketed glass doors and a dedicated outside air supply.

Advisory: Factory-built wood burning fireplaces qualified under EPA's wood-burning fireplace program are recommended. See: www.epa.gov/burnwise/fireplacelist.html
 - Wood stove and fireplace inserts as defined in section 3.8 of UL 1482 shall meet the certification requirements of that standard, **AND** they shall meet the emission requirements of the EPA's New Source Performance Standards for new residential wood heaters. See: www.epa.gov/residential-wood-heaters/final-new-source-performance-standards-residential-wood-heaters.

- Pellet stoves shall meet the requirements of ASTM E1509 **AND** they shall meet the emission requirements of the EPA New Source Performance Standards for new residential wood heaters.
- Natural gas and propane fireplaces shall have a permanently affixed glass front or gasketed door, and be power vented or direct vented in accordance with ANSI Z21.88/CSA 2.33. Decorative gas logs as defined in ANSI Z21.84/CSA 2.33 are not permitted.

Note: Unfinished basements and crawlspaces (except raised pier foundations with no walls) and attached garages that are air-sealed to the outside and intended for use as work or living space, are considered "conditioned spaces" for the purpose of this requirement.

5.2 Carbon Monoxide Alarms

Indoor airPLUS Requirement:

- All homes equipped with combustion appliance(s) or an attached garage shall have a carbon monoxide (CO) alarm installed in a central location in the immediate vicinity of each separate sleeping zone (e.g., in a hallway adjacent to bedrooms.) The alarm(s) shall be hard-wired with a battery back-up function and placed according to NFPA 720. The alarms shall be certified by either CSA 6.19-01 or UL 2034.

5.3 Multi-Family Environmental Tobacco Smoke Protections

Indoor airPLUS Requirements:

- Reduce exposure to environmental tobacco smoke (ETS) in multi-family buildings by:
 - Prohibiting smoking in indoor common areas, specified explicitly in building rental/lease agreements or condo/co-op association covenants and restrictions.
 - Locating designated outdoor smoking areas a minimum of 25 ft. from entries, outdoor air intakes and operable windows.
 - Minimizing uncontrolled pathways for ETS transfer between individual dwelling units by sealing penetrations in the walls, ceilings and floors of dwelling units; sealing vertical chases adjacent to dwelling units; and applying weather stripping to all doors in dwelling units leading to common hallways.

Advisory: To ensure that air sealing will effectively prevent migration of ETS, other air pollutants and odors between units in multifamily structures, conduct air-tightness testing of each unit in accordance with Section 802 of the RESNET Standard. The maximum air leakage rate should not exceed 0.3 CFM per square foot of the dwelling unit's enclosure area, at an induced pressure difference of 50 Pa, where the enclosure area includes the floor area, the ceiling area, and the demising and exterior wall areas.

5.4 Attached Garages

NOTE: Completion of the ENERGY STAR requirements satisfies the following Indoor airPLUS requirement:

- ✓ Isolate attached garages from conditioned spaces as follows:
 - Air-seal common walls and ceilings between attached garages and living spaces before installing insulation (Rater-F 2.4, 2.6, and 4.7).

- Use weather stripping or equivalent gasket to ensure all doors between living spaces and attached garages are substantially airtight (Rater-F 4.9).

Additional Indoor airPLUS Requirements:

- Install an automatic door closer on all connecting doors between living spaces and attached garages, **AND**
- In homes with exhaust-only whole house ventilation meet one of the following two requirements:
 - Equip the attached garage with an exhaust fan with a minimum installed capacity of 70 cfm that is vented directly outdoors. The fan shall be wired for continuous operation or with automatic fan controls (e.g., a motion detector) that activate the fan whenever the garage is occupied and operate for at least 1 hour after the garage has been vacated. If a ducted fan (not through-the-wall) is used, test and verify minimum capacity of 70 cfm, **OR**
 - Verify that the garage-to-house air barrier can maintain a pressure difference of greater than 45 Pa while the home maintains a 50 Pascal pressure difference with respect to the outdoors. All operable garage openings shall be closed during this test.

Advisories:

1. EPA recommends installing a garage exhaust fan if the homebuyer is expected to occupy the garage for work or recreational activities over extended periods of time.
2. ENERGY STAR certified fans are highly recommended.
3. Provide occupants with information in the Buyer Information Kit on the importance of, and methods for, ensuring adequate ventilation in the garage while occupied for extended periods of time.

6. Low-Emission Materials

Download [How to Find Indoor airPLUS Compliant Low Emission Products](#), which provides guidance on identifying compliant products including industry databases and examples of product labeling.

Note: The evaluation, certification and labeling of products for indoor emissions of volatile organic compounds (VOCs) is complex and evolving. EPA has not established threshold levels for indoor VOC emissions from any of the product categories addressed in these specifications. The third-party programs referenced in these specifications include U.S. programs that are designed to reduce human exposure indoors to individual VOCs of potential concern for human health effects, compared to similar products not certified as low-VOC or no-VOC. EPA will consider modifying these specifications to include additional third-party programs as appropriate.

6.1 Composite Wood

NOTE: The following requirements pertain to ALL composite wood products installed in the home during construction. Examples include but are not limited to: structural panels, cabinetry, shelving, trim, doors, stair treads, flooring, etc. See exceptions.

Indoor airPLUS Requirements:

- Structural plywood and oriented strand board (OSB): Use only products certified compliant with:

- PS1 or PS2, as appropriate, and made with moisture-resistant adhesives as indicated by “Exposure 1” or “Exterior” on the American Plywood Association (APA) trademark.

- Hardwood plywood: Use only products certified compliant with:
 - Formaldehyde emissions requirements of ANSI/HPVA HP-1-2016; **OR**
 - California Air Resources Board (CARB) Airborne Toxics Control Measure (ATCM) Phase II to Reduce Formaldehyde Emissions from Composite Wood Products; **OR**
 - EPA Toxic Substances Control Act (TSCA) Title VI certified.
- Particleboard and MDF products: Use only products certified compliant with:
 - CARB ATCM Phase II to Reduce Formaldehyde Emissions from Composite Wood Products; **OR**
 - EPA Toxic Substances Control Act (TSCA) Title VI certified; **OR**
 - Formaldehyde emissions requirements of ANSI A208.1 (particleboard) and A208.2 (MDF); **OR**
 - ECC Sustainability Standard by the Composite Panel Association; **OR**
 - GREENGUARD or GREENGUARD GOLD Certification.
- Cabinetry: Made with component materials (plywood, particleboard, MDF) that are certified to comply with:
 - The appropriate standards above; **OR**
 - Registered brands or products produced in plants certified under the Kitchen Cabinet Manufacturers Association’s (KCMA) Environmental Stewardship Certification Program (ESP 05-12); **OR**
 - GREENGUARD or GREENGUARD GOLD Certification for Cabinetry.

Exceptions to Item 6.1 per the CA ATCM and EPA’s TSCA Title VI:

- Windows that contain composite wood products are exempt from the requirements of this section if the window product contains less than five percent by volume of HWPW, PB, or MDF combined in relation to the total volume of the finished window product.
- Exterior doors and garage doors that contain composite wood products are exempt from the requirements of this section if either: (A) the doors are made from composite wood products manufactured with no added formaldehyde based resins or ULEF resins; or (B) the doors contain less than three percent by volume of HWPW, PB, or MDF combined in relation to the total volume of the finished exterior door or garage door.

Note: “No added formaldehyde” (NAF) or “Ultra-low emitting formaldehyde” (ULEF) products that are specifically manufactured under a limited exemption from the CARB ATCM to Reduce Formaldehyde Emissions from Composite Wood Products or EPA’s TSCA Title VI rule are compliant with Indoor airPLUS.

6.2 Interior Paints and Finishes

Indoor airPLUS Requirements:

- At least 90 percent of the interior surface area covered by site-applied paints and coatings shall use low-VOC or no-VOC products certified by one of the following third-party standards or certifications:
 - GREENGUARD or GREENGUARD GOLD Certification for Paints and Coatings, **OR**
 - Scientific Certification Systems (SCS) Standard EC-10.3-2014, Indoor Advantage Gold, **OR**
 - A third-party low-emitting product list based on CA Section 01350 (CDPH Standard Method V1.2-2017), **OR**
 - Green Seal Standard GS-11, **OR**
 - Green Wise and Green Wise Gold products, **OR**
 - Master Painters Institute (MPI) Green Performance Standards X-Green, GPS-1 or GPS-2.

6.3 Carpets and Carpet Adhesives

Indoor airPLUS Requirements:

- At least 90 percent of the interior surface area covered by carpet and carpet adhesives must use products labeled with, or otherwise documented as meeting, the Carpet and Rug Institute (CRI) Green Label Plus testing program criteria.
- For carpet cushion (i.e., padding), use only products certified to meet the CRI Green Label Plus testing program criteria.

6.4 Adhesives and Sealants

Advisory: While not currently required by Indoor airPLUS, EPA recommends that at least 90 percent of site-applied interior adhesives and sealants be low-VOC or no-VOC products certified by one of the following third-party standards or certifications:

- A third-party low-emitting product list based on CA Section 01350 (CDPH Standard Method V1.2-2010), **OR**
- Green Seal GS-36, **OR**
- GREENGUARD or GREENGUARD GOLD certification for adhesives and sealants.

6.5 Hard Surface Flooring

Advisory: While not currently required by Indoor airPLUS, EPA recommends that at least 90 percent of the interior hard surface flooring materials, adhesives, and underlayments be low-VOC or no-VOC emitting as certified by one of the following third-party standards or certifications:

- FloorScore ®; **OR**
- GREENGUARD or GREENGUARD Gold; **OR**
- SCS Indoor Advantage Gold; **OR**
- A third party low-emitting product list based on CA Section 01350 (CDPH Standard Method v1.2-2017); **OR**
- CRI Green Label Plus (adhesives)

7. Home Commissioning

7.1 HVAC and Ductwork Verification

Indoor airPLUS Requirements:

- Inspect ductwork before installing registers, grilles and diffusers to verify it is dry and substantially free of dust or debris. If duct openings were not covered during construction, thoroughly vacuum out each opening prior to installing registers, grilles and diffusers.
- After all dust-producing construction activities are complete (e.g., drywall, trim carpentry, floor sanding), verify HVAC filters are new, clean, and meet specified MERV rating (see Specification 4.7).

Advisory: Air balancing of supply registers and return grilles is highly recommended to improve the performance of the HVAC system and comfort of the occupants, but is not required at this time for Indoor airPLUS qualification.

7.2 Ventilation after Material Installation

Indoor airPLUS Requirements:

- Ventilate the home with outside air at the highest rate and duration practical, meeting ventilation requirements for outdoor air flow and humidity control (see Item 4.5):
 - During and shortly after installing products that are known sources of contaminants (e.g., cabinets, carpet padding and painting), **AND**
 - During the period between finishing and occupancy.

Advisory: If whole house ventilation cannot be scheduled prior to occupancy, advise the buyer to operate the ventilation system at the highest rate it can provide during the first few months of occupancy, meeting the above requirements.

7.3 Owner and Resident Information Kit

Indoor airPLUS Requirements:

- Provide resident(s), property manager, and/or building owner with information and documentation of the home's IAQ protections, including:
 - An Indoor airPLUS label and certificate.
 - Operations and maintenance instruction manuals for all installed equipment and systems addressed by Indoor airPLUS and ENERGY STAR requirements, including HVAC systems and accessories, dehumidifiers, combustion appliances and any radon system.

Advisory: Provide the homebuyer with information that addresses the importance of ensuring that manually controlled ventilation options (e.g., bathroom, garage (if applicable), kitchen exhaust fans; operable windows, and doors, etc.) are used when strong pollutant sources are present, such as when using common household products (e.g., cleaning products, pesticides) and when using the garage for hobbies or other pollutant generating activities.

Abbreviations

CFDS	Composite Foundation Drainage System
cfm	cubic feet per minute
ETS	Environmental Tobacco Smoke
fpm	feet per minute
ft.	feet
HVAC	heating, ventilating and air-conditioning
IAQ	indoor air quality
in.	inches
mil	common term to describe plastic sheeting thickness; 1 mil equals 0.001 inches
min.	minimum

MDF	medium density fiberboard
MERV	Minimum Efficiency Reporting Value; defined in ASHRAE 52.2-2007
OSB	oriented strand board
Pa	Pascal
pCi/L	picocuries per liter
Rev.	Revision
sq. ft.	square foot
spec	specification
VOC	Volatile Organic Compound
w.c.	water column

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ASHRAE Handbooks: ASHRAE Handbook Series. American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

ASHRAE 52.2: ANSI/ASHRAE Standard 52.2-2007: Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size. 2007. American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

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IRC: International Residential Code for One- and Two-Family Dwellings. 2015. International Code Council, Inc.

KCMA ESP 05-12: Environmental Stewardship Program. 2012. Kitchen Cabinet Manufacturer's Association.

MPI X-Green (Extreme Green), GPS-1 and GPS-2: Master Painters Institute (MPI) Green Performance Standards for Paints and Coatings [X-Green, GPS-1 and GPS-2]. 2015. Master Painters Institute, Inc. http://www.paintinfo.com/mpi/approved/Specification_index.shtml.

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Climate Zones of the Continental United States

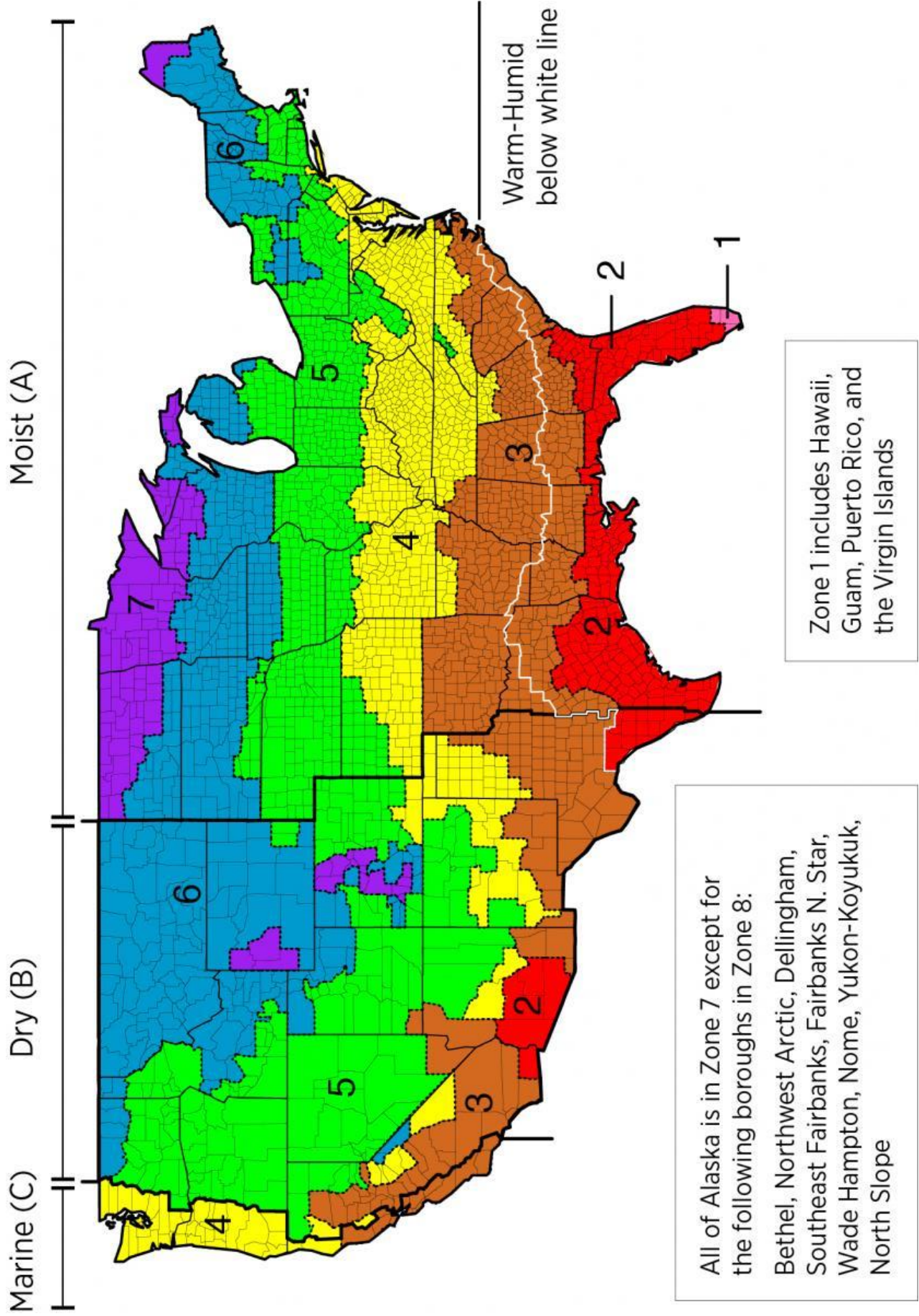


Figure 301.1 Climate Zones of the Continental United States. International Energy Conservation Code



Office of Air and Radiation (6609J)

EPA-402-K-13/001 | Revised February 2018



Homes with the Indoor airPLUS label are designed for improved indoor air quality compared to homes built to minimum code.

www.epa.gov/indoorairplus

J. ENHANCEMENTS

Each development must meet the following baseline energy performance standard applicable to the development's construction category.

- a. **New Construction:** must meet all criteria for EPA EnergyStar certification.
- b. **Rehabilitation:** renovation must result in at least a 30% performance increase or score an 80 or lower on the HERS Index.
- c. **Adaptive Reuse:** must score a 95 or lower on the HERS Index.

Certification and HERS Index score must be verified by a third-party, independent, non-affiliated, certified RESNET home energy rater.

Indicate **True** for the following items that apply to the proposed development:

ACTION: Provide RESNET rater certification (**TAB F**)

ACTION: Provide Internet Safety Plan and Resident Information Form (**Tab W**) if corresponding options selected below

REQUIRED:

1. For any development, upon completion of construction/rehabilitation:

- TRUE a. A community/meeting room with a minimum of 749 square feet is provided.
- 50.00% b1. Percentage of brick covering the exterior walls.
- 50.00% b2. Percentage of Fiber Cement Board or other similar low-maintenance material approved by the Authority covering exterior walls. Community buildings are to be included in percentage calculations.
- FALSE c. Water expense is sub-metered (the tenant will pay monthly or bi-monthly bill).
- TRUE d. All faucets, toilets and showerheads in each bathroom are WaterSense labeled products.
- FALSE e. Rehab Only: Each unit is provided with the necessary infrastructure for high-speed internet/broadband service.
- f. *Not applicable for 2022 Cycles*
- FALSE g. Each unit is provided free individual high speed internet access.
- or
- FALSE h. Each unit is provided free individual WiFi access.
- FALSE i. Full bath fans are wired to primary light with delayed timer or has continuous exhaust by ERV/DOAS.
- or
- TRUE j. Full bath fans are equipped with a humidistat.
- FALSE k. Cooking surfaces are equipped with fire prevention features
- or
- TRUE l. Cooking surfaces are equipped with fire suppression features.
- FALSE m. Rehab only: Each unit has dedicated space, drain and electrical hook-ups to accept a permanently installed dehumidification system.
- or
- TRUE n. All Construction types: each unit is equipped with a permanent dehumidification system.
- TRUE o. All interior doors within units are solid core.
- TRUE p. Every kitchen, living room and bedroom contains, at minimum, one USB charging port.
- TRUE q. All kitchen light fixtures are LED and meet MDCR lighting guidelines.
- 0% r. Percentage of development's on-site electrical load that can be met by a renewable energy electric system (for the benefit of the tenants)
- FALSE s. New construction only: Each unit to have balcony or patio with a minimum depth of 5 feet clear from face of building and a minimum size of 30 square feet.

J. ENHANCEMENTS

For all developments exclusively serving elderly tenants upon completion of construction/rehabilitation:

- FALSE a. All cooking ranges have front controls.
- FALSE b. Bathrooms have an independent or supplemental heat source.
- FALSE c. All entrance doors have two eye viewers, one at 42" inches and the other at standard height.
- FALSE d. Each unit has a shelf or ledge outside the primary entry door located in an interior hallway.

2. Green Certification

- a. Applicant agrees to meet the base line energy performance standard applicable to the development's construction category as listed above.

The applicant will also obtain one of the following:

- | | | | |
|--------------------------------|--|--------------------------------|--|
| <input type="checkbox"/> TRUE | Earthcraft Gold or higher certification | <input type="checkbox"/> FALSE | National Green Building Standard (NGBS) certification of Silver or higher. |
| <input type="checkbox"/> FALSE | U.S. Green Building Council LEED certification | <input type="checkbox"/> FALSE | Enterprise Green Communities (EGC) Certification |

If Green Certification is selected, no points will be awarded for d. Watersense Bathroom fixtures above.

Action: If seeking any points associated Green certification, provide appropriate documentation at TAB F.

- b. Applicant will pursue one of the following certifications to be awarded points on a future development application. (Failure to reach this goal will not result in a penalty.)

- | | | | |
|-------------------------------|-------------------------------------|--------------------------------|-------------------------|
| <input type="checkbox"/> TRUE | Zero Energy Ready Home Requirements | <input type="checkbox"/> FALSE | Passive House Standards |
|-------------------------------|-------------------------------------|--------------------------------|-------------------------|

3. Universal Design - Units Meeting Universal Design Standards (units must be shown on Plans)

- TRUE a. Architect of record certifies that units will be constructed to meet Virginia Housing's Universal Design Standards.

- 21 b. Number of Rental Units constructed to meet Virginia Housing's Universal Design standards:
100% of Total Rental Units

- 4. FALSE Market-rate units' amenities are substantially equivalent to those of the low income units.

If not, please explain:

[Empty text box for explanation]

Architect of Record initial here that the above information is accurate per certification statement within this application.

K. SPECIAL HOUSING NEEDS

NOTE: Any Applicant commits to providing first preference to members of targeted populations having state rental assistance and will not impose any eligibility requirements or lease terms for such individuals that are more restrictive than its standard requirements and terms, the terms of the MOU establishing the target population, or the eligibility requirements for the state rental assistance.

Accessibility: Indicate **True** for the following point categories, as appropriate.

Action: Provide appropriate documentation (**Tab X**)

FALSE

- a. Any development in which (i) the greater of 5 units or 10% of units will be assisted by HUD project-based vouchers (as evidenced by the submission of a letter satisfactory to the Authority from an authorized public housing authority (PHA) that the development meets all prerequisites for such assistance), or another form of documented and binding federal project-based rent subsidies in order to ensure occupancy by extremely low-income persons. Locality project based rental subsidy meets the definition of state project based
 - (ii) will conform to HUD regulations interpreting the accessibility requirements of section 504 of the Rehabilitation Act; and be actively marketed to persons with disabilities as defined in the Fair Housing Act in accordance with a plan submitted as part of the
 - (iii) above must include roll-in showers, roll under sinks and front control ranges, unless agreed to by the Authority prior to the applicant's submission of its application.

Documentation from source of assistance must be provided with the application.

Note: Subsidies may apply to any units, not only those built to satisfy Section 504.

TRUE

- b. Any development in which ten percent (10%) of the units (i) conform to HUD regulations interpreting the accessibility requirements of section 504 of the Rehabilitation Act and (ii) are actively marketed to persons with disabilities as defined in the Fair Housing Act in accordance with a plan submitted as part of the application for credits.

For items a or b, all common space must also conform to HUD regulations interpreting the accessibility requirements of section 504 of the Rehabilitation Act.

Architect of Record initial here that the above information is accurate per certification statement within this application.

Special Housing Needs/Leasing Preference:

- a. If not general population, select applicable special population:

####

Elderly (as defined by the United States Fair Housing Act.)

####

Persons with Disabilities (must meet the requirements of the Federal Americans with Disabilities Act) - Accessible Supportive Housing Pool only

TRUE

Supportive Housing (as described in the Tax Credit Manual)

Action: Provide Permanent Supportive Housing Certification (**Tab S**)



2023¹ Minimum Design and Construction Requirements

Requirements for All Developments

The following minimum requirements were created to address issues related to the design, construction, maintenance, marketing, life cycle costs and aesthetic concerns for developments utilizing low-income housing tax credits (LIHTC) and/or developments financed by the Virginia Housing Development Authority (Virginia Housing). Virginia Housing may require an expansion of the proposed scope of work for a project beyond those items specifically listed within the Minimum Design and Construction Requirements (MDCR) if it determines, in its sole discretion, that such expansion of scope is necessary after review of submitted plans and specifications for the project or examination of the existing conditions at the property. Any such required additions to the proposed scope of work shall be communicated to the developer by Virginia Housing in writing and shall be automatically incorporated into the MDCR herein by reference as it pertains to that specific project. For developments utilizing LIHTC, Virginia Housing will alert applicants to the additional required scope of work prior to allocating credits to the respective development. Submission requirements for Virginia Housing loan applications can be found on the Virginia Housing webpage. Submission requirements for the LIHTC program can be found in the Virginia Housing Federal Housing Credit Manual. All developments utilizing LIHTC are subject to REAC Inspections utilizing the NSPIRE standard. The following MDCRs do not account for all NSPIRE requirements. Developers are responsible for ensuring compliance with NSPIRE.

Drawings, specifications, scope of work, and installations are to comply with the latest applicable issue of the *Virginia Uniform Statewide Building Code (USBC)*², *International Building Code (IBC)*³, other applicable Virginia and national codes and standards, requirements of localities, prevailing design and construction practices and the *Minimum Design and Construction Requirements* of Virginia Housing. All work performed at the property must be managed and completed by a single prime Virginia-licensed Class A general contractor (GC) contracted by the developer. In no event may work be self-directed or self-performed by the developer unless the developer's construction arm is the contracted prime GC and Virginia Housing has approved, in writing, the developer's construction arm as the prime GC.

Installation of materials, equipment, products, and building systems in both New Construction and Rehabilitation shall adhere to all manufacturers' requirements, specifications, and recommendations. All developments are to comply with applicable accessibility codes and standards, including but not limited to the USBC, the Fair Housing Act Design Requirements, and all accessibility commitments made through the LIHTC application process.

All **additions** and **adaptive reuse** are to comply with the Virginia Housing Minimum Design and Construction Requirements (MDCR) for *New Construction*. **Adaptive reuse** may also be required to comply with the MDCR for *Rehabilitation* where Virginia Housing deems applicable.

¹ The 2023 Virginia Housing Minimum Design and Construction Requirements apply to Virginia Housing loans with a 2023 application date, as well as developments receiving Federal Low-Income Housing Tax Credit allocations for year 2023.

² (USBC 2018) *Virginia Uniform Statewide Building Code* (Latest applicable edition as referenced by the USBC).

³ (IBC 2018) *International Building Code* (Latest applicable edition as referenced by the IBC).

Requirements for New Construction

SITE WORK

1. Finished floor elevations of buildings are to be a minimum of 8 inches higher than the adjoining finished grade. When achieving an 8-inch height separation is not feasible, due to accessibility requirements or other conditions, provide an alternate solution acceptable to Virginia Housing.
2. Areas around buildings are to be graded to have a minimum 5% slope away from foundation walls for a minimum distance of 10 feet, per IBC. Install yard drains, storm inlets, or drainage pipes under concrete walks to drain properly if the space between foundation walls and concrete walks is less than 10 feet. Drainage systems are to be designed to avoid water flowing over sidewalks. Provide an alternate drainage solution acceptable to Virginia Housing:
 - a. When buildings are closer than 10 feet to concrete walks.
 - b. When a minimum 5% slope is not feasible.
 - c. To avoid water draining over sidewalks.
 - d. At accessible entrances, when applicable.
3. Install seamless gutters and downspouts, or an internal drainage system for all buildings. When discharging on grades steeper than 20%, or less than 1%, water from gutters and downspouts is to be piped underground to a storm sewer system, or to daylight at grades that will avoid soil erosion.
4. Paving designs are to be based upon the soil report, California Bearing Ratio (CBR) of the soil, traffic count, and loading. All drive lanes of parking lots are to be designed for dumpster trucks. Parking bays may have lighter paving than the drive lanes of parking lots.
5. Extend concrete dumpster pads at least 12 feet into the asphalt so that the load bearing wheels of trucks rest on concrete while servicing the dumpsters.
 - a. Thickness of concrete is to be a minimum of 6 inches with reinforcement.
 - b. Dumpsters and/or compactors accessed via an accessible route are to meet accessibility requirements.
 - c. Install a privacy screen on at least three sides of all dumpster and/or compactor pads.
6. Minimum width of sidewalks is to be 3 feet. Sidewalks that are located perpendicular to parking spaces are to be a minimum of 5 feet wide excluding curb or 3 feet wide with 2 feet of space between the sidewalks and curbs. Provide gravel and sand base under walks when required by the soil report. Provide control and expansion joints.
7. Site lighting shall not be obstructed by trees.
8. All plantings must be shown on landscape drawings illustrating size at full maturity. Show dimension of tree locations from trunks/calipers to buildings. Portions of tree branches when fully mature shall not overhang roofs or contact building faces. Field verify planting locations match initial design.

9. Grade to avoid standing water. Provide a smoothly graded transition from disturbed to undisturbed areas. Finish grade with clean topsoil. Seed and straw, and/or landscape all bare and disturbed areas. Provide ground cover materials or sod for slopes steeper than 20%. Provide foundation plantings in the front of all buildings. Clean site and dispose of all construction debris. Grass must be established prior to project closeout.

ARCHITECTURAL

1. Roofing

- a. Roof sheathing thickness is to be a minimum of 15/32 inch-thick plywood or 15/32 inch OSB. Install sheathing with clips. ZIP System roof sheathing or similar products are not accepted.
 - b. Install drip edge on all sides of the roof.
 - c. Install ice barrier extending from eave's edge to a point 24 inches beyond the exterior wall cladding.
 - d. Roof shingles are to be a minimum 25-year, anti-fungal product, and are to be nailed (not stapled).
 - e. Flat roofs to have a minimum 20-year manufacturer's warranty.
2. Provide permanent access to all flat roofs. Access to be easily reachable and located in an interior common area.
 3. Install walk pads that provide access to all rooftop equipment.
 4. Provide roofs/overhangs over exterior entrance doors to all units and buildings that are accessed by residents or visitors. Provide a minimum 30 inches of overhang along the front and 12 inches along each side of the door; or the door may be setback a minimum of 24 inches from the face of the exterior wall.
 5. Stairs to apartment units where stair halls are not enclosed are to be protected from weather by design features, such as, setting back stairs a minimum 5 feet from the exterior wall and/or installing a roof overhang at the second floor level, projecting a minimum of 5 feet beyond the first riser.
 6. Crawl spaces to be free of debris and water. Provide a minimum 6 mil vapor barrier at floor with seams overlapped 12 inches. Edges and seams to be taped.
 7. Install waterproofing on exterior walls up to finished grade where finished floors are below adjoining finished grades. Provide a 10-year material/manufacturer's warranty.
 8. Install weep holes in brick veneer at foundation walls, over lintels, and relief angles.
 - a. Weep holes at foundation walls are to be a minimum 6 inches above finished grade.
 - b. Provide mortar mesh to prevent blockage of weep holes.
 - c. Provide continuous flashing at all weep holes and end dams at flashing terminations.

9. At masonry and precast window sills, and caps for masonry veneer walls that do not terminate directly under roofs, provide a positive slope resulting in a minimum $\frac{3}{4}$ inch differential over the length of the sill/cap.
10. All wood framing in contact with concrete or masonry is to be of treated wood.
11. Provide sill sealer for sill plates at all exterior walls.
12. All brick veneer or sidings, such as vinyl, aluminum, wood and fiber cement board, are to have a solid backing of plywood, OSB, gypsum, or similar material. Siding and brick are to be installed over an independent drainage plane, such as Tyvek® or equal. Fasten siding to framing with nails penetrating a minimum $\frac{3}{4}$ of an inch into studs. Install pre-manufactured mounting blocks for all penetrations in siding such as electrical, plumbing, HVAC, etc.
EXCEPTION: Exterior wall sheathing systems with integrated drainage planes may be used when observation reports are provided by the manufacturer and the following conditions are met:
 - 1) Pre-installation
 - a. General Contractor to hold pre-installation meeting with architect and manufacturer prior to installation. Manufacturer's observation reports to include documentation of meeting.
 - b. Manufacturers' flashing details including windows, doors, joints and penetrations must be maintained on site.
 - c. Store materials to meet manufacturer's requirements.
 - 2) Installation
 - a. The integral drainage plane must be preserved. Use manufacturer's approved products including tape, tape gun and roller.
 - b. When weather conditions warrant, follow manufacturer's requirements for inclement weather installation and storage of materials.
 - c. Manufacturer's representative to review the final installation to confirm all requirements are met prior to installation of exterior cladding. Manufacturer's observation reports documenting installation acceptance is required and must be maintained on site.
13. All panel type siding to be installed over vertical furring to allow adequate drainage and ventilation, or provide siding product with integrated vented rain screen.
14. The use of foil faced sheathing is prohibited.
15. The bottom of all siding and window sills are to be a minimum of 6 inches above the finished grade or mulch beds.
16. Exterior wooden trim, brick molding, sills, fascia, rake boards, and columns, are to be clad with vinyl, vinyl coated aluminum, or similar materials. Use materials designed for cladding with a minimum thickness of 0.019 inch and provide a stiffening crimp for trim and fascia boards are more than 8 inches wide. Virginia Housing recommends the use of low maintenance composite/ manufactured materials instead of wood for exterior use.

17. Powder coat or galvanize all exterior steel products, or provide an exterior steel paint that can achieve a minimum 10-year material warranty. Prepare surfaces per warranty requirements. Prime and paint steel prior to placement in concrete.
18. Use vinyl, aluminum, or steel for exterior railings, handrails, guardrails, posts and pickets instead of wood products.
19. Windows and sliding glass doors:
 - a. Provide minimum ½ inch insulated glass.
 - b. Provide minimum 10-year warranties for material and breakage of seal.
 - c. Provide thermal break for aluminum frames.
 - d. Install and flash per manufacturer's specifications.
 - e. Provide back dam flashing at sill.
 - f. Before installing windows; perform initial installation with the Construction Control Officer.
20. All exterior doors, except sliding glass doors, must be either insulated fiberglass or insulated metal. Exterior wooden door jambs and molding require composite material, such as FrameSaver® or equal, at their lowest points.
21. Install hard surface flooring at the interior of all entrance doors, except for doors entered through carpeted interior hallways. Hard surface area is to be approximately 3 foot by 4 foot using flooring materials such as VCT, sheet vinyl, hardwood, or tile.
22. Resilient flooring such as, but not limited to, sheet vinyl and VCT is to be installed over minimum nominal ¼ inch underlayment grade plywood, or similar underlayment material. Ceramic tile or similar flooring is to be installed over minimum nominal ¼ inch cementitious board or similar underlayment material. Flooring may be installed over concrete provided concrete is finished smooth and uniform. When installed over Gypcrete, or a similar material, apply manufacturer approved sealer.
23. Carpets are to have the minimum number of seams. Seams are not to be located in heavily trafficked areas. T-seams are not acceptable except in closets.
24. All interior doors are to be side hinged. Bifold, pocket, or sliding doors are not acceptable. Install or undercut doors a minimum of ¾ inch clear to prevent dragging and to provide ventilation. Paint bottom top and all other sides of doors. All doors must be factory assembled. Field modifications, such as but not limited to, cutting vents in door is prohibited. Instead, pre-manufactured louvered doors must be installed.
25. All unit interior spaces must have finished floor and solid wood base/molding. Base and base moldings are to match in design and finish.

EXCEPTIONS:

 - 1) Ceramic or stone baseboard is acceptable at matching adjacent flooring.
 - 2) Mechanical closets may use an alternate base material such as vinyl.

26. All common area interior spaces must have finished floor and base.

EXCEPTIONS: Utility/service rooms may have sealed concrete floor.

27. All windows are to have blinds, shutters, or other similar products, and sliding glass doors are to have vertical blinds.
28. Provide a minimum of one full-height closet of at least 6 square feet for general storage in a location other than a bedroom.
29. Provide a minimum of 1 ½ bathrooms (one full bathroom and one half bathroom) in all two bedroom units and a minimum of 2 full bathrooms in all three or more bedroom units.
30. Concealed solid dimensional wood blocking (2x material) is to be provided for all handrails, grab bars and wall mounted cabinets and accessories.
31. Tub and shower surrounds built of ceramic tile, marble, or similar materials are to be installed over minimum ½ inch cementitious board.
32. Provide a pass-through opening with counter space when kitchen and dining/living areas are separated by a wall.
33. Kitchen cabinets and bathroom vanities are to comply with Virginia Housing's Minimum Cabinet Requirements:
 - a. All cabinets are to be factory/manufacturer assembled.
 - b. All exposed portions of cabinetry must have factory applied finish.
 - c. Kitchen cabinets and bathroom vanities are to abut the side walls or provide a minimum spacing of 12 inches between wall and cabinets. Wall cabinets are to abut the ceiling/soffits or provide minimum of 12 inches between cabinet and ceiling/soffits.
 - d. Kitchen wall cabinets are to be fastened to blocking with a minimum of four washer head cabinet screws; two in each upper and lower nailing strip for each wall cabinet.
 - e. Plastic laminate countertops are to be post formed, or have back splashes that are factory attached to the countertop and sealed.
 - f. A side splash is to be installed where countertops abut walls.
 - g. Holes in cabinet backs for plumbing are to be drilled and completely covered by escutcheon plates.
 - h. Provide at least one base cabinet with drawer, minimum 15-inch-wide.
34. Install a cleanable surface, such as plastic laminate, metal, or ceramic tile on the sidewall next to the cooking range when it is located directly adjacent to a wall. Materials such as plastic laminate or metal are to be installed with adhesive.
35. Appliances
 - a. Provide 30-inch-wide range in all units except studio/efficiency apartments and one bedroom elderly apartments, which may have a minimum 20-inch-wide range. Provide maximum 24-inch-wide range hood for all 20-inch-wide ranges.
 - b. Provide a range hood or combination range hood-microwave over all cooking ranges.
 - c. Provide a 24-inch-wide dishwasher in all units, except for studio/efficiency apartments, which may have 18-inch-wide dishwashers.

- d. All refrigerators are to be frost free. Minimum rated sizes of refrigerators are to be 12 cubic feet for studio/efficiency apartments, 14 cubic feet for 1 and 2 bedroom apartments, and 16 cubic feet for 3 and 4 bedroom apartments. Side-by-side models must open fully or have at least 12" of cabinetry between an adjacent sidewall.
- e. Provide laundry equipment, or connections for full-size side-by-side or full-size stack type washers and dryers, in all units. When provided, laundry equipment and connections shall be installed in a closet with doors in a location other than a bedroom. Otherwise, provide onsite laundry facilities.
Exception: Studio and one bedroom apartments may utilize a bedroom closet for laundry equipment provided equipment does not impede on tenant storage, an exhaust fan with humidistat is installed in the closet, and a jumper duct is provided to communicate with return air location. (See "Plumbing" section for washing machine pan requirements.)
- f. All kitchen appliances in an apartment unit are to match in color.

36. Age restricted housing serving residents 55 years or older:

- a. Provide a handrail on at least one side of common corridors.
- b. Provide an accessible elevator for buildings with two or more stories.
- c. Provide indoor resident garbage drop-off area and access.

37. Where a permanent dehumidification system is not provided for all units, provide space for a future dehumidifier in a stud cavity within the apartment living space. Utilize concealed power and plumbing drain (e.g. mechanical closet). Identify location in drawings and coordinate with plumbing and electrical.

MECHANICAL

1. Provide Heating, Ventilation, and Air Conditioning (HVAC) equipment with R-410A refrigerant in all dwelling units. All apartments are to have ducted HVAC systems except as noted in #3 below. Size of HVAC equipment, ducts and diffusers are to be designed per heat gain/loss calculations.
2. For all ducted HVAC systems including ducted mini-splits and self-contained packaged systems (similar to Magic-Pak or First Co):
 - a. Air supply diffusers are to be located near windows in living rooms, dens and bedrooms.
EXCEPTION: The mechanical engineer may locate supply diffusers at alternate locations with Virginia Housing's prior approval based on supporting calculations.
 - b. Provide HVAC diffusers for kitchens and all full baths.
 - c. Provide premanufactured air filters.
 - d. Seal air duct penetrations in unheated spaces.
 - e. Refrigerant and condensate lines are to be concealed within walls. Seal all penetrations
 - f. Provide ducted return air grille. Provide a separate ducted return for each floor of townhouse units.
 - g. Heat pump to include auxiliary heat.
 - h. Main supply trunk line from air handler to branch duct shall be metal. Flex duct may be used only between main trunk line and supply diffuser. Fiberglass ductboard is prohibited.
 - i. All ductwork must be concealed behind permanent construction unless otherwise approved by Virginia Housing.

3. Ductless Heat Pumps (mini-splits) may be used in efficiencies, 1 bedroom units or elderly housing developments.
 - a. All mini-splits are to discharge condensate to grade through a pipe concealed within the exterior wall system.
 - b. Provide separate mini-split wall mounted unit for each bedroom, den or living room.
 - c. Provide separate wired wall mounted thermostat for each mini-split wall mounted unit.
 - d. Provide a heater with a thermostat or timer controlled heat lamp for all full baths.
4. All exhaust ducts are to discharge to the exterior of the building, and terminate into vent caps. Vent caps to be of a quality that will minimize repair and replacement.
5. Do not install condenser units in front of windows.
6. Electric baseboard heating and electric forced air heating shall not be used as the primary heating method.

PLUMBING

1. Clothes washing machines or connections for clothes washing machines are to have a pan, with a drain, connected to the sewer system per applicable plumbing code.
2. The bottoms of bath tubs are to have slip resistant/textured finish.
3. All tubs/showers and shower diverters are to have internal shut-off-valves or external shut-off-valves with access panels.
4. Depress entire bathroom floor and build up as needed to account for accessibility and drainage requirements when designing for roll-in showers. Bathrooms which include a roll-in shower, are to have ceramic or similar tile flooring, with a minimum of 3'-0" positively sloped towards the shower drain at a maximum 2%. Roll-in showers are to be either:
 - a. Ceramic or similar tile floor with water proofing membrane extending a minimum 8" up walls, and a zero height transition between the bathroom floor and the shower floor, **OR**
 - b. Pre-manufactured with a trench drain located immediately adjacent to, and the full length of, the shower.
5. Wall-hung lavatories may only be installed in common areas or dwelling units recognized as UFAS, ANSI Type A, or fully accessible. When installing wall-hung sinks, provide concealed arm type carriers.
6. All pipes to be concealed behind permanent construction. All wet plumbing pipe to be solid wall construction (Cellular core pipe not permitted).
7. All floor drains and indirect waste receptors to receive trap primer or code approved drain trap seal device.
8. Seal around all plumbing penetrations in floors, walls and ceilings.

- 9 .When installing electric water heaters provide the following minimum rated sizes:
 - a. Studio/1BR units 30 gallon.
 - b. 2BR units 40 gallon.
 - c. 3BR units 50 gallon.
10. Provide hub drain in mechanical closet to accept overflow pan and condensate lines.
11. Vanities may not be installed within 12" of tub or showers.
12. Where wall-hung lavatories, roll-under sinks, or pedestal sinks are installed, provide an alternate storage solution complying with code required reach ranges and other accessibility requirements, which may apply to the unit.

ELECTRICAL

1. Provide fluorescent light fixtures or LED light fixtures in all public common areas such as offices, multipurpose rooms, laundry rooms, hallways, and stairs.
2. Kitchens are to have a minimum of one light fixture 4 feet long with either LED or two 32 watt fluorescent bulbs, or lighting fixture(s) that provide a minimum illumination of 30 foot candles distributed across all countertops.
3. Pre-wire cable TV and internet outlets for all bedrooms, living rooms, family rooms, and dens. Provide a minimum of one landline telephone outlet in each apartment. Provide interface for incoming service at one central location per building. All wiring for the interior and exterior of the building is to be concealed within the walls.
4. Exterior fixtures are to be LED, fluorescent, metal halide, high or low pressure sodium, or mercury vapor. Tenant controlled exterior lighting is exempt. Provide exterior lighting to illuminate all parking areas, dumpster pads, building entrances and mailboxes with a minimum of one-foot candle of illumination. Provide illumination so that building numbers and apartment numbers are legible at night.
5. Seal around all electrical penetrations.
6. Provide tenant controlled light fixture at all patios and balconies.
7. Where a permanent dehumidification system is not provided for all units, provide an outlet for a future dehumidifier. Identify outlet location in drawings and coordinate with architectural. Locate outlet such that when dehumidifier is installed, power cord will not be visible from a habitable space.

Requirements for Rehabilitation

All **additions** and **adaptive reuse** are to comply with the Virginia Housing Minimum Design and Construction Requirements (MDCR) for *New Construction*. **Adaptive reuse** may also be required to comply with the MDCR for *Rehabilitation* where Virginia Housing deems applicable.

All rental offices, public areas, and associated parking and routes are to meet the latest USBC accessibility requirements for new construction. Developments that have accessible units or are required to have accessible units due to the building codes these developments are subject to, federal requirements, or as the result of commitments made in the LIHTC application, are to provide accessible routes through the site from those units to accessible parking and other accessible common areas.

Identify any hazardous materials/conditions such as asbestos, lead paint, radon, recalled drywall, mold on site and/or in buildings and contaminated soils. Address or abate all hazardous materials per applicable regulations. Submit abatement certification to Virginia Housing if requested.

SITE WORK

1. Identify areas that require grading to drain water away from buildings and areas where adjoining grades are higher than finished floor of buildings:
 - a. Provide a minimum distance of 6 inches between finished grade or mulch beds, and the bottom of siding and window sills.
 - b. Provide a minimum of 5% slope away from foundation walls, for a minimum distance of 10 feet.
 - c. Provide alternate solutions acceptable to Virginia Housing when required grades, slopes, or other site conditions make the above requirements infeasible.
2. Provide seamless gutters and downspouts for all buildings, or an internal drainage system. When discharging on grades steeper than 20%, or less than 1%, water from gutters and downspouts is to be piped underground to a storm sewer system, or to daylight at grades that will avoid soil erosion. Avoid water drainage over sidewalks.
3. Extend concrete dumpster pads at least 12 feet into the asphalt so that the load bearing wheels of trucks rest on concrete while servicing the dumpsters.
 - a. Thickness of concrete is to be a minimum of 6 inches with reinforcement.
 - b. Dumpsters and/or compactors accessed via an accessible route are to meet accessibility requirements.
 - c. Install a privacy screen on at least three sides of all dumpster and/or compactor pads.
4. Concrete that is cracked, crumbling, spalling, heaving or settling, or may be a safety issue is to be repaired or replaced. Provide a solution acceptable to Virginia Housing if any of these conditions exist. Sidewalks at new locations to comply with new construction guidelines.
5. Asphalt that has cracking, alligating, or a deteriorating sub-base is to be repaired or replaced. Provide a solution acceptable to Virginia Housing if any of these conditions exist. Paving at new locations to comply with new construction guidelines.

6. Remove all dead bushes, trees, tree-stumps, and their above-ground roots. Remove all portions of tree branches that overhang roofs or contact building faces. Remove trees with root structures that may compromise building foundations. New plantings must comply with new construction requirements.
7. Grade to avoid standing water. Provide a smoothly graded transition from disturbed to undisturbed areas. All areas which have dead grass are to be tilled. Seed and straw, and/or landscape all bare and disturbed areas. Finish grade with clean topsoil. Provide ground cover materials or sod for slopes steeper than 20%. Provide foundation plantings in the front of all buildings. Clean site and dispose of all construction debris. Grass must be established prior to project closeout.

ARCHITECTURAL

1. Install waterproofing up to finished grades for all perimeter walls of finished and unfinished spaces where evidence of water, moisture, or mildew is present. Waterproofing may be installed on the exterior or interior sides of the wall. The waterproofing system is to have a minimum 10-year manufacturer's warranty.
2. All debris and wood are to be removed from crawl spaces.
 - a. Install sump pump or drain tile discharging to daylight for any area accumulating water.
 - b. Install a minimum 6 mil vapor barrier at floor with seams overlapped 12 inches. Edges and seams to be taped. Provide adequate crawl space ventilation.
3. Remove all abandoned and non-operable equipment, devices and accessories. Virginia Housing may approve abandoned material that is secured, sealed and concealed.
4. Structural deficiencies are to be identified and corrected. If requested by Virginia Housing, corrective measures to be designed, inspected, and certified by a structural engineer.
5. Install minimum of R-19 insulation in unconditioned crawl spaces and basements and R-38 insulation in attics.
6. When replacing drywall at an exterior wall or replacing exterior sheathing, provide wall insulation at affected areas per the latest adopted edition of the International Energy Conservation Code.
7. Roof inspection reports are required for all roofs more than 5 years old. Report to include age and remaining life of roofs and areas that need repairs. Replace all roofs with a remaining life of less than 5 years. Repair or replace all roofs with damage or leaks.
8. When replacing pitched roofs:
 - a. Repair or replace all damaged sheathing, rafters, and/or trusses.
 - b. Replace all 3/8 inch sheathing with a minimum of 15/32 inch plywood or 15/32 inch OSB. Install sheathing with clips. ZIP System roof sheathing or similar products are not accepted.
 - c. Replace all existing attic vents and pipe collars. Replace rusted or damaged flashing. Replace all existing sealant.

- d. Roof shingles are to be a minimum 25 year, anti-fungal product, and are to be nailed (not stapled). Do not install new shingles over existing shingles. Replace existing ridge vents.
- e. Install drip edge on all sides of the roof.
- f. Install ice barrier extending from eave's edge to a point 24 inches beyond the exterior wall cladding.
- g. Provide roof ventilation per the latest USBC for new construction.

9. When replacing flat roofs:

- a. Remove and dispose of existing roofing and above deck insulation, damaged vents and other items not in good condition.
- b. Provide a minimum R-25 continuous insulation above the roof deck or provide a minimum R-38 insulation in the attic space.
- c. New roofing is to have a minimum 20-year manufacturer's warranty.
- d. Provide roof ventilation per the latest USBC for new construction.

10. Install walk pads that provide access to all rooftop equipment.

11. If equipment is installed on a roof, provide easily reachable access from an interior common area.

12. Stairs to apartment units where stair halls are not enclosed are to be protected from weather by design features. Install an awning, a roof overhang at the second floor level, or a roof at the stair hall entrance. Provide a minimum overhang of 5 feet from first riser. All buildings in a development are to have similar design features. Historic buildings may be exempt.

13. Exterior wooden trim, brickmold, sills, fascia, rake boards, and columns are to be clad with vinyl, vinyl coated aluminum, or similar materials. Use materials designed for cladding with a minimum thickness of 0.019 inch and provide a stiffening crimp for trim and fascia boards are more than 8 inches wide. Replace all damaged wood prior to cladding. Virginia Housing recommends the use of composite/manufactured materials instead of wood for exterior use. Exceptions may be considered for historic buildings.

14. When repainting existing or installing new exterior steel products; powder coat, galvanize or provide an exterior steel paint that can achieve a minimum 10-year material warranty. Prepare surfaces per warranty requirements. Prime and paint steel prior to placement in concrete.

15. When replacing exterior railings, handrails, guard rails, posts and pickets use vinyl, aluminum, or steel instead of wood.

16. When replacing siding:

- a. New siding is to have solid backing of plywood, OSB, gypsum, or similar material. Siding is to be installed over an independent drainage plane, such as Tyvek® or equal.
EXCEPTION: Exterior wall sheathing systems with integrated drainage planes may be used when observation reports are provided by the manufacturer and the following conditions are met:

- 1) Pre-installation
 - a. General Contractor to hold pre-installation meeting with architect and manufacturer prior to installation. Manufacturer's observation reports to include documentation of meeting.
 - b. Manufacturers' flashing details including windows, doors, joints and penetrations must be maintained on site.
 - c. Store materials to meet manufacturer's requirements.
- 2) Installation
 - a. The integral drainage plane must be preserved. Use manufacturer's approved products including tape, tape gun and roller.
 - b. When weather conditions warrant, follow manufacturer's requirements for inclement weather installation and storage of materials.
 - c. Manufacturer's representative to review the final installation to confirm all requirements are met prior to installation of exterior cladding. Manufacturer's observation reports documenting installation acceptance is required and must be maintained on site.
- b. Do not install new siding over materials such as vinyl siding, Thermo-ply®, or other flexible materials.
- c. Material such as T1-11, wood siding, or hardboard lap-siding may be used as backing for new siding, provided it is in good condition.
- d. Repair, replace, and re-nail all sections of damaged siding or sheathing to provide a uniform and flat surface.
- e. Fasten siding to framing with nails penetrating a minimum $\frac{3}{4}$ of an inch into studs.
- f. Install mounting blocks for all penetrations in siding such as electrical, plumbing, HVAC, and ductwork etc.
17. All new panel type siding to be installed over vertical furring to allow adequate drainage and ventilation, or provide siding product with integrated vented rain screen.
18. The use of foil faced sheathing is prohibited.
19. Repair masonry walls having cracks and/or settlement. Replace damaged brick and point-up deteriorated mortar to match existing. Replace rowlocks for window sills that do not have a slope to drain water away from building. Prime and paint all metal lintels which are corroded, or not already painted. Remove abandoned items from brick and power wash/clean exterior of buildings.
20. Replace all damaged windows.
21. Replace single glazed windows with insulated glass.
 - a. When window replacement is not permitted in historic buildings, repair or replace existing windows and install triple track operable storm sashes, with screens, over existing single glazed windows.
 - b. When conditions make storm sashes not feasible, provide an alternative solution acceptable to Virginia Housing.

22. When replacing windows and/or sliding glass doors:
 - a. Provide minimum ½ inch thick insulated glass.
 - b. Provide minimum 10 year warranties for material and breakage of seal.
 - c. Provide thermal break for aluminum frames.
 - d. Provide new construction windows when replacing siding.
 - e. Provide back dam flashing at sill.
 - f. Install and flash per manufacturer’s specifications. Perform initial replacement with Construction Control Officer.
23. All windows are to have blinds, shutters, or other similar products, and sliding glass doors are to have vertical blinds. Replace all blinds that are damaged and/or do not match in color.
24. Repair or replace all damaged or dented doors, jambs and hardware.
 - a. When replacing exterior doors, except sliding glass doors, replacement doors are to be insulated fiberglass or insulated metal. Wooden door jambs and molding require composite material, such as FrameSaver® or equal, at their lowest points.
 - b. Solid core wood doors may be used where entrances are located in interior conditioned corridors.
25. All entry doors to apartment units, except entry doors located in conditioned corridors, are to have weather stripping and threshold to provide a tight seal around the door and to minimize heat loss/gain due to air infiltration.
26. Provide roofs/overhangs over entrance doors to all units and buildings that are accessed directly by residents or visitors. Provide a minimum 30 inches of overhang along the front and 12 inches along each side of the door; or the door may be setback a minimum of 24 inches from the face of the exterior wall.
27. Replace all damaged Gypcrete, or similar material, floor sheathing and floor joists.
28. Install an area approximately 3 feet by 4 feet using materials such as VCT, sheet vinyl, hardwood flooring, or tile at the interior of all entrance doors, except for doors entered through carpeted interior hallways.
29. Repair or replace all damaged, stained, or mismatched flooring. Upon inspection, replace or seal damaged or stained underlayment, or underlayment which gives off odors. On a room by room basis, all flooring must match in color and design. All rooms must have finished floor and base.
30. Resilient flooring such as, but not limited to, sheet vinyl and VCT is to be installed over minimum nominal ¼ inch underlayment grade plywood, or similar underlayment material. Ceramic tile or similar flooring is to be installed over minimum nominal ¼ inch cementitious board or similar underlayment material. Flooring may be installed over concrete provided concrete is finished smooth and uniform. When installed over Gypcrete, or a similar material, apply manufacturer approved sealer.

31. Carpets are to have the minimum number of seams. Seams are not to be located in heavy traffic areas. T-seams are not acceptable except in closets. Remove shoe molding/quarter-round molding before installing carpet.
32. Provide a pass-through opening with counter space when kitchen and dining/living areas are separated by a wall.
33. Interior finishes: doors, moldings, paint, and drywall.
 - a. Replace all interior bifold, pocket, or sliding doors with side hinged doors.
 - b. Repair or replace all damaged doors and trim. Doors previously cut to allow for modifications, such as adding vents, must be replaced with factory assembled louvered doors.
 - c. All doors, door trim, and door hardware in a unit are to match in design and finish.
 - d. Install or undercut doors a minimum of 3/4 inch clear to prevent dragging and to provide ventilation.
 - e. Paint bottoms, tops, and all other sides of new doors.
 - f. All new doors must be factory assembled.
 - g. All base and base moldings in a unit are to be solid wood and are to match in design and finish.

EXCEPTIONS:

 - 1) Ceramic or stone baseboard is acceptable at matching flooring.
 - 2) Mechanical closets may use an alternative base material such as vinyl.
 - h. Repair flaws in drywall such as, but not limited to, holes, failing tape joints, cracks and nail pops. Replace all drywall that has mold, mildew, or signs of moisture.
 - 1) When drywall replacement is required, match adjacent type and thickness.
 - 2) Nail pops and settling drywall must be re-screwed to framing.
 - 3) Repairs, including previous repairs, are to match the adjacent surface and the unit's intended finish.
34. Repair damaged or compromised draft stopping and/or fire stopping.
35. Concealed solid dimensional wood blocking (2x material) is to be provided for all new handrails, grab bars and wall mounted cabinets and accessories.

EXCEPTION: Toggle bolts may be used at wall mounted accessories.
36. Replacement or repairs of tub and shower surrounds built of ceramic tile, marble, or similar materials are to be installed over minimum ½ inch cementitious board.
37. When replacing kitchen cabinets and/or bathroom vanities all new cabinets are to comply with *Virginia Housing's Minimum Cabinet Requirements*.
 - a. Cabinets and/or vanities that are not being replaced are to be approved by Virginia Housing.
 - b. All cabinets are to be factory/manufacturer assembled.
 - c. All exposed portions of cabinetry must have factory applied finish.
 - d. Kitchen cabinets and bathroom vanities are to abut the side walls or provide a minimum spacing of 12 inches between wall and cabinets. Wall cabinets are to abut the ceiling/soffits or provide minimum of 12 inches between cabinet and ceiling/soffits.

- e. Kitchen wall cabinets are to be fastened to blocking with a minimum of four washer head cabinet screws; two in each upper and lower nailing strip for each wall cabinet.
- f. Plastic laminate countertops are to be post formed, or have back splashes that are factory attached to the countertop and sealed.
- g. A side splash is to be installed where countertops abut walls.
- h. Install a cleanable surface, such as plastic laminate, metal, or ceramic tile to the side wall next to the cooking range when it is located directly adjacent to a wall.
- i. Remove and replace all drywall that has mold. Repair or replace all damaged drywall.
- j. Holes in cabinet backs for plumbing are to be drilled, and completely covered by escutcheon plates.
- k. Provide at least one base cabinet with drawer, minimum 15-inch-wide.

38. Appliances

- a. Replace all damaged and or dented appliances. All kitchen appliances in an apartment unit are to match in color.
- b. Provide 30-inch-wide range in all units except studio/efficiency apartments and one bedroom elderly apartments, which may have a minimum 20-inch-wide range. Provide range hoods or combination range hood-microwaves over the cooking ranges. Provide maximum 24-inch-wide range hood for all 20-inch-wide ranges.
- c. Dishwashers are required in all units. Provide 24-inch-wide dishwashers except for studio/efficiency apartments, which may have 18-inch-wide dishwashers.
- d. All refrigerators are to be frost free. Minimum rated sizes of refrigerators are to be 12 cubic feet for studio/efficiency apartments, 14 cubic feet for 1 and 2 bedroom apartments, and 16 cubic feet for 3 and 4 bedroom apartments. Side-by-side models must open fully or have at least 12" of cabinetry between an adjacent sidewall.
- e. When present, laundry equipment and connections shall be installed in a closet with doors. New locations may not be in a bedroom.
Exception: Studio and one bedroom apartments may utilize a bedroom closet for laundry equipment provided equipment does not impede on tenant storage, an exhaust fan with humidistat is installed in the closet, and a jumper duct is provided to communicate with return air location.

- 39. Provide a handrail on at least one side of common corridors for age restricted housing serving residents 55 years or older.

40. Replace any item with an assessed original install date or equipment ID plate that places the item **at or older than**:

Item	Years*	Item	Years*
EXTERIOR**			
Asphalt Paving	25	Vinyl/Aluminum siding	25
Exterior Doors	25	Windows	25
Asphalt shingle Roofing	20	Flat Roofing	15
Stairs - Wood	15	Stairs – Metal, Metal Pan Filled	25
Timber Retaining Wall	25	Fence - Wood	15
Playground Equipment	10	Gutter and Downspouts	10

Item	Years*	Item	Years*
INTERIOR**			
Kitchen/Vanity cabinets	15	Fire/Smoke/CO detectors	10
Kitchen/Vanity countertop	15	Air Handlers and Heat Pumps	15
Carpet	5	Water Heaters	10
Resilient Flooring	10	Plumbing Fixtures	15
		Elevator Equipment, Hoist and Rails	25
Laundry Equipment	8		
Kitchen Appliances	8	Bath Exhaust Fans	10
Interior Doors	20	Sump Pumps	7
Fiberglass Bath/surrounds	20	Window Coverings	5
Bath Accessories	10		

* Age at start of renovation

** Due to poor existing conditions, some items may need replacement prior to the ages listed above. Evaluate the property fully and create a property/unit condition survey to identify items or other components that are in poor condition, and add their replacement to the scope of work. Through scope review and the construction inspection process, Virginia Housing may add items to the replacement scope based on evaluation.

MECHANICAL

1. All units are to have a Heating, Ventilation, and Air Conditioning (HVAC) system. Sizes of HVAC equipment, ducts and diffusers are to be designed per heat gain/loss calculations. All apartments are to have ducted HVAC systems except as noted in #3 below. All ductwork must be concealed behind permanent construction unless otherwise approved by Virginia Housing.
2. When installing a new HVAC system including, but not limited to, traditional split systems, ducted mini-split or self-contained “packaged systems” (similar to Magic-Pak and First Co):
 - a. Replace both air-handlers and condensers at the same time.
 - b. R-410A refrigerant is required in all new HVAC equipment.
 - c. Verify if refrigerant lines are appropriate for new HVAC unit size and type. Lines not being replaced are to comply with all of the requirements of the manufacturer for using existing lines. Submit a letter from the manufacturer that states the use of existing lines will not reduce performance and/or warranty of the heat pumps or other air conditioning systems.
 - d. Condensate and refrigerant lines not located in the mechanical closet are to be concealed within the wall, ceiling, or floor systems.
 - e. Fire-caulk all penetrations in fire partitions and ceilings.
 - f. Seal air duct penetrations in unheated spaces.
 - g. When adding and/or replacing ductwork, air supply diffusers are to be located near windows in living rooms, dens, and bedrooms. Provide ducted return air grille. Provide a separate ducted return for each floor of townhouse units. Fiberglass ductboard is prohibited.

EXCEPTION: The mechanical engineer may locate supply diffusers at alternate locations with Virginia Housing’s prior approval based on supporting calculations.
 - h. Provide pre-manufactured air filters.
 - i. Replace all diffusers and thermostats.
 - j. Air supply diffusers are to be located in living rooms, dens, bedrooms, kitchens, and full baths.
 - k. Replace condenser pads that are damaged. Pads are to be concrete, solid vinyl, or similar materials. Level all condenser units.
 - l. Heat pumps to include auxiliary heat.
 - m. Main supply trunk line from air handler to branch duct shall be metal. Flex duct may be used only between main trunk line and supply diffuser.
3. Ductless Heat Pumps (mini-splits) may be used in efficiencies, 1 bedrooms or elderly housing development.
 - a. All mini-splits are to discharge condensate to grade through a pipe concealed within the exterior wall system.
 - b. Provide separate mini-split wall mounted unit for each bedroom, den or living room.
 - c. Provide separate wired wall mounted thermostat for each mini-split wall mounted unit.
 - d. Provide a heater with a thermostat or timer controlled heat lamp for all full baths.
4. All exhaust ducts are to discharge to the exterior of the building, and terminate into vent caps. Vent caps to be of a quality that will minimize repair and replacement.

5. Clean existing HVAC ducts and plenums. Verify duct sizes and air flows (cubic feet per minute at supply diffusers) are appropriate for HVAC system. Replace all supply and return vent covers and diffusers. Seal all duct penetrations in unheated spaces. All existing ductwork located in crawl spaces, attics, or any unconditioned space, is to be properly insulated. Clean, service, and repair all HVAC units not being replaced.
6. All bathroom fans are to be in good working condition, cleaned, and ducted out to the exterior. Install fans in all bathrooms, including those with windows.
7. Electric baseboard heating and electric forced air heating shall not be used as the primary heating method.

PLUMBING

1. Identify all water supply material types. Water supply is to have adequate pressure.
 - a. Replace all interior, exterior, and underground PB (Polybutylene) pipes such as “Quest” and “Big Blue” with current code accepted materials.
 - b. Replace all galvanized pipes with CPVC, copper, plastic or other approved materials.
2. Video and jet all sewer lines connecting buildings with the public sewer. Identify pipe material types and repair or replace all corroded, damaged, or settled underground sewer lines. Provide report of video findings to Virginia Housing and include repair/replacement costs.
3. Identify all sanitary pipe material types and replace all galvanized lines and traps with PVC.
4. All wet plumbing pipe to be solid wall construction (Cellular core pipe not permitted).
5. All floor drains and indirect waste receptors to receive trap primer or code approved drain trap seal device.
6. When replacing water heaters, installations are to comply with latest adopted edition of the *International Plumbing Code for New Construction*. Refer to Code for pan and drain specifications.
7. Clothes washing machines or connections for clothes washing machines are to have an IntelliFlow A2C- WB automatic washing machine water shutoff valve with leak sensor, or approved equal, or have a pan with a drain connected to the sewer system per applicable plumbing code.
8. When installing new wall-hung sinks, provide concealed arm type carrier.
9. All new tubs/showers and shower diverters are to have internal shut-off-valves or external shut-off- valves with access panels.
10. Bathtubs, showers, and surrounds which will not be replaced, are to be refinished or repaired. Remove mold and stains, clean, and re-caulk all tubs, showers, and surrounds. The bottoms of all new bathtubs and showers are to have slip resistant/textured finish.
11. Bathrooms which include a **new** roll-in shower are to have ceramic or similar tile flooring. Roll-in showers are to be either:

- a. Ceramic or similar tile floor with water proofing membrane extending a minimum 8" up walls. A minimum of 3'-0" of the bathroom floor is to slope back towards the shower drain at 2%, with a zero height transition between the bathroom floor and the shower floor, **OR**
 - b. Premanufactured with a secondary floor drain located outside of the shower. The bathroom floor shall have a 2% slope towards the secondary floor drain. Provide silicone joint between bathroom and shower floor.
12. Seal around existing accessible and all new plumbing penetrations in floors, walls and ceilings.
 13. Vanities within 12" of tub or showers must have plywood sides, backs and bottoms.
 14. Where wall-hung lavatories, roll-under sinks or pedestal sinks exist in dwelling units, provide an alternate storage solution complying with code required reach ranges and other accessibility requirements, which may apply to the unit.
 15. All new pipe is to be concealed behind permanent construction.

ELECTRICAL

1. Size electric panels and service per load calculations.
2. Electrical panels with fuses are to be replaced with circuit breakers.
3. Use appropriate connectors for connecting aluminum wiring to electrical outlet and switches.
4. All switches, outlets and cover plates that are painted, damaged or worn, are to be replaced and are to match in color and design.
5. Provide ground fault outlets near vanities in all bathrooms.
6. All wiring for the interior and exterior of the building is to be concealed within the walls, ceiling or floor systems. Cable TV, internet and/or telephone wiring exposed within individual apartment units may be accepted when fastened to the edges of baseboards and/or door casings and not crossing any portion of floors, doorways or openings. Exposed electrical service to the building is to be in conduit and run vertically to the meter without horizontal runs.
7. When replacing kitchen cabinets and counter tops, electrical outlets for countertop, ranges, refrigerators, dishwashers, and other appliances are to comply with the latest applicable requirements of the *National Electric Code for New Construction*.
8. Provide fluorescent light fixtures or LED light fixtures in all public common areas such as offices, multipurpose rooms, laundry rooms, hallways, and stairs.
9. Kitchens are to have a minimum of one light fixture 4 feet long with either LED or two 32 watt fluorescent bulbs, or lighting fixture(s) that provide a minimum illumination of 30 foot candles distributed across all countertops.

10. Provide a minimum of one electric smoke detector with battery backup for garden units and a minimum of one electric smoke detector with battery backup for each floor for townhouses.
11. Exterior fixtures are to be LED, fluorescent, metal halide, high or low pressure sodium, or mercury vapor. Tenant controlled exterior lighting is exempt. Provide exterior lighting to illuminate all parking areas, dumpster pads, building entrances and mailboxes with a minimum of one-foot candle of illumination. Provide illumination so that building numbers and apartment numbers are legible at night.
12. Seal around existing accessible and all new electrical penetrations.

Architectural & Engineering Review

VIRGINIA HOUSING LOAN APPLICATION SUBMISSION REQUIREMENTS:

- The submission requirements listed below are for properties applying for Virginia Housing financing.
- If the property is receiving both Virginia Housing financing and LIHTC, the scope of work should include enhancement items committed to in the Tax Credit Application.
- Submit digital drawings, specifications and reports in PDF form for review through the Procurement Plan review Work Center. Separate each design discipline into a separate PDF file for review, and include one PDF file for the specification book.
- See Virginia Housing Webpage for Review Process and Process Flow Charts
- If the property is applying for LIHTC only, follow **Tax Credit submission requirements specified in the Virginia Housing Federal Housing Credit Manual.**

New Construction Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings **
4. Mechanical drawings **
5. Plumbing drawings (including Fire Suppression) **
6. Electrical drawings (including Fire Alarm) **
7. Three-part specification book encompassing all work
8. Site lighting and photometric drawings **
9. Landscape drawings
10. Geotechnical Report
11. Phase I Environmental Site Assessment
12. Narrative scope of work with itemized cost estimate

Rehabilitation Requirements

1. Civil drawings **
2. Architectural drawings *
3. Structural drawings**
4. Mechanical drawings **
5. Plumbing drawings (including Fire Suppression) **
6. Electrical drawings (including Fire Alarm) **
7. Three-part specification book, or outline specification, encompassing all work
8. Site lighting and photometric drawings **
9. Landscape drawings
10. Unit by unit condition survey not older than 6 months prior to submission
11. Termite Report
12. Water Intrusion Report (to be provided by architect or 3rd Party for all below grade spaces)

13. Phase I Environmental Site Assessment
 14. Narrative scope of work with itemized cost estimate
 15. Structural, Geotechnical, Roof Condition and Sewer Line reports when applicable
 16. For detailed descriptions of submission requirements refer to [VirginiaHousing.com](https://www.virginiahousing.com).
- * All drawings to be a minimum 85% complete and prepared by a Virginia licensed architect. See Virginia Housing Webpage when determining what constitutes 85%.
- ** All drawings to be a minimum 85% complete and prepared by a Virginia licensed Professional Engineer. See Virginia Housing Webpage when determining what constitutes 85%.

Virginia Housing Architectural and Engineering Review Process

Prior to issuing 42(m) letter, or Loan Commitment

Virginia Housing will review the submission and provide comments. A renovation deal will require a site visit to ensure the scope of work considers the existing condition of the property. A&E review comments will be captured in a template memo that will be shared with the developer and their architect through the Procurement Plan Review work center. The developer's architect and engineers will amend the memo with their responses. An item will remain "open" until a satisfactory response and corresponding revision to the plans or specifications has been received. Resubmissions will be uploaded to Procurement by the architect of record, and must include both a fully responded to memo, and revised plans and specifications. All revisions must be "clouded and tagged", and the revision ID number and date must be added to the affected sheet's title block. **With each resubmission, provide an updated Title Sheet and Index of Drawings.** Show each sheet's revision dates in the index such that the Index of Drawings establishes a running record of revisions for each sheet. Sheet issuance dates may also be tracked in the index, but a sheet issuance shall not contain revisions unless each revision is identified as described above. **Finally, the review process must be completed (no "open" items) before a 42(m) letter or loan commitment will be issued.**

Further, developments seeking 4% LIHTC without financing from Virginia Housing must upload to the Procurement Plan Review work center the closed-out A&E memo, signed by the developer and architect of record, acknowledging that all MDCR, tax credit enhancements, and any comments generated from the A&E review will be incorporated into the development's final scope of work.

Prior to Bond Inclusion Date (Developments Financed by Virginia Housing Only)

A Contract Set of plans and specifications is required at least 7 days prior to Bond Inclusion date. If revisions occur after Virginia Housing closes the A&E review, they must be approved by Virginia Housing before the Contract Set submission. Submit a narrative describing and locating the revisions along with only the affected sheets.

Once all open items from the A&E review have been closed **and new revisions approved**, the developer may upload the Contract Set of plans and specifications which include all revisions and addenda made during the Virginia Housing A&E review process to the Procurement Plan Review work center. Past revision clouds and tags must be removed except for any revisions that were included in the narrative described above. The Contract Set shall include an Index of Drawings identifying all sheets in the set by sheet number and sheet title. **In addition, the index must identify all revision dates for each sheet.** Each sheet's revision dates must be identified on its title block **and match the Index of Drawings.** Add the Virginia Housing Signature Block (found on the Virginia Housing website) to the Contract Set's Title Sheet, the Index Sheet, and the seal section of the specification book. The signature block must be digitally signed (through Adobe or BlueBeam) by an **authorized officer** from the developer, architect of record, and general contractor's company. The developer is responsible for providing a copy of the signed Contract Set of plans and specifications to all parties of the Virginia Housing construction contract. Each sheet of the Contract Set must include the architect of record's seal and signature, except drawings completed by consulting engineers which must be signed and sealed by the applicable engineer. Digital seals and signatures are acceptable. **The signed Contract Set of plans and specifications must be reviewed and approved by Virginia Housing before the Bond Inclusion date, or the deal will not be included in the bond pricing. Virginia Housing reserves 7 days to review the set. Furthermore, the deal will not be included in the bond pricing if Locality final site plan approval has not been obtained prior to Bond Inclusion date.**

Submittals Required after Completion of Construction

Architect to review and approve the general contractor's as-built drawings and create an as-built package to include all revisions and changes to drawings and specifications. Architect to submit the as-built package in PDF format through the **Procorem** Plan Review Work Center at the completion of construction and before the loan may convert to permanent financing.

Madison Road Apartments
Orange, VA

SECTION 00100-PROJECT

DESCRIPTION PART 1-GENERAL

1.01 SUMMARY

The Madison Road Apartments project consists of the demolition of two existing structures and construction of a twenty-one unit, (3) story + Ground floor level Apartment building with shared Apartment use space & business offices on the ground floor level.

APARTMENTS

(18) 1BR UD / HC Units

(3) 2BR UD / HC Units

GROUND FLOOR OFFICE LEVEL

Leasing Office

Maintenance / Utility Room

Two Community Rooms

Accessible Toilets

ECS Business Offices

SECTION 00600 – CONTRACT FORMS AND GENERAL CONDITIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. The purpose of this section is to describe what forms are required. By their inclusion on the following list these documents become part of the Contract Documents.

1.02 CONTRACT FORMS

- A. Standard Form of Agreement Between Owner and Contractor: AIA Document A107-2017.
- B. Performance Bond and Payment Bond: AIA Document A312-2010.
- C. Application and Certificate for Payment: AIA Document G702-1992.
- E. Continuation Sheet: AIA Document G703-1992.
- F. Certificate of Substantial Completion: AIA Document G704-1992.
- G. Contractor's Affidavit of Payment of Debts and Claims: AIA Document G706-1994.
- H. Contractor's Affidavit of Release of Liens: AIA Document G706A.

1.03 CONDITIONS OF THE CONTRACT

- A. By this reference, General Conditions of the Contract for Construction is incorporated into the Construction Documents, AIA Document A201-2017.

PART 2 – PRODUCTS – Not Applicable to this Section.

PART 3 – EXECUTION – Not Applicable to this Section.

END OF SECTION

SECTION 01010 - - USDA-RD REGULATED DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. The purpose of this section is to list the USDA-RD Regulated Documents. By their inclusion on the following list and in this Section, these documents become part of the Contract Documents.

1.2 CONTRACT FORMS

- | | |
|--|-----------------------------------|
| A. Contract Concurrence | RD 1924-A, Guide 1 ATCH. 8 |
| B. Certificate of Owner's Attorney | RD 1924-A, Guide 1 ATCH. 7 |
| C. Compliance Statement (Form 400-6) | RD 400-6 |
| D. <u>Standard Form of Agreement between Owner and Contractor</u>
(AIA A101-2007) with Supplement to Agreement | RD 1924-A, Guide 1 ATCH.6 |
| E. Notice to Proceed | RD 1924-A, Guide 1 ATCH. 9 |
| F. <u>General Conditions of the Contract for Construction</u>
(AIA A201-2007) with Supplementary General Conditions | RD 1924-A, Guide 1 ATCH.10 |
| G. Identity of Interest Disclosure/Qualification Certificate | RD 3560-31 |
| H. Contract Change Order | RD 1924-7 (Rev. 2-97) |
| I. AIA G702-1992: Application and Certificate for Payment | |
| J. AIA G703-1992: Continuation Sheet | |
| K. Partial Payment Estimate | RD 1924-18 (Rev. 6-97) |
| L. Equal Opportunity Agreement | RD 400-1 |
| M. Certification for Contracts, Grants, and Loans | FMHA 1940-Exhibit A-1 |
| N. Certification Regarding Debarment with Instructions | AD 1048 |
| O. Disclosure of Lobbying Activities with Instructions | |
| P. Notice to Prospective Subcontractors of Requirements for Certification of Non-Segregated Facilities | |
| Q. Release of Claimants | RD 1924-10 |
| R. Builder's Warranty | RD 1924-19 |

PART 2 – PRODUCTS – Not Applicable to this Section.

PART 3 – EXECUTION – Not Applicable to this Section.

END OF SECTION

Madison Road Apartments
Orange, VA

SECTION 01012 - – Virginia Housing (VHDA) DOCUMENTS AND FORMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The following Virginia Housing (VHDA) and Virginia Housing (VHDA) LIHTC-related Documents and Forms of this section are to be used for this project and by their inclusion, shall become part of the Contract Documents.

1.2 Virginia Housing (VHDA) DOCUMENTS

- A. 2022 Virginia Housing (VHDA) Minimum Design and Construction Requirements: See Drawings
- C. Virginia Housing (VHDA) Minimum Cabinet Requirements (by reference)
- D. Project Related Documents (by reference)
 - 1. 2018 International Building Code (IBC) as amended by Virginia
 - 2. Virginia Construction Code (VCC), 2018 edition
 - 3. Uniform Federal Accessibility Standards (UFAS)
 - 4. American National Standards Institute (ANSI) A117.1 – 2012

1.3 Virginia Housing (VHDA) FORMS

- A. Virginia Housing (VHDA) Cabinet Review Form (by reference)
- B. Virginia Housing (VHDA) Appliance Submittal Form (by reference)
- C. Energy Star Certification

PART 2 – PRODUCTS – Not Applicable to this Section.

PART 3 – EXECUTION

3.1 Virginia Housing (VHDA) DOCUMENTS

- A. 2022 Virginia Housing (VHDA) Minimum Design and Construction Requirements:
 - 1. The Drawings and Specifications, developed by the Architect, are intended to meet these Requirements. During the course of the project, the Contractor shall refer to these Requirements to confirm that all Work is in compliance with the Requirements.

- C. Virginia Housing (VHDA) Minimum Cabinet Requirements
 - 1. The Kitchen and Bath Cabinets, as delineated on the Drawings, and as described in the Specifications meet the Virginia Housing (VHDA) Minimum Cabinet Requirements. During the course of the project, the Contractor shall refer to these Requirements to confirm that all Work is in compliance with the Requirements.

- D. Project Related Documents
 - 1. 2018 Virginia Construction Code (VCC): All New Construction shall comply with the VCC. Contractor shall refer to the Code during the course of the project for reference and confirmation of the Work's compliance.

 - 2. Uniform Federal Accessibility Standards (UFAS): The Work associated with all Handicap Apartments shall comply with the regulations as set forth in UFAS. Contractor shall refer to UFAS during the course of the project for reference and confirmation of the Work's compliance.

 - 3. American National Standards Institute (ANSI) A117.1 – 2012: The Work associated with all Public spaces and site amenities shall comply with the regulations as set forth in ANSI A117.1 - 2012. Contractor shall refer to these Standards during the course of the project for reference and confirmation of the Work's compliance.

3.2 Virginia Housing (VHDA) FORMS

- A. Virginia Housing (VHDA) Cabinet Review Form (by reference):
 - 1. General Contractor shall complete this form and submit to VHDA, after review and approval by the Owner and Architect. Upon approval by VHDA, the General Contractor may proceed with ordering the cabinets.

- B. Virginia Housing (VHDA) Appliance Submittal Form (by reference):
 - 1. General Contractor shall complete this form and submit to VHDA, after review and approval by the Owner and Architect. Upon approval by VHDA, the General Contractor may proceed with ordering the cabinets.

- C. Energy Star and EarthCraft Gold Certification (See PM & Drawings):
 - 1. These forms are completed by the RESNET Rater prior to Construction.
 - 2. EarthCraft Multifamily New Construction

END OF SECTION

SECTION 012900 - PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. General Contractor shall provide coordination of work with:
 - 1. Supervisory personnel.
 - 2. Preconstruction conference.
 - 3. Minimum of Two Progress Meetings per month.
 - 4. Punch List Inspections when scheduled.
 - 5. Other meetings as needed.
 - 6. Collection of and removal/recycling of construction material and debris from work crew to include but not be limited to:
 - a. Beverage containers from work crew.
 - b. Cardboard from new fixtures and appliances.
 - c. Metal (scrap/surplus/removed copper, piping, electrical wiring, or sheet metal)
 - d. Wood/wood products.
 - e. Carpet.
 - 7. Collection of and donating of material, appliances, and fixtures only if requested by Owner and agreed to by General Contractor:
 - a. Kitchen and Bath cabinetry
 - b. Kitchen appliances
 - c. Plumbing fixtures, water heaters

- B. Prior to beginning construction, Contractor shall:
 - 1. Submit progress schedule to Owner. Update schedule monthly.
 - a. Post schedule at site.
 - 2. Prepare and submit submittal schedule to Architect. Coordinate submittal schedule with progress schedule.
 - 3. Submit schedule of values to Architect.
 - 4. Submit schedule of required tests including payment and responsibility.

- C. Contractor shall submit and post a list of emergency telephone numbers and address for individuals to be contacted in case of emergency.

- D. Contractor shall submit monthly payment requests, based on AIA Document No's. G702 and G703, to the Architect, along with Partial Payment Estimate.

- E. Contractor shall maintain record drawings and specifications. Contractor shall maintain and annotate these documents as work progresses.

- F. Contractor shall perform quality control during installation.

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G. Clean and protect the work.

PART 2 - PRODUCTS - Not Applicable To This Section

PART 3 - EXECUTION - Not Applicable To This Section

END OF SECTION

SECTION 013100 – COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Contractor shall provide the following:
 - 1. Coordination.
 - 2. Request for Punch List Inspections
- B. Owner will schedule the following
 - 1. Pre-construction meeting.
 - 2. Weekly Conference Calls
 - 3. Progress meetings, minimum of two per month until project's completion.
 - 4. Punch List Inspections when requested by General Contractor.
 - 5. Pre-Final and Final Inspections

1.2 COORDINATION

- A. Coordination scheduling, submittals and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to and placing in service such equipment.
- C. Coordinate completion and clean-up of work of separate sections in preparation for Substantial Completions.

1.3 PRE-CONSTRUCTION MEETING

- A. Owner will schedule pre-construction meeting with VHDA before the Notice to Proceed has been issued, prior to the start of construction.
- B. Attendance Required: Owner or Owner's representative, Contractor and Architect.
- C. Agenda:
 - 1. Construction Schedule & Payment Schedule of Values
 - 2. Critical work sequencing.
 - 3. Major material deliveries.
 - 4. Designation of personnel representing the parties in Contract.
 - 5. Procedures and processing of field decisions.
 - 6. Use of premises by Owner and Contractor.
 - 7. Staging areas.
 - 8. Security.

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Orange, VA

- D. A written record shall be made of the proceedings by the Owner and shall become part of the job record.

1.4 MEETINGS

- A. The Owner will schedule and administer meetings throughout progress of the work at least once a month.
 - 1. End of the month Pay Request and Progress meeting.
 - 2. Progress meetings every two weeks depending on progress
- B. Weekly Conference Calls.
- C. Punch List Inspections when requested by General Contractor.
- D. Pre-Final and Final Inspections

PART 2 - PRODUCTS - Not Applicable to This Section

PART 3 - EXECUTION - Not Applicable to This Section

END OF SECTION

SECTION 013300 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

- A. Comply with project format for submittals.
- B. Provide types of submittals listed in individual sections and number of copies required.
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples as needed to indicate range of color, finish, and texture to be expected.
 - 4. Mock-ups - as needed or requested by Owner or Architect.
 - 5. Inspection and test reports; three (3) copies.
 - 6. Warranties; 3 copies.
 - 7. Survey data; 3 copies.
 - 8. Closeout submittals; 3 copies.
- C. Send submittals to the Architect in PDF format. For material Samples and color selections provide (3) physical samples or manufacturer's printed color materials. Links to websites shall not be accepted for material and color selections. ***Color selections shall not be made from website links.***
- D. Action on submittals:
 - 1. Architect's Action:
 - a. Review each Shop Drawing/Product Data/Sample submittal.
 - b. Indicate Review without Exceptions or appropriate action needed.
 - c. Return each review within two weeks of submittal.
 - 2. Contractor's Action:
 - a. Prepare Shop Drawing/Product Data/Sample submittals on a timely manner.
 - b. Take appropriate action where indicated on returned submittal.
 - c. Conform to procedures of this Section.
- E. Comply with progress schedule for submittals related to work progress. Coordinate submittal of related items.
- F. After Architect review of Shop Drawing/Product Data/Sample submittal, revise and resubmit as needed, identifying changes made since previous submittal.
- G. Distribute copies of reviewed submittals to appropriate individuals/entities. Instruct recipients to promptly report any inability to comply with provisions.
- H. 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.

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- I. Provide warranties as specified; warranties shall not limit length of time for remedy of damages Owner may have by legal statute. Warranties shall be signed by contractor, supplier or installer responsible for performance of warranty.

PART 2 - PRODUCTS - Not Applicable to This Section

PART 3 - EXECUTION - Not Applicable to This Section

END OF SECTION

Madison Road Apartments
Orange, VA

SECTION 013350 – Virginia Housing (VHDA) SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Submit all new Energy Star rated products to Virginia Housing (VHDA) on Virginia Housing (VHDA) Form. The completed forms will become part of the Contract Documents.
 - 1. No product shall be ordered or purchased prior to Virginia Housing's (VHDA) and Architect's review and approval.
 - 2. All new Kitchen Appliances:
 - a. Refrigerator – make and model number with product data sheet
 - b. Dishwasher – make and model number with product data sheet
 - c. Rangehood – make and model number with product data sheet
 - 3. Windows: make and model number, series numbers and product data sheet.
 - 4. Water Heaters: make and model number with product data sheet.
 - 5. Bathroom Vent Fans: make and model number with product data sheet
 - 6. New WaterSense labeled fixtures:
 - a. Bathroom faucets - make and model number with product data sheet.
 - b. Shower heads and water closets - make and model number with product data sheet.
 - 7. Heating and cooling (HVAC) systems - make and model number with product data sheet.
 - 8. ERV (Fresh Air) Unit systems - make and model number with product data sheet.
- B. Submit all new Kitchen and Bath cabinetry to Virginia Housing (VHDA) (Virginia Housing (VHDA) Cabinet Review Form).
 - 1. Submittals will be made on the enclosed Virginia Housing (VHDA) Cabinet Review Form.
 - 2. No cabinets shall be ordered or purchased prior to Virginia Housing's (VHDA) and Architect's review and approval.

PART 2 - PRODUCTS - Not Applicable To This Section

PART 3 - EXECUTION - Not Applicable To This Section

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Owner will provide temporary services and utilities, including utility costs:

1. Water from on-site Town connection

B. Contractor will provide:

1. Lighting and temporary power
2. Storage area/facility for materials, office and equipment.
3. Construction equipment.
4. Toilet facilities.
5. Building and site security of exposed areas.
6. Fire extinguishers.
7. Environmental protection.
8. Snow and ice removal if applicable.
9. Project identification sign.
10. Cleaning and trash removal.
11. Protection of public & pedestrians

PART 2 - PRODUCTS - Not Applicable to This Section

PART 3 - EXECUTION - Not Applicable to This Section

END OF SECTION

SECTION 016000 - PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide products from one manufacturer for each type or kind as applicable. Provide secondary materials as recommended by manufacturers of primary materials.
- B. Provide products selected or approved equal. Products submitted for substitution shall be submitted with acceptable documentation, and include costs of substitution including related work.
- C. All Energy Star rated products must also be submitted to Virginia Housing (VHDA), on Virginia Housing Forms, for approval. (Refer to Section 013350 – VHDA Submittals for submittal requirements).
 - 1. Energy Star rated products to include but not be limited to:
 - a. Kitchen Appliances (Refrigerator, Dishwasher, and Rangehood)
 - b. Windows, new Water Heaters
 - c. Bath Vent Fans
 - d. WaterSense Plumbing Fixtures to include Bath faucets, showerheads (1.75gpm), and water closets (1.30 gpf)
 - e. Heating and Cooling Systems (15.0 SEER min. and 8.5 HSPF min)
- D. All Kitchen and Bath cabinets must also be submitted to VHDA, on VHDA Forms, for approval. (Refer to Section 013350 – VHDA Submittals for submittal requirements).
 - 1. Submit all new Kitchen and Bath cabinetry to Virginia Housing (see enclosed VHDA Cabinet Review Form).
 - 2. Submittals will be made on the enclosed VHDA Cabinet Review Form.
 - 3. No cabinets ordered or purchased prior to Virginia Housing's/Architect's review/approval.
- E. Substitutions shall be submitted prior to award of contract, unless otherwise acceptable. Approval of shop drawings, product data, or samples is not a substitution approval unless clearly presented as a substitution at the time of submittal.
- F. 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 offered Owner in terms of cost, time, or other consideration.

PART 2 - PRODUCTS - Not Applicable to This Section

PART 3 - EXECUTION - Not Applicable to This Section

END OF SECTION

SECTION 017700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

- A. The following are prerequisites to substantial completion. Provide the following:
1. Punch list.
 2. Supporting documentation.
 - a. Certificate of Occupancy
 - b. Termite Letter/Contract
 - 1) Include Slab Treatment for New Construction
 - c. Carpet, LVT, and Vinyl Flooring Letters from vendors stating that materials meet or exceed the requirements of (HUD/FHA, UM-44e, VHDA, EarthCraft/VA).
 - d. Insulation Certificates for R-values in ceiling/attics and walls.
 - e. Serial Numbers for Refrigerator, Range, Water Heater, HVAC Air Handler and Condenser
 - f. Cabinet Certification
 - g. Window and Door labels and supporting data indicating that the products meet Energy Star requirements.
 - h. Manual J Form from HVAC subcontractor.
 - i. Product literature and data indicating that plumbing fixtures are labeled 'WaterSense' products.
 3. Warranties, where applicable.
 4. Certifications, where applicable.
 5. Change over of locks, where applicable.
- B. Provide the following prerequisites to final acceptance:
1. Final payment request with supporting affidavits.
 2. Completed punch list.
- C. Provide a marked-up set of drawings (record documents) including changes which occurred during construction.
- D. Provide the following closeout procedures:
1. Submission of record documents.
 2. Submission of maintenance manuals, where applicable.
 3. Final cleaning and touch-up.
 4. Removal of temporary facilities or barriers.

PART 2 - PRODUCTS - Not Applicable to This Section

PART 3 - EXECUTION - Not Applicable to This Section

END OF SECTION

Section #022200 Phase 1 Environmental Report

PART 1 - GENERAL

1.1 SUMMARY

- A. Phase 1 Environmental Report is available for reference upon request

Section #022210 HUD 24 CFR Part 58

PART 1 - GENERAL

1.2 SUMMARY

- A. HUD 24 Part 58 is available for reference upon request



October 23, 2023

Mr. Dex Sanders
Sanders Architecture, PC
16125 Raccon Ford Road
Culpeper, VA 227001

ECS Project No. 05:7957

Reference: Preliminary Subsurface Exploration and Geotechnical Analysis
454 Madison Road Apartments
Orange County, Virginia

Dear Mr. Sanders,

As requested, ECS Mid-Atlantic, LLC (ECS) performed a subsurface exploration and laboratory testing services at the above referenced residence. Attached to this letter are the results of our subsurface exploration, laboratory test results, and evaluation of the soil and groundwater conditions.

Some very loose soils may be encountered at foundation bearing elevations. If soft soils are encountered, they may require removal and replacement with approved engineered fill. The grade may be restored with approved engineered fill or dense granular aggregate such as VDOT 21A. These materials shall be compacted to a minimum 95% of their standard dry density in accordance with ASTM D698.

We appreciate this opportunity to be of service to you. If there is anything else we can do to assist you, please do not hesitate to call.

Respectfully,

ECS MID-ATLANTIC, LLC


Sean J. Horiuchi E.I.T.
Geotechnical Project Manager
SHoriuchi@ecslimited.com



William P. Gaspar, P.E., F.A.C.I., LEED AP
Principal Engineer
WGaspar@ecslimited.com



915 Maple Grove Drive, Suite 100
 Fredericksburg, VA 22407
 Phone: (540) 785-6100
 Fax: (540) 785-3577

ECS CLIENT:
 Mr. Dex Sanders
 454 Madison Road
 Orange, VA 22960

ECS PROJECT NAME: **ECS PROJ. NO.:**

PROJECT ID: (SUBDIVISION):
 (LOT NUMBER): 454
 (STREET): 454 North Madison Road
 (COUNTY): Orange County, Virginia

PROPOSED CONSTRUCTION:
 (Building Type / Foundation Loading / Etc.)

SITE CHARACTERISTICS: (Based on Site Visit By) **ON:**

(Topography / Existing Development / Vegetation / Drainage / Etc.):

SUBSURFACE CONDITIONS: (Based on Hollow Stem Auger Borings)

- Fill Encountered: Yes No Structure Supported by Fill: Yes No
- Groundwater Encountered: Yes No

• Laboratory Test Results:

Boring Number	Depth (feet)	Moisture Content, %	Liquid Limit	Plasticity Index	%, -200 Sieve	Expansion Index	USCS Symbol
HA-01	2-3	25.9	40	17	42.7	-	SC
HA-02	1-2	33.4	-	-	-	-	-
HA-03	1-2	21.6	-	-	-	-	-
HA-04	3-4	26.6	44	19	39.3	-	SC

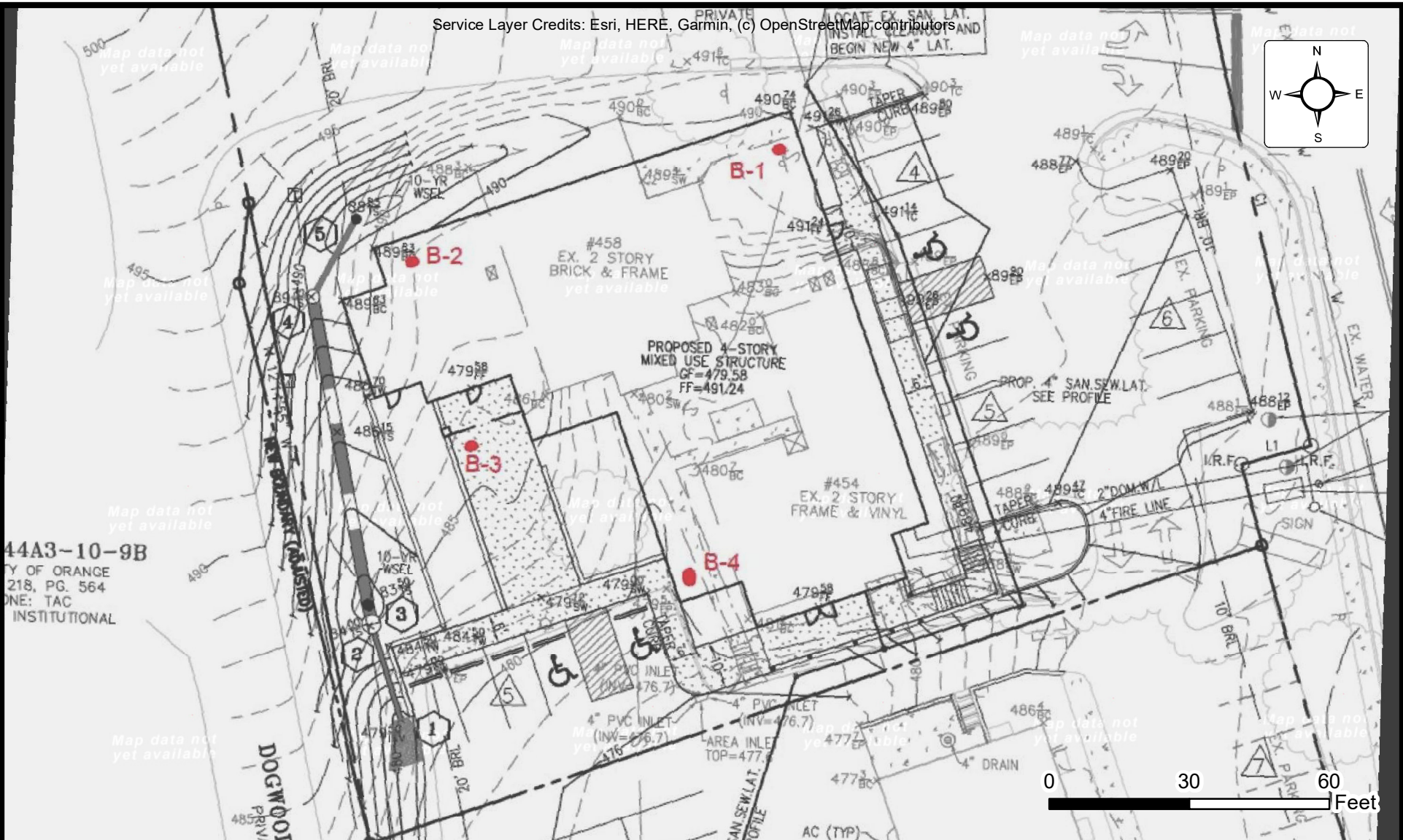
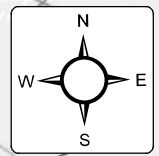
SHRINK SWELL POTENTIAL:

Basement Wall Lateral Earth Pressure:

Net Allowable Bearing Pressure:

Additional Notes:

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors




44A3-10-9B
 CITY OF ORANGE
 § 218, PG. 564
 ZONE: TAC
 INSTITUTIONAL

BORING LOCATION DIAGRAM MADISON ROAD APARTMENTS

454 NORTH MADISON ROAD, ORANGE, VIRGINIA



ENGINEER WPG
SCALE AS NOTED
PROJECT NO. 05:7957
FIGURE 1 OF 1
DATE 10/23/2023

CLIENT: Sanders Architecture PC	PROJECT NO.: 05:7957	SHEET: 1 of 1	
PROJECT NAME: Madison Road Apartments	HAND AUGER NO.: HA-01	SURFACE ELEVATION:	
SITE LOCATION: 454 North Madison Road, Orange, Virginia, 22920		STATION:	
NORTHING:		EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
5		485	(SC) CLAYEY FINE TO MEDIUM SAND, trace gravel, trace organics, reddish brown, moist, medium dense			S-1		
			BUCKET REFUSAL AT 3 FT				S-2	
10		480						
15								


REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

<input type="checkbox"/> WL (First Encountered)	<input checked="" type="checkbox"/> WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
<input checked="" type="checkbox"/> WL (Completion)		SJH	Oct 02 2023	English	

HAND AUGER LOG

CLIENT: Sanders Architecture PC	PROJECT NO.: 05:7957	SHEET: 1 of 1	
PROJECT NAME: Madison Road Apartments	HAND AUGER NO.: HA-02	SURFACE ELEVATION:	
SITE LOCATION: 454 North Madison Road, Orange, Virginia, 22920		STATION:	
NORTHING:		EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
5		483	(SC) CLAYEY FINE TO MEDIUM SAND, trace gravel, trace organics, reddish brown, moist, medium dense			S-1		
10		478	BUCKET REFUSAL AT 2 FT					
15								


REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

<input type="checkbox"/> WL (First Encountered)	<input checked="" type="checkbox"/> WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
<input checked="" type="checkbox"/> WL (Completion)		SJH	Oct 02 2023	English	

HAND AUGER LOG

CLIENT: Sanders Architecture PC	PROJECT NO.: 05:7957	SHEET: 1 of 1	
PROJECT NAME: Madison Road Apartments	HAND AUGER NO.: HA-03	SURFACE ELEVATION:	
SITE LOCATION: 454 North Madison Road, Orange, Virginia, 22920		STATION:	
NORTHING:		EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
5		479	(SC) CLAYEY FINE TO MEDIUM SAND, trace organics, trace gravel, reddish brown, moist, medium dense			S-1		
10		474	BUCKET REFUSAL AT 2 FT					
15								


REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDRY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

<input type="checkbox"/> WL (First Encountered)	<input checked="" type="checkbox"/> WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
<input checked="" type="checkbox"/> WL (Completion)		SJH	Oct 02 2023	English	

HAND AUGER LOG

CLIENT: Sanders Architecture PC	PROJECT NO.: 05:7957	SHEET: 1 of 1	
PROJECT NAME: Madison Road Apartments	HAND AUGER NO.: HA-04	SURFACE ELEVATION:	
SITE LOCATION: 454 North Madison Road, Orange, Virginia, 22920		STATION:	
NORTHING:		EASTING:	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	DESCRIPTION OF MATERIAL	EXCAVATION EFFORT	DCP	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
5		475	(SC) CLAYEY FINE TO MEDIUM SAND, trace organics, trace gravel, orangish brown, moist, medium dense			S-1		
			BUCKET REFUSAL AT 4 FT			S-2		
10		470						
15								

REMARKS:

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

EXCAVATION EFFORT: E - EASY M - MEDIUM D - DIFFICULT VD - VERY DIFFICULT

<input type="checkbox"/> WL (First Encountered)	<input checked="" type="checkbox"/> WL (Seasonal High)	ECS REP:	DATE COMPLETED:	UNITS:	CAVE-IN-DEPTH:
<input checked="" type="checkbox"/> WL (Completion)		SJH	Oct 02 2023	English	

HAND AUGER LOG

Laboratory Testing Summary

Sample Location	Sample Number	Depth (ft)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
HA-01	S-2	3	25.9	SC	40	23	17	42.7					
HA-02	S-1	2	33.4										
HA-03	S-1	2	21.6										
HA-04	S-2	4	26.6	SC	44	25	19	39.3					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Madison Road Apartments
Client: Sanders Architecture PC

Project No.: 05:7957
Date Reported: 10/21/2023



Office / Lab

ECS Mid-Atlantic LLC - Fredericksburg

Address

915 Maple Grove Drive
Suite 100
Fredericksburg, VA 22407

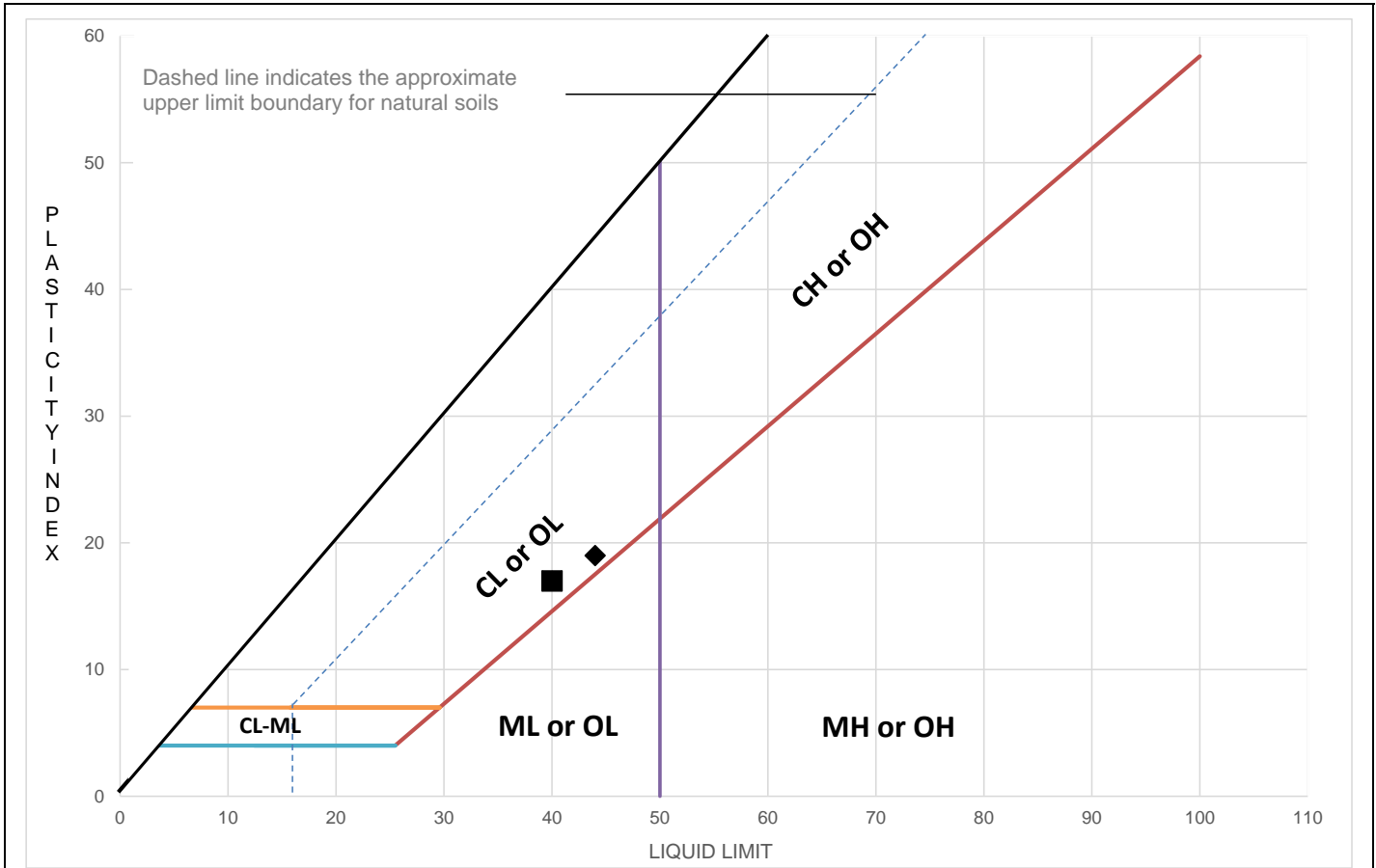
Office Number / Fax

(540)785-6100

(540)785-3577

Tested by	Checked by	Approved by	Date Received
AMcCall	AMcCall	SJH	10/23/2023

LIQUID AND PLASTIC LIMITS TEST REPORT



TEST RESULTS (ASTM D4318-10 (MULTIPOINT TEST))

	Sample Location	Sample Number	Sample Depth (ft)	LL	PL	PI	%<#40	%<#200	AASHTO	USCS	Material Description
■	HA-01	S-2	3	40	23	17	68.7	42.7	A-6	SC	Reddish Brown Clayey Sand
◆	HA-04	S-2	4	44	25	19	64.5	39.3	A-7-6	SC	Orangish Brown Clayey Sand

Project: Madison Road Apartments
 Client: Sanders Architecture PC

Project No.: 05:7957
 Date Reported: 10/21/2023



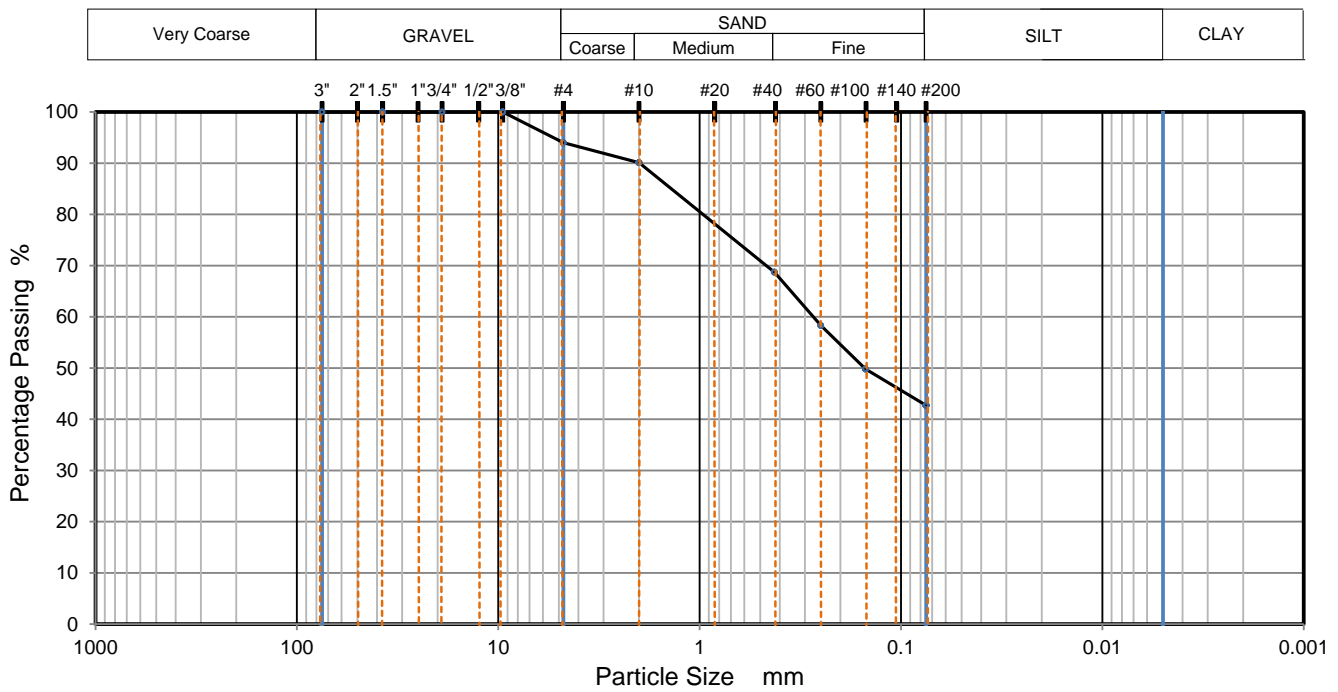
Office / Lab
 ECS Mid-Atlantic LLC - Fredericksburg

Address
 915 Maple Grove Drive
 Suite 100
 Fredericksburg, VA 22407

Office Number / Fax
 (540)785-6100
 (540)785-3577

Tested by AMcCall	Checked by AMcCall	Approved by SJH	Date Received 10/23/2023
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PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
1 1/2"	100		
3/4"	100		
3/8"	100		
#4	94		
#10	90		
#40	69		
#60	58		
#100	50		
#200	43		

Dry Mass of sample, g

71.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	6
Coarse Sand, #4 to #10 sieve	4
Medium Sand, #10 to #40	21
Fine Sand, #40 to #200	26
Fines <#200	43

USCS	SC	Liquid Limit	40	D90	1.986	D50	0.152	D10	
AASHTO	A-6	Plastic Limit	23	D85	1.383	D30		Cu	
USCS Group Name	Clayey sand	Plasticity Index	17	D60	0.273	D15		Cc	

Project: Madison Road Apartments

Client: Sanders Architecture PC

Sample Description: Reddish Brown Clayey Fine to Medium Sand

Sample Source: HA-01

Project No.: 05:7957

Depth (ft): 3

Sample No.: S-2

Date Reported: 10/21/2023



Office / Lab

Address

Office Number / Fax

ECS Mid-Atlantic LLC -
Fredericksburg

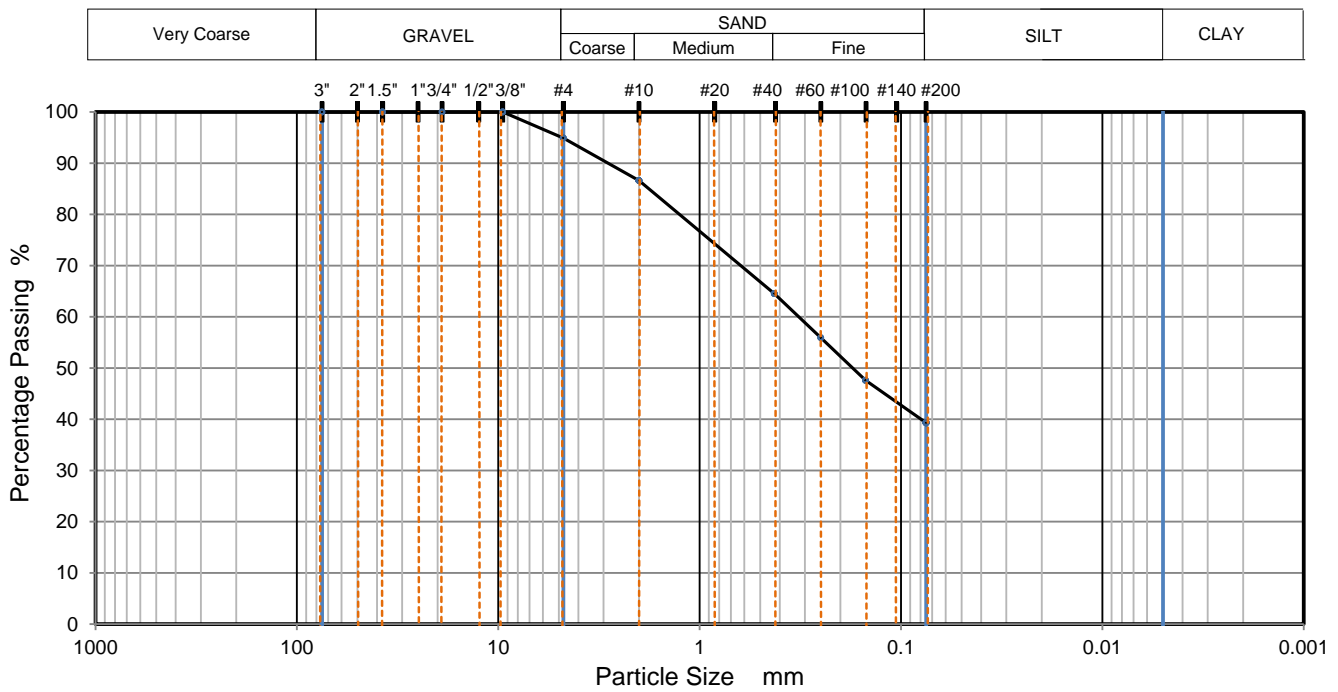
915 Maple Grove Drive
Suite 100
Fredericksburg, VA 22407

(540)785-6100

(540)785-3577

Tested by	Checked by	Approved by	Date Received	Remarks
AMcCall	AMcCall	SJH	10/23/2023	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
1 1/2"	100		
3/4"	100		
3/8"	100		
#4	95		
#10	87		
#40	65		
#60	56		
#100	48		
#200	39		

Dry Mass of sample, g

60.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	5
Coarse Sand, #4 to #10 sieve	8
Medium Sand, #10 to #40	22
Fine Sand, #40 to #200	25
Fines <#200	39

USCS	SC	Liquid Limit	44	D90	2.850	D50	0.174	D10	
AASHTO	A-7-6	Plastic Limit	25	D85	1.788	D30		Cu	
USCS Group Name	Clayey sand	Plasticity Index	19	D60	0.322	D15		Cc	

Project: Madison Road Apartments

Client: Sanders Architecture PC

Sample Description: Orangish Brown Clayey Fine to Medium Sand

Sample Source: HA-04

Project No.: 05:7957

Depth (ft): 4

Sample No.: S-2

Date Reported: 10/21/2023



Office / Lab

Address

Office Number / Fax

ECS Mid-Atlantic LLC -
Fredericksburg

915 Maple Grove Drive
Suite 100
Fredericksburg, VA 22407

(540)785-6100

(540)785-3577

Tested by	Checked by	Approved by	Date Received	Remarks
AMcCall	AMcCall	SJH	10/23/2023	

**ATTACHMENT FOR ADDITIONAL DESIGN AND CONSTRUCTION NOTES
[LOT EXPLORATION]**

EXPLORATION PROCEDURES

This exploration was accomplished by performing hand auger borings and Wildcat Dynamic Cone Test testing within the approximate limits of the proposed building construction. Laboratory testing was performed on selected samples, and available Soil Survey data from the Soil Conservation Service publications was reviewed.

The soil deposits encountered in the borings were classified in the field in general accordance with ASTM D2488 (Description and Identification of Soils - Visual/Manual Procedures). Representative samples of soils encountered were collected from the borings and returned to our Fredericksburg laboratory for moisture content, sieve analyses, and Atterberg Limits (plasticity) testing, as appropriate.

BUILDING FOUNDATION AND SLAB

If moderate to highly plastic soils are encountered at the foundation bearing elevation or within 2 feet below the footing subgrade, the footings should be undercut to a depth of 3 feet for moderate plasticity soils and 4 feet for highly plasticity soils below the final exterior site grades or to non-expansive soils, whichever is less, and re-establish to design bearing elevation with lean concrete. If these materials are encountered at or within 2 feet below the subgrades of slabs-on-grade or below stoops, these materials should be undercut to a depth of 2 feet. For basement slabs, only the area below the slab within 5 feet of the walk out area will need to be undercut. These materials can be replaced with non-expansive structural fill. These undercuts will not be necessary for basement areas other than in walkout conditions.

We recommend that continuous footings have a minimum width of 16-inches. The minimum dimension recommended above helps reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" action. In addition, footings should be placed at a depth to provide adequate frost cover protection. Therefore, we recommend perimeter footings subject to climatic variations be located at a minimum depth of 24 inches below exterior finished grades.

It is recommended that slabs-on-grade be supported by a minimum 4-inch layer of No. 57 Stone placed over stable natural subgrade or compacted engineered fill. The slab should be isolated from the exterior walls by utilizing expansion material or other bond breaking material. Also, the floor slab-on-grade should be reinforced with welded wire mesh to minimize the effects of shrinkage, and polyethylene sheeting is recommended below the slab to minimize floor dampness. In order to be effective, the wire mesh should be placed within the top half of the slab. The above are recommendations to aid slab design. ECS will defer to the structural engineers' final design, which should be utilized in the field.

BELOW GRADE WALLS AND DRAINAGE

Draintile at the outside perimeter of the footings is always considered to be good practice and is recommended. The perimeter drainage system should consist of slotted corrugated drainpipe surrounded by a minimum of 6 inches of free draining granular material (VDOT No. 57). The granular drainage material should be wrapped with geotextile fabric. The draintiles should be designed for discharge by gravity where possible to daylight or connected to the storm drain system. If daylighted, the lines should extend at least

10 feet from the building limits. For basement areas, sump pumps should be installed that are either daylighted or connected to the storm drain system.

Below grade walls should be designed to withstand lateral earth pressures and any surcharge loads within a 45° slope from the base of the wall. We recommend the wall be designed for a linearly increasing lateral earth pressure of 64 psf per foot of vertical wall height. This lateral earth pressure assumes that the onsite ML materials or more granular will be used as backfill material and that the backfill behind the wall is fully drained.

The space between the outside of the walls and excavation should be backfilled with an inorganic, free draining granular material, free of debris. We recommend that the basement walls be backfilled with soils that classify as ML or more granular. High plasticity soils (MH, CH) are not acceptable for use as below grade wall backfill. Suitable manmade drainage materials may be used in lieu of the granular backfill, adjacent to the below grade walls. Examples of suitable materials include Enka-mat, Mira drain or Geotek drains. The material should be placed in accordance with the manufacturer's recommendations and connected to either the perimeter drainage system or the underslab granular mat, which in turn should be properly drained. The ground surface adjacent to the below grade walls should be kept properly graded to prevent ponding of water adjacent to below grade walls.

To achieve a desirable balance between minimizing excessive pressures against below grade walls and reducing the settlement of the wall backfill, heavy earthwork equipment should maintain a minimum of 1 foot space per foot of vertical wall height away from the wall. Lighter compaction equipment should be used close to the below grade walls and the loose thickness of the lifts should be reduced to no more than 6 inches.

CONSTRUCTION CONSIDERATIONS

In general, all footing excavations should extend through all uncontrolled fill, soft or otherwise unsuitable material so as to expose firm, natural soils or approved, firm engineered fill. Where soft or unsuitable materials are encountered below the minimum excavation depths, they should be removed and the footing lowered to firm soil, as directed by the geotechnical engineer. Alternatively, the undercut can be backfilled with lean concrete or flowable fill to the design foundation elevation. A qualified representative under the direction of the geotechnical engineer should be called on to observe all footing excavations prior to placement of concrete to ascertain that firm bearing soils have been exposed.

All topsoil and/or non-engineered fill that is placed as protective overburden to the subgrade soils onsite should be removed before commencing construction. The removal of such overburden should be supervised by a qualified soils technician, under the supervision of the Geotechnical Engineer.

Care should be exercised to prevent water from ponding above or within the bearing soils. A slight swale may be constructed uphill of the homesite (if appropriate) to intercept surface runoff and divert it away from the foundations. Any natural drainage should be diverted away from the foundations. The final site grading should allow for strong positive drainage away from the foundation.

Weathered Rock and Rock Excavation

Based on boring data obtained during the exploration, we anticipate that materials requiring difficult, or rock excavation techniques will be encountered during site grading and excavation to planned subgrades.

Especially in the lower areas of the site where weathered rock may impact excavation for your foundations.

The excavation of weathered rock and rock can have a substantial impact on the cost and schedule of the proposed construction. This discussion considers two general classes of materials for purposes of describing excavatability. Residuum and weathered rock will be used as the terms for the materials to be excavated.

In mass excavations for general site work, overburden soils with standard penetration test N-values of 30 bpf or less can usually be removed with conventional earth excavation equipment. Residual soils or soft weathered rock with N-values of 30 to 60 bpf can generally be removed with conventional earth moving equipment after first being loosened with a large single-tooth ripper attached to a large crawler tractor. Harder, less weathered rock will generally require the use of a large single-tooth ripper, dozers, and/or track-mounted backhoes for excavation. However, materials exhibiting N-values of 50 blows for 1 inch of penetration, typically defined as refusal material, will be more difficult to excavate and generally require blasting and other rock excavation techniques. The actual excavatability of the bedrock material will be greatly controlled by in-situ jointing and bedding and may vary from location to location.

In confined excavations, such as utility trenches, excavation of dense residual soils typically requires the use of large track-mounted backhoes. Excavation of harder phases of weathered rock typically requires the use of large track-mounted backhoes, pneumatic spades, or light blasting. Refusal materials (apparent rock) normally require blasting in trench excavations. Blasting in utility trenches should be done carefully to avoid damage to the surrounding materials. When the material to be excavated requires blasting, the contractor should comply with the requirements of VDOT Road and Bridge Specifications Section 107.11 - Use of Explosives.

Nondurable rock materials removed in blast and ripping excavations may be used as fill if suitably broken down by mechanical compaction effort. For the purposes of this report, all forms of rock at the site will be considered nondurable. Durability is the term used to describe the ability of a rock or rock-like material to withstand long term chemical or mechanical weathering without size degradation. Any rock materials excavated from the site and used as earth fill should have a well-graded grain size distribution with rock and soil particles generally ranging from clay or silt size particles to a maximum size of 4-inches in lateral dimensions with 2-inch thickness. Particles larger than that should be broken by mechanical compaction equipment to achieve the desired grain size distribution, and the samples should have a minimum of 20% passing the #200 sieve and 50% passing the #40 sieve. The resulting fill should consist of a "soil skeleton" with rocks evenly dispersed throughout the fill.

Laboratory classification and proctor compaction tests should be performed on samples that have been broken down by compaction equipment to be used for compaction of the fill. On unbroken down materials, proctors should be performed with a minimum of three cycles to model compaction of the materials, each cycle showing an increasing mechanical breakdown of the parent rock materials. The geotechnical engineer should select the most appropriate Proctor curve for earthwork compaction purposes.

LIMITATIONS

It should be noted that this study was limited in scope to hand auger borings, visual soil classification, Wildcat Dynamic Cone testing, and laboratory testing only. The soil borings, generally, were extended to

a minimum depth of 2 feet below the anticipated foundation bearing elevation or auger refusal, whichever occurred first. The recommendations contained herein were based on the data obtained from the soil borings, which indicates subsurface conditions at this specific location at the time of the exploration. Soil conditions may vary across the house pad.

It should be noted that subsurface conditions might change between test locations. It is considered essential that all footing excavations and subgrade areas be observed by the geotechnical engineer or his representative to assure that the recommendations made herein are consistent with the conditions. If during the course of construction variations appear evident, the geotechnical engineer should be informed so that the conditions can be addressed.



TJL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

ASBESTOS-CONTAINING MATERIALS INSPECTIONS

***454 and 458 North Madison Road
Orange, Virginia***

September 26, 2024



TJL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

September 26, 2024

Mr. Caleb Bullock
Facilities and Property Director
Encompass Community Supports
15361 Bradford Road
Culpeper, VA 22701

RE: Asbestos-Containing Materials (ACM) Inspections of 454 and 458 North Madison Road, Orange, Virginia

Dear Mr. Bullock:

On September 20, 2024, T. Joel Loving of TJL Environmental Health Consultants, Inc. (TJL) inspected the above referenced structures for the presence of asbestos-containing materials (ACM). In accordance with Virginia Statewide Building Code and EPA NESHAP pre-demolition requirements, all suspect ACM* in these structures were sampled by TJL and later tested for asbestos content by a Virginia State-licensed laboratory using polarized light microscopy (PLM).

454 North Madison Road

The following ACM were identified by this inspection in the types, approximate locations, asbestos contents, and conditions as noted:

<u>ACM</u>	<u>LOCATION(S)</u>	<u>LABORATORY RESULTS</u>	<u>CONDITIONS (Friable** or Non-Friable, Stable or Damaged)</u>
(1) 9"x9" Red and black floor tiles and related white paper underlayment	Throughout most of the basement; Some are exposed but most are beneath carpeting and 12"x12" vinyl floor tiles	6% Chrysotile Asbestos (Tiles 35% Chrysotile Asbestos (paper underlayment)	These floor tiles were non-friable but the paper underlayment was friable. Both were water-damaged and in poor condition where accessible at the time of this inspection.
(2) 9"x9" floor tiles (mostly white, but possibly other colors as well)	Throughout most of the 1 st floor; All are beneath carpeting, sheet vinyl flooring or 12"x12" vinyl floor tiles.	2% Chrysotile Asbestos	These ACM were non-friable, encased by other flooring materials, but noticeably water-damaged at the time of this inspection.



TjL Environmental Health Consultants, Inc.
2304 Jefferson Park Avenue
Charlottesville, VA 22903
434-977-1409
tjloving@comcast.net

(3) Gray and brown sheet vinyl floor covering	Slate pattern sheet vinyl flooring at front entrance to 1 st floor, and beneath some of the 12"x12" vinyl floor tiles in front room as well	15% Chrysotile Asbestos	These ACM were non-friable and in stable condition at the time of this inspection.
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As indicated by the attached laboratory PLM report, samples of the following materials were tested and none of them contained asbestos:

1. Roof shingles and related felts
2. Exterior glazing around glass panes of metal casement and wood windows
3. 12"x12" Floor tiles and related mastic on both levels (underlying 9"x9" floor tiles are positive ACM however)
4. Black mastic beneath 9"x9" asbestos-containing floor tiles on both levels
5. 4" Vinyl cove base (all colors) and related mastic on both levels
6. Ivory sheet vinyl floor covering in basement hall bath
7. Tan sheet vinyl floor covering in basement hall bath
8. Tan construction adhesive in basement hall bath
9. Flue pipe cement at wall in basement furnace room
10. Fiberboard ceiling panels in basement furnace room
11. Drywall and related joint compound on both levels
12. Wall and ceiling plaster on both levels
13. 1'x1' Acoustic ceiling tiles on both levels
14. 2'x4' Lay-in ceiling tiles in basement
15. Duct board insulation around HVAC system air ducts in basement
16. 18"x18" Acoustic ceiling tiles on 1st floor
17. Tan and brown sheet vinyl floor covering in 1st floor hall bath
18. Textured ceiling surfacing compound on acoustic ceiling tiles and plaster ceilings on 1st floor

458 North Madison Road

No ACM were identified in this building. As indicated by the attached laboratory PLM report, samples of the following materials were tested and none of them contained asbestos:

1. Roof shingles and related felts
2. Drywall and related joint compound on both levels
3. 12"x12" White and blue vinyl floor tiles and related mastic on both levels



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***NOTE:** Since there was no actual demolition performed by TJL to allow access behind, beneath, above, etc. exposed building materials, certain inaccessible ACM may not have been identified. TJL has made every possible effort to locate all suspect ACM that were reasonably accessible to the inspector during the survey. Future maintenance, renovations or demolition contractors should be informed that enclosed ACM may not have been identified during this inspection and that if encountered, to cease work until a positive identification of the suspect materials has been made. Since only building materials were tested, any equipment, appliances, fixtures or supplies within this building that were not part of its construction, were not examined.

****NOTE:** Friable materials are those that can be reduced to a fine powder by applying normal hand pressure. Removal of greater than 160 square feet or 260 linear feet of friable ACM must be monitored by a third-party Asbestos Project Monitor during all abatement activities. Project monitoring is recommended, but optional if less than these amounts of friable ACM are removed. Non-friable ACM that is in stable condition can be left in place during renovations if not disturbed or made friable. Non-friable ACM can be left in place during demolition provided they are not subjected to sanding, grinding, cutting, abrading or in any way made friable; however, all related construction debris must be properly disposed of as asbestos in a landfill approved to accept EPA NESHAP Category I or II Non-friable asbestos wastes, and all demolition workers must be properly trained, monitored and protected in accordance with the OSHA Asbestos Standard.

Please do not hesitate to contact me should you have questions regarding this report, if you would like us to monitor the removal of the identified ACM, or if I can provide further assistance with environmental health matters on this or future projects.

Sincerely,

A handwritten signature in black ink that reads "T. Joel Loving". The signature is written in a cursive style and is underlined with a single horizontal line.

T. Joel Loving, M.S., C.E.I., President
Virginia Asbestos Inspector License #3303-000057



AmeriSci Richmond

13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: 8047631200 FAX: 8047631800

September 26, 2024

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue
Charlottesville, VA 22903

RE: Environmental Health Consultants
Job Number 124091719
P.O. #Loving
454 North Madison Rd

Dear T. Joel Loving:

Enclosed are the results for PLM asbestos analysis of the following Environmental Health Consultants samples received at AmeriSci on Saturday, September 21, 2024, for a 48 hour turnaround:

Sample ID NM 9-20-24-11 through NM 9-20-24-44.8

The 75 samples contained in zip lock bag were shipped to AmeriSci via Fed Ex 2797 5056 9422 B 1105. These samples were prepared and analyzed according to EPA PLM Method (EPA 600/R-93/116 Section 2.2). The required analytical information, analysis results, analyst signature and laboratory identification are contained in the PLM Bulk Asbestos Report. If TEM analysis was requested for selected samples the gravimetric reduction data (by Sec 2.3) and TEM Asbestos % (by Sec 2.5) are included in Table 1 along with a summary of Asbestos % by PLM for all samples analyzed.

This report relates ONLY to the sample analysis expressed as % asbestos. AmeriSci assumes no responsibility for customer supplied data such as "sample type", "location", or "area sampled". This report must not be used to claim product endorsement by AmeriSci, NVLAP or any agency of the U. S. Government. The National Institute of Standards and Technology accreditation requirements mandate that this report must not be reproduced, except in full, without the written approval of the laboratory. This report may contain specific data not covered by NVLAP or ELAP accreditations, if so identified in relevant footnotes.

AmeriSci appreciates this opportunity to serve your organization. Please contact us for any further assistance or with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn F. Massey". The signature is fluid and cursive, with a long horizontal stroke at the end.

Glenn F. Massey
QA Manager | Authorized Signatory



AmeriSci Richmond

13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue

Charlottesville, VA 22903

Date Received 09/21/24
Date Examined 09/24/24

RE: 454 North Madison Rd

AmeriSci Job # 124091719
P.O. #
Page 1 **of** 23

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-11 1 Location: Roof Shingles & Felt Main Roof Analyst Description: Black, Heterogeneous, Non-Fibrous, Shingle Asbestos Types: Other Material: Fibrous glass 15%, Non-fibrous 85%	124091719-01L1	No	NAD (by CVES) by Jared Marko on 09/24/24
NM 9-20-24-11 1 Location: Roof Shingles & Felt Main Roof Analyst Description: Black, Homogeneous, Fibrous, Felt Asbestos Types: Other Material: Cellulose 90%, Non-fibrous 10%	124091719-01L2	No	NAD (by CVES) by Jared Marko on 09/24/24
NM 9-20-24-12 1 Location: Roof Shingles & Felt Main Roof Analyst Description: Black, Heterogeneous, Non-Fibrous, Shingle Asbestos Types: Other Material: Fibrous glass 15%, Non-fibrous 85%	124091719-02L1	No	NAD (by CVES) by Jared Marko on 09/24/24
NM 9-20-24-12 1 Location: Roof Shingles & Felt Main Roof Analyst Description: Black, Homogeneous, Fibrous, Felt Asbestos Types: Other Material: Cellulose 90%, Non-fibrous 10%	124091719-02L2	No	NAD (by CVES) by Jared Marko on 09/24/24
NM 9-20-24-13 2 Location: Roof Shingles Over Flat Roof Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 10%, Synthetic fibers 10%, Non-fibrous 80%	124091719-03	No	NAD (by CVES) by Jared Marko on 09/24/24

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-14 2	124091719-04 Location: Roof Shingles Over Flat Roof	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Black, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 10%, Synthetic fibers 10%, Non-fibrous 80%			
NM 9-20-24-15 3	124091719-05 Location: Casement Window Glazing	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-16 3	124091719-06 Location: Casement Window Glazing	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-16.5 4	124091719-07 Location: Wood Double Hung Window Glazing	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-16.6 4	124091719-08 Location: Wood Double Hung Window Glazing	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-17 5	124091719-09L1 Location: 12"x12" Gray Floor Tile & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Floor Tile			
Asbestos Types:			
Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-17 5	124091719-09L2 Location: 12"x12" Gray Floor Tile & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-18 5	124091719-10L1 Location: 12"x12" Gray Floor Tile & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-18 5	124091719-10L2 Location: 12"x12" Gray Floor Tile & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-19 6	124091719-11L1 Location: 9"x9" Red & Black Floor Tile & Mastic; Basement	Yes	6.0% (by CVES) by Jared Marko on 09/24/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Chrysotile 6.0% Other Material: Non-fibrous 94%			
NM 9-20-24-19 6	124091719-11L2 Location: 9"x9" Red & Black Floor Tile & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-20 6	124091719-12L1 Location: 9"x9" Red & Black Floor Tile & Mastic; Basement	Yes	6.0% (by CVES) by Jared Marko on 09/24/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Chrysotile 6.0% Other Material: Non-fibrous 94%			

See Reporting notes on last page

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-20 6	124091719-12L2 Location: 9"x9" Red & Black Floor Tile & Mastic; Basement	Yes	35% (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Paper Underlayment Asbestos Types: Chrysotile 35% Other Material: Cellulose 15%, Non-fibrous 50%			
NM 9-20-24-21 7	124091719-13L1 Location: 4" Brown Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Cove Base Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-21 7	124091719-13L2 Location: 4" Brown Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-22 7	124091719-14L1 Location: 4" Brown Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Cove Base Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-22 7	124091719-14L2 Location: 4" Brown Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow/Black, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-23 8	124091719-15 Location: Ivory Sheet Floor Covering In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Fibrous glass 5.0%, Non-fibrous 95%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-24 8	124091719-16 Location: Ivory Sheet Floor Covering In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 5.0%, Non-fibrous 95%			
NM 9-20-24-25 9	124091719-17 Location: Tan Sheet Floor Covering In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 5.0%, Non-fibrous 95%			
NM 9-20-24-26 9	124091719-18 Location: Tan Sheet Floor Covering In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Fibrous glass 5.0%, Non-fibrous 95%			
NM 9-20-24-27 10	124091719-19 Location: Tan Construction Glue In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-28 10	124091719-20 Location: Tan Construction Glue In Hall Bath; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-29 11	124091719-21 Location: Flue Pipe Cement In Furnace Room; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Bulk Material			
Asbestos Types:			
Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-30 11	124091719-22 Location: Flue Pipe Cement In Furnace Room; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Wollastonite 5.0%, Non-fibrous 95%			
NM 9-20-24-31 12	124091719-23 Location: Fiberboard Ceiling In Furnace Room; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-32 12	124091719-24 Location: Fiberboard Ceiling In Furnace Room; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-33 13	124091719-25.1 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Beige, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Fibrous glass 2.0%, Non-fibrous 96%			
NM 9-20-24-33 13	124091719-25.2 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-34 13	124091719-26.1 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Non-fibrous 98%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-34 13	124091719-26.2 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-35 13	124091719-27.1 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Beige, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Fibrous glass 2.0%, Non-fibrous 96%			
NM 9-20-24-35 13	124091719-27.2 Location: Drywall And Joint Compound; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-36 14	124091719-28.1 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster) Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			
NM 9-20-24-36 14	124091719-28.2 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster) Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-37 14	124091719-29.1 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster) Asbestos Types: Other Material: Cellulose Trace, Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-37 14	124091719-29.2 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-38 14	124091719-30.1 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-38 14	124091719-30.2 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-39 14	124091719-31.1 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster)			
Asbestos Types:			
Other Material: Cellulose Trace, Non-fibrous 100%			
NM 9-20-24-39 14	124091719-31.2 Location: Wall & Ceiling Plaster; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-40 15	124091719-32 Location: 1'x1' Tan Acoustic Ceiling Tile; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 75%, Fibrous glass 5.0%, Non-fibrous 20%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-41 15	124091719-33 Location: 1'x1' Tan Acoustic Ceiling Tile; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 75%, Fibrous glass 5.0%, Non-fibrous 20%			
NM 9-20-24-42 16	124091719-34 Location: 2'x4' Lay-In Ceiling Tile Crossgrain In Pattern; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 75%, Fibrous glass 5.0%, Non-fibrous 20%			
NM 9-20-24-43 16	124091719-35 Location: 2'x4' Lay-In Ceiling Tile Crossgrain In Pattern; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 75%, Fibrous glass 5.0%, Non-fibrous 20%			
NM 9-20-24-44 17	124091719-36 Location: 2'x4' Lay-In Ceiling Tile Indent Pattern; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-45 17	124091719-37 Location: 2'x4' Lay-In Ceiling Tile Indent Pattern; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-44.5 18	124091719-38L1 Location: 4" Tan Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Cove Base			
Asbestos Types:			
Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-44.5 18	124091719-38L2 Location: 4" Tan Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-44.6 18	124091719-39L1 Location: 4" Tan Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Homogeneous, Non-Fibrous, Cove Base Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-44.6 18	124091719-39L2 Location: 4" Tan Cove Base & Mastic; Basement	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-46 19	124091719-40 Location: 18"x18" Acoustic Ceiling Tile; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-47 19	124091719-41 Location: 18"x18" Acoustic Ceiling Tile; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-48 20	124091719-42L1 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Blue, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-48 20	124091719-42L2 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-48 20	124091719-42L3 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	Yes	2.0% (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Chrysotile 2.0% Other Material: Non-fibrous 98%			
NM 9-20-24-48 20	124091719-42L4 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-49 20	124091719-43L1 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-49 20	124091719-43L2 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-49 20	124091719-43L3 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor		NA/PS
Analyst Description: Floor Tile Asbestos Types: Other Material:			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-49 20	124091719-43L4 Location: 12"x12" Multi-Colored Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-50 21	124091719-44L1 Location: 12"x12" Ivory Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-50 21	124091719-44L2 Location: 12"x12" Ivory Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-51 21	124091719-45L1 Location: 12"x12" Ivory Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-51 21	124091719-45L2 Location: 12"x12" Ivory Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-52 22	124091719-46L1 Location: 5" Pattern Tan Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Flooring Asbestos Types: Other Material: Cellulose 2.0%, Fibrous glass 8.0%, Non-fibrous 90%			

See Reporting notes on last page

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-52 22	124091719-46L2 Location: 5" Pattern Tan Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Beige, Homogeneous, Fibrous, Floor Backing			
Asbestos Types:			
Other Material: Cellulose 40%, Fibrous glass 2.0%, Non-fibrous 58%			
Comment: Different than L1			
NM 9-20-24-53 22	124091719-47L1 Location: 5" Pattern Tan Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Flooring			
Asbestos Types:			
Other Material: Cellulose 2.0%, Fibrous glass 8.0%, Non-fibrous 90%			
NM 9-20-24-53 22	124091719-47L2 Location: 5" Pattern Tan Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: White, Homogeneous, Fibrous, Floor Backing			
Asbestos Types:			
Other Material: Cellulose 40%, Fibrous glass 2.0%, Non-fibrous 58%			
Comment: Different than L1			
NM 9-20-24-54 23	124091719-48L1 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Flooring			
Asbestos Types:			
Other Material: Cellulose 5.0%, Fibrous glass 2.0%, Non-fibrous 93%			
NM 9-20-24-54 23	124091719-48L2 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic			
Asbestos Types:			
Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-54 23	124091719-48L3 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/24/24
Analyst Description: Pattern/Cream, Heterogeneous, Non-Fibrous, Flooring Asbestos Types: Other Material: Cellulose 12%, Fibrous glass 3.0%, Non-fibrous 85%			
NM 9-20-24-55 23	124091719-49L1 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Tan, Heterogeneous, Non-Fibrous, Flooring Asbestos Types: Other Material: Cellulose 12%, Fibrous glass 3.0%, Non-fibrous 85%			
NM 9-20-24-55 23	124091719-49L2 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Flooring Asbestos Types: Other Material: Cellulose 12%, Fibrous glass 3.0%, Non-fibrous 85%			
NM 9-20-24-55 23	124091719-49L3 Location: 9" Pattern Brown Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-56 24	124091719-50L1 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Green, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-56 24	124091719-50L2 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

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Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-56 24	124091719-50L3 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-56 24	124091719-50L4 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	Yes	2.0% (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Chrysotile 2.0% Other Material: Non-fibrous 98%			
NM 9-20-24-56 24	124091719-50L5 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-57 24	124091719-51L1 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Green, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-57 24	124091719-51L2 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-57 24	124091719-51L3 Location: 12"x12" Gray & Green Vinyl Floor Tile & Mastic; 1st Floor	Yes	15% (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Flooring Asbestos Types: Chrysotile 15% Other Material: Cellulose 5.0%, Non-fibrous 80%			

See Reporting notes on last page

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-58 25	124091719-52 Location: Slate Pattern Sheet Flooring; 1st Floor	Yes	15% (by CVES) by Jared Marko on 09/25/24
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Bulk Material Asbestos Types: Chrysotile 15% Other Material: Cellulose 5.0%, Non-fibrous 80%			
NM 9-20-24-59 25	124091719-53L1 Location: Slate Pattern Sheet Flooring; 1st Floor		NA/PS
Analyst Description: Flooring Asbestos Types: Other Material:			
NM 9-20-24-59 25	124091719-53L2 Location: Slate Pattern Sheet Flooring; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Tan/Black, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-60 26	124091719-54 Location: Textured Ceiling Surfacing On Ceiling Tiles; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-61 26	124091719-55 Location: Textured Ceiling Surfacing On Ceiling Tiles; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-62 26	124091719-56 Location: Textured Ceiling Surfacing On Ceiling Tiles; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-63 27 Location: Drywall & Joint Compound; 1st Floor	124091719-57.1	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Non-fibrous 98%			
NM 9-20-24-63 27 Location: Drywall & Joint Compound; 1st Floor	124091719-57.2	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-64 27 Location: Drywall & Joint Compound; 1st Floor	124091719-58.1	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Non-fibrous 98%			
NM 9-20-24-64 27 Location: Drywall & Joint Compound; 1st Floor	124091719-58.2	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-65 27 Location: Drywall & Joint Compound; 1st Floor	124091719-59.1	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 2.0%, Non-fibrous 98%			
NM 9-20-24-65 27 Location: Drywall & Joint Compound; 1st Floor	124091719-59.2	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-66 28	124091719-60.1 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-66 28	124091719-60.2 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-67 28	124091719-61.1 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster)			
Asbestos Types:			
Other Material: Animal hair Trace, Non-fibrous 100%			
NM 9-20-24-67 28	124091719-61.2 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster)			
Asbestos Types:			
Other Material: Non-fibrous 100%			
NM 9-20-24-68 28	124091719-62.1 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Sheetrock			
Asbestos Types:			
Other Material: Cellulose 5.0%, Non-fibrous 95%			
NM 9-20-24-68 28	124091719-62.2 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Off-White, Homogeneous, Non-Fibrous, Compound			
Asbestos Types:			
Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-69 28	124091719-63.1 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Sheetrock Asbestos Types: Other Material: Cellulose 5.0%, Non-fibrous 95%			
NM 9-20-24-69 28	124091719-63.2 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster) Asbestos Types: Other Material: Animal hair Trace, Non-fibrous 100%			
NM 9-20-24-69 28	124091719-63.3 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster) Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-69 28	124091719-63.4 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Texture Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-70 28	124091719-64.1 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Gray, Homogeneous, Non-Fibrous, Cementitious, Base Coat (Plaster) Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-70 28	124091719-64.2 Location: Wall & Ceiling Plaster; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Skim Coat (Plaster) Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-71 29	124091719-65L1 Location: 4" Brown Cove Base & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Brown, Homogeneous, Non-Fibrous, Cove Base Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-71 29	124091719-65L2 Location: 4" Brown Cove Base & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Multi-Colored, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-72 29	124091719-66L1 Location: 4" Brown Cove Base & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Cove Base Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-72 29	124091719-66L2 Location: 4" Brown Cove Base & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-73 30	124091719-67L1 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-73 30	124091719-67L2 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-73 30	124091719-67L3 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	Yes	2.0% (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Chrysotile 2.0% Other Material: Non-fibrous 98%			
NM 9-20-24-73 30	124091719-67L4 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-74 30	124091719-68L1 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Red, Homogeneous, Non-Fibrous, Floor Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-74 30	124091719-68L2 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Yellow, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-74 30	124091719-68L3 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor		NA/PS
Analyst Description: Floor Tile Asbestos Types: Other Material:			
NM 9-20-24-74 30	124091719-68L4 Location: 12"x12" Maroon Floor Tile & Mastic; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: Black, Homogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-75 31	124091719-69 Location: 1'x1' Acoustic Ceiling Tiles; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-76 31	124091719-70 Location: 1'x1' Acoustic Ceiling Tiles; 1st Floor	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			
NM 9-20-24-77 32	124091719-71 Location: Textured Ceiling Surfacing On Plaster	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 4.0%, Non-fibrous 96%			
NM 9-20-24-78 32	124091719-72 Location: Textured Ceiling Surfacing On Plaster	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-79 32	124091719-73 Location: Textured Ceiling Surfacing On Plaster	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White, Homogeneous, Non-Fibrous, Bulk Material Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-44.7 33	124091719-74 Location: Duct Board Insulation Around HVAC Ducts	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material Asbestos Types: Other Material: Cellulose 98%, Non-fibrous 2.0%			

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

454 North Madison Rd

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-44.8 33	124091719-75 Location: Duct Board Insulation Around HVAC Ducts	No	NAD (by CVES) by Jared Marko on 09/25/24
Analyst Description: White/Brown, Homogeneous, Fibrous, Bulk Material			
Asbestos Types:			
Other Material: Cellulose 98%, Non-fibrous 2.0%			

Reporting Notes:

Analyzed by: Jared Marko
Date: 9/24/2024



Reviewed by: Glenn F. Massey



*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis using Meiji, Model MT6120 microscope, Serial #2200362, by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.

Subject: Re: ACTION NEEDED/ON HOLD - AmeriSci 124-09-1719; 454 North Madison Rd

From: Joel Loving <joel@tjlenvironmental.com>

Date: 9/23/2024, 3:14 PM

124-09-1719

To: Tiffany Goodwyn <vareresults@amerisci.com>, Joel Loving <tjlenvironmental@gmail.com>

These samples should read duct board insulation around HVAC ducts. Sorry about that. Please add at the end of the report. Thank you.

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From: Tiffany Goodwyn <vareresults@amerisci.com>

Sent: Monday, September 23, 2024 3:09:05 PM

To: Joel Loving <tjlenvironmental@gmail.com>

Subject: ACTION NEEDED/ON HOLD - AmeriSci 124-09-1719; 454 North Madison Rd

Hey Joel,

Thank you for the COCs, but we have not been able to take this project off hold yet due to receiving extra samples not on the attached.

We have sample bags:

NM9-20-24-44.7 & 44.8 that are not on the COC. One analyst described both materials as wallboard with paint.

I've already stamped everything else that matched the paperwork so if you'd like to add these, it will need to be at the end of the report. If adding them is what you choose to do, just let me know the the description you would like to go on the report for each and if they are to be Positive Stopped as their own group.

thank you!

tif

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Confidentiality Notice: Unless otherwise indicated, the information

contained in this communication is confidential information for use of

the individual named above. If the reader of this communication is not

the intended recipient, you are hereby notified that any dissemination,

distribution or copying of this communication is prohibited.

If you have received this communication in error, please immediately notify

the sender by telephone and return the original message to the above address



Environmental Health Consultants, Inc.
 2304 Jefferson Park Avenue
 Charlottesville, VA 22903

124-09-1719

Phone: (434) 962-8721 • Email: joel@tjlenvironmental.com

Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (48hrs)

Project Description: 454 North Madison Rd.

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: SP: STOP POSITIVE

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
NM9-20-24-11		Roof shingles + felt main roof					
-12	SP	"	"				
-13		Roof shingles + felt over over flat roof					
-14	SP	"	"				
-15		Casement window glazing					
-16	SP	"					
-16.5		Wood double hung window glazing					
-16.6	SP	"					
-17		12" x 12" gray floor tile + mastic					Basement
-18	SP	"					
-19		9" x 9" red + black	"	"			
-20	SP	"	"				
-21		4" Brown cove base + mastic					
-22	SP	"					
-23		Ivory sheet floor covering in hall bath					
-24	SP	"					
-25		Tan	"	"	"		
-26	SP	"					
-27		Tan construction glue		"	"		
-28	SP	"	"				

Samples submitted by: [Signature] Received Date: 9-20-24
 Samples received by: _____ Date: _____
 SEP 23 2024



Environmental Health Consultants, Inc.
 2304 Jefferson Park Avenue
 Charlottesville, VA 22903

124-09-1719

Phone: (434) 962-8721 • Email: joel@tjlenvironmental.com

Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (48 hrs)

Project Description: 454 N. Madison Rd (Page 2)

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: _____

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
-29		Flue pipe cement in furnace room					basement ↓ 1st Floor ↓
-30	SP	"					
-31		Fiberboard ceiling in		"			
-32							
-33		Drywall and joint compound					
-34	SP	"					
-35	SP	"					
-36	SP	Wall + ceiling plaster					
-37		↓					
-38	↓						
-39							
-40		1" x 1" Tan acoustic ceiling tile					
-41	SP	"					
-42		2' x 4' Lay-in ceiling tile crossgrain pattern					
-43	SP	"					
-44		" " " indent pattern					
-45	SP	" " "					
-44.5		4" Tan cove base + mastic					
-44.6	SP	"					
-46		18" x 18" Acoustic ceiling tile					
-47	SP	"					
-48		12" x 12" Multicolored floor tile + mastic					
-49	SP	"					

Samples submitted by: [Signature] Received: _____ Date: 9-20-24

Samples received by: _____ SEP 23 2024 Date: _____

6



Environmental Health Consultants, Inc.
 2304 Jefferson Park Avenue
 Charlottesville, VA 22903

Phone: (434) 962-8721 • Email: joel@tjlenvironmental.com

124-09-1719

Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (48 hrs)

Project Description: 454 N. Madison Rd (Page 3)

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: _____

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
-50		12" x 12" Ivory	Floor tile + mastic			1st	Floor
-51	SP	"	"				
-52		5" Pattern tan sheet	Flooring				
-53	SP	"	"				
-54		9" Pattern brown	"				
-55	SP	"	"				
-56		12" x 12" gray + green vinyl	Floor tile + mastic				
-57	SP	"	"				
-58		Slate pattern sheet	Flooring				
-59	SP	"	"				
-60		Textured ceiling surfacing or	ceiling tiles				
-61	SP	"	"				
-62	SP	"	"				
-63		Drywall + joint compound					
-64	SP	"	"				
-65	SP	"	"				
-66	SP	Wall + ceiling plaster					
-70	↓	↓					
-71		4" Brown cove base + mastic					
-72	SP	"					
-73		12" x 12" Maroon	Floor tile + Mastic				
-74	SP	"					

Samples submitted by: _____

[Signature]

Received

Date: 9-20-24

Samples received by: _____

SEP 23 2024

Date: _____



Environmental Health Consultants, Inc.
 2304 Jefferson Park Avenue
 Charlottesville, VA 22903

Phone: (434) 962-8721 • Email: joel@tjlenvironmental.com

124-09-1719

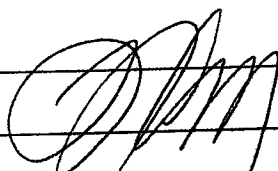
Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (48hrs)

Project Description: 454 N. Madison Rd (Page 4)

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: _____

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
-75		1'x1' Acoustic ceiling tiles				1st	PROV
-76	SP	"					
-77		Textured ceiling surfacing on plaster					
-78	SP	"					
-79	SP	"					

Samples submitted by:  Received _____ Date: 9-20-24

Samples received by: _____ SEP 23 2024 Date: _____



AmeriSci Richmond

13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: 8047631200 FAX: 8047631800

September 25, 2024

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue
Charlottesville, VA 22903

RE: Environmental Health Consultants
Job Number 124091786
P.O. #Loving
458 North Madison Road

Dear T. Joel Loving:

Enclosed are the results for PLM asbestos analysis of the following Environmental Health Consultants samples received at AmeriSci on Saturday, September 21, 2024, for a 48 hour turnaround:

NM 9-20-24-1, NM 9-20-24-2, NM 9-20-24-3, NM 9-20-24-4, NM 9-20-24-5, NM 9-20-24-6, NM 9-20-24-7

The 7 samples contained in zip lock bag were shipped to AmeriSci via Fed Ex 2797 5056 9422 B 1105. These samples were prepared and analyzed according to EPA PLM Method (EPA 600/R-93/116 Section 2.2). The required analytical information, analysis results, analyst signature and laboratory identification are contained in the PLM Bulk Asbestos Report. If TEM analysis was requested for selected samples the gravimetric reduction data (by Sec 2.3) and TEM Asbestos % (by Sec 2.5) are included in Table 1 along with a summary of Asbestos % by PLM for all samples analyzed.

This report relates ONLY to the sample analysis expressed as % asbestos. AmeriSci assumes no responsibility for customer supplied data such as "sample type", "location", or "area sampled". This report must not be used to claim product endorsement by AmeriSci, NVLAP or any agency of the U. S. Government. The National Institute of Standards and Technology accreditation requirements mandate that this report must not be reproduced, except in full, without the written approval of the laboratory. This report may contain specific data not covered by NVLAP or ELAP accreditations, if so identified in relevant footnotes.

AmeriSci appreciates this opportunity to serve your organization. Please contact us for any further assistance or with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn F. Massey".

Glenn F. Massey
QA Manager | Authorized Signatory



AmeriSci Richmond

13635 GENITO ROAD
MIDLOTHIAN, VIRGINIA 23112
TEL: (804) 763-1200 • FAX: (804) 763-1800

PLM Bulk Asbestos Report

Environmental Health Consultants
Attn: T. Joel Loving
2304 Jefferson Park Avenue

Charlottesville, VA 22903

Date Received 09/21/24

Date Examined 09/24/24

RE: 458 North Madison Road

AmeriSci Job # 124091786

P.O. #

Page 1 **of** 3

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-1 1 Location: Roof Shingles & Felt Analyst Description: Black, Heterogeneous, Non-Fibrous, Shingle Asbestos Types: Other Material: Fibrous glass 45%, Non-fibrous 55%	124091786-01L1	No	NAD (by CVES) by Daisha Addison on 09/24/24
NM 9-20-24-1 1 Location: Roof Shingles & Felt Analyst Description: Black, Heterogeneous, Non-Fibrous, Felt Asbestos Types: Other Material: Cellulose 80%, Non-fibrous 20%	124091786-01L2	No	NAD (by CVES) by Daisha Addison on 09/24/24
NM 9-20-24-2 1 Location: Roof Shingles & Felt Analyst Description: Black, Heterogeneous, Non-Fibrous, Shingle Asbestos Types: Other Material: Fibrous glass 45%, Non-fibrous 55%	124091786-02L1	No	NAD (by CVES) by Daisha Addison on 09/24/24
NM 9-20-24-2 1 Location: Roof Shingles & Felt Analyst Description: Black, Heterogeneous, Non-Fibrous, Felt Asbestos Types: Other Material: Cellulose 80%, Non-fibrous 20%	124091786-02L2	No	NAD (by CVES) by Daisha Addison on 09/24/24
NM 9-20-24-3 2 Location: Drywall And Related Joint Compound Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 4.0%, Non-fibrous 96%	124091786-03.1	No	NAD (by CVES) by Daisha Addison on 09/24/24

Client Name: Environmental Health Consultants

PLM Bulk Asbestos Report

458 North Madison Road

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-3 2	124091786-03.2 Location: Drywall And Related Joint Compound	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-4 2	124091786-04.1 Location: Drywall And Related Joint Compound	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 4.0%, Non-fibrous 96%			
NM 9-20-24-4 2	124091786-04.2 Location: Drywall And Related Joint Compound	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-5 2	124091786-05.1 Location: Drywall And Related Joint Compound	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: Gray, Heterogeneous, Non-Fibrous, Drywall Asbestos Types: Other Material: Cellulose 3.0%, Non-fibrous 97%			
NM 9-20-24-5 2	124091786-05.2 Location: Drywall And Related Joint Compound	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Joint Compound Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-6 3	124091786-06L1 Location: 12"x12" White & Blue Vinyl Floor Tile & Mastic	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Tile Asbestos Types: Other Material: Non-fibrous 100%			

PLM Bulk Asbestos Report

458 North Madison Road

Client No. / HGA	Lab No.	Asbestos Present	Total % Asbestos
NM 9-20-24-6 3	124091786-06L2 Location: 12"x12" White & Blue Vinyl Floor Tile & Mastic	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: Brown, Heterogeneous, Non-Fibrous, Mastic Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-7 3	124091786-07L1 Location: 12"x12" White & Blue Vinyl Floor Tile & Mastic	No	NAD (by CVES) by Daisha Addison on 09/24/24
Analyst Description: White, Heterogeneous, Non-Fibrous, Tile Asbestos Types: Other Material: Non-fibrous 100%			
NM 9-20-24-7 3	124091786-07L2 Location: 12"x12" White & Blue Vinyl Floor Tile & Mastic "Insufficient Material Submitted For Analysis"		NA
Analyst Description: Mastic Asbestos Types: Other Material:			

Reporting Notes:

Analyzed by: Daisha Addison
Date: 9/24/2024



Reviewed by: Glenn F. Massey



*NAD = no asbestos detected, Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Pt Ct = 0.25%, 1000 Pt Ct = 0.1%; "Present" or NVA = "No Visible Asbestos" are observations made during a qualitative analysis; NA = not analyzed; NA/PS = not analyzed / positive stop; PLM Bulk Asbestos Analysis using Meiji, Model MT 6120 microscope, Serial #2200363, by EPA 600/R-93/116 per 40 CFR 763 (NVLAP Lab Code 101904-0) and ELAP PLM Analysis Protocol 198.1 for New York friable samples which includes quantitation of any vermiculite observed (198.6 for NOB samples) or EPA 400 pt ct by EPA 600/M4-82-020 (NYSDOH ELAP Lab # 10984); CA ELAP Lab # 2508; Note: PLM is not consistently reliable in detecting asbestos in floor coverings and similar NOB materials. NAD or Trace results by PLM are inconclusive, TEM is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos-containing in New York State (also see EPA Advisory for floor tile, FR 59, 146, 38970, 8/1/94). NIST Accreditation requirements mandate that this report must not be reproduced except in full without the approval of the laboratory. This PLM report relates ONLY to the items tested.



Environmental Health Consultants, Inc.
 2304 Jefferson Park Avenue
 Charlottesville, VA 22903

124091786

Phone: (434) 962-8721 • Email: joel@tjlenvironmental.com

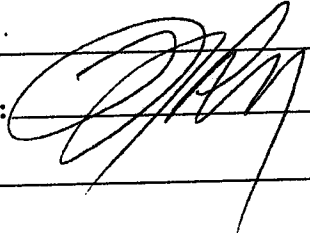
Laboratory Sample Analysis Request

Analysis and Turnaround Time Requested: PLM (48hrs)

Project Description: 458 North Madison Road

Instructions: Please email results as soon as analyses completed. Repeat all sample information shown below on final lab report. Please sign and return this form with written report. Other special requests: SP = Stop Res

Sample #	Special Notes	Person/Area Sampled	Activity Occurring	Pump #	Pump Flow Rate (LPM)	Start Time	Stop Time
NM9-20 -21-1		Roof shingles + felt					
-2	SP	"					
-3		Drywall and related joint compound					
-4	SP	"					
-5	SP	"					
-6		12"x12" white + blue vinyl floor tile + mastic					
-7	SP	"					

Samples submitted by:  Received Date: 9-20-24

Samples received by: _____ Date: SEP 23 2024

Section #033000 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide concrete products for the installation of concrete footings and slab, concrete walks, and concrete parking areas.
- B. Repair of any concrete elements damaged during construction.
- C. See Structural drawings for additional information. Structural drawings will take precedence over other specifications for structural concrete.

1.2 SUBMITTALS

- A. Submit for approval product data and test reports.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Formwork: APA rated B-B Plyform forms sufficient for structural and visual requirements or approved equal.
- B. Reinforcement:
 - 1. Bars: Deformed steel, ASTM A 615, Grade 60.
 - 2. Mesh: Welded steel wire fabric, ASTM A 185.
- C. Concrete materials:
 - 1. Cement: Portland cement, ASTM C 150, Type 1.
 - 2. Aggregate: Normal weight aggregates, ASTM C 33.
- D. Admixtures, all with less than 1% chloride ions:
 - 1. Water-reducing type and superplasticizer as required for workability; Euclid, Sika, L&M or approved equal.
 - 2. Air-entraining type for use in exterior concrete and foundations exposed to freeze-thaw; Euclid, Sika, L&M or approved equal.
- E. Miscellaneous Materials:
 - 1. Grout: Non-metallic, non-shrink type.
- F. Concrete Mixes:
 - 1. Concrete footings to be minimum 3000 psi.
 - 2. Exterior Concrete to be 3500psi. air entrained, for sidewalks and slabs.
 - a. Concrete walks shall be a minimum 4” thick
 - b. Control joints for concrete walks shall be ¾” deep and ¼” wide

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with ACI 301, 304, 305, 306, 311, 318, 347, CRSI "Manual of Standard Practice", and ASTM C94. Do not change mix design without approval. Calcium chloride admixtures are not permitted.
- B. Cure and protect work. Contractor shall report defective work to Architect in writing.
- C. Contractor shall submit 28-day test results to Owner.

Section #042113 MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide Concrete Masonry Units (CMU) for foundations U.N.O..
- B. Provide Brick Masonry products for the installation of brick veneer construction as delineated on the Drawings.
- C. Provide Brick Masonry for Project Sign piers.
- D. Refer to structural drawings for additional specifications. Structural drawings shall take precedence over other submittal information.

1.2 SUBMITTALS

- A. Submit for approval samples and product data, and test reports.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide masonry products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced masons. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete Masonry Units (CMU): 15-5/8" x 7-5/8" 7-5/8" (16 x 8 x 8 nominal) lightweight units. Or size as indicated.
- B. Brick: Oversize modular, ASTM C 216, Severe weathering grade, Type FBS. Special shapes as required by building configuration.
- D. Mortar: ASTM C 270, portland cement-lime mortar, Type N above grade; Type M below grade; other types as required by application. Inorganic oxide mortar pigments, color as selected; Davis, Solomon Grind-Chem or approved equal.
 - 1. Provide mortar mesh in all brick veneer installations using 'MortarNet' mesh as manufactured by Mortar Net Solutions, or approved equal.
- C. Reinforcing:
 - 1. Ties and reinforcing: Hot-dipped galvanized, ASTM A 153.
 - 2. Horizontal reinforcing: Welded truss type, 9 gage wire with deformed side rods.
 - 3. Reinforcing bars: Deformed bars, ASTM A 615, Grade 60.
- D. Miscellaneous Materials:
 - 1. Weep baffle at base of cavity: Clean, rounded gravel.
 - 2. Drainage: Open head joints equal to masonpro cell vents to match mortar color.
 - 3. Drainage Plane Material: Tyvek commercial wrap or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with PCA "Recommended Practices for Laying Concrete Block" and BIA Tech Notes 11, 11A, 11B, 11C, 11D, and 11E, and NCMA TEK Bulletins.
- B. Weather Protection: Cold weather; heat mortar water and sand, enclose walls and provide temporary heat as recommended by BIA Tech Notes 1, 1A, 1B, and 1C. Hot weather; use mortar within 1-1/2" hours after mixing for ambient 80 degrees F or above.
- C. Tolerances: From dimensions and locations in Contract Documents for plumb, level and alignment, plus or minus 1/8 in 20'.
- D. Bond: Lay exposed face brick in running bond except at areas of special coursing, patterns and bonding as indicated on Drawings.
- E. Joints: Maintain uniform 3/8" width; tool concave. Provide full bed, head and collar joints except at weep holes; keep cavity clean at cavity walls.
- F. All grading and new mulch shall allow weep holes in new brick veneer to remain exposed.
- G. Coordinate installation of flashings; prepare masonry surfaces smooth and bed flashings in mortar.
- H. Ties and Horizontal Reinforcing: Comply with codes; space hot dipped galvanized ties not more than 16" oc. vertically and 16" oc horizontally.
- I. Provide expansion joints where indicated and no greater than 30' oc. at approved locations.
- J. Install rowlocks for window sills and at brick veneer caps sloped to drain water away from building.
- K. Brick Veneer Installation:
 - 1. Install new brick veneer as specified above, providing steel angle brick lintels over windows and exterior doors.
 - 2. Brick veneer shall be installed over an independent drainage plane, such as Tyvek® or equal.
 - 3. Install weep holes at foundation walls at 2'-0" oc horizontally at least two brick courses below elevation of concrete slab or finished floor and a minimum 6 inches above finished grade.
 - 4. Install weep holes in brick veneer over lintels, and relief angles.
 - a. Provide mortar mesh to prevent blockage of weep holes.
 - b. Provide continuous flashing at all weep holes and end dams at flashing terminations.

- L. Remove and replace any units damaged during construction. Enlarge holes in mortar and re-point. Prepare joints to receive sealants.
- M. Erect brick sample panel showing all brick and mortar colors on site for Owner / Architect approval. Sample to remain until brickwork is complete and clean.
- N. Clean brick veneer installation using bucket and brush method; comply with BIA Tech Note 20. Clean Concrete masonry by dry brushing; comply with NCMA TEK No. 28.

END OF SECTION

Section #055000 MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Miscellaneous metals shall include, but not necessarily be limited to, furnishing and installing anchors, fasteners, hardware, railings, stairs, utility specialties, and other miscellaneous metal items in accordance with the Contract Documents.
- B. Related Sections: 099113 – Exterior Painting
- C. Provide miscellaneous metals:
 - 1. Loose Angle Lintels for Brick Veneer installation.
 - 2. Exterior Guardrails
 - 3. Stair components
 - a. Metal Pan Treads
 - b. Stair stringers
 - c. Metal Guard Rails
 - 4. Miscellaneous Fasteners

1.2 SUBMITTALS

- A. Submit for approval shop drawings and product data.
 - 1. Shop drawings shall include sizes; finishes; all materials, locations, attached hardware, and fittings; and detail for all items including fabricated metal work, threaded fasteners, and welds. Indicate all welds, both shop and field, by AWS standards symbols.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide metal products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Material requirements:
 - 1. Whenever practicable, items shall be standard products, meeting the requirements specified herein, of a manufacturer regularly engaged in production of such items.
 - 2. All fasteners, hangers, or other miscellaneous connections or accessories shall be of the same material or compatible with the item being fastened or hung.

- B. Loose Angle Steel Lintels for Brick Veneer Installation (SEE STRUCTURAL DRAWINGS)
1. Steel for lintels shall be galvanized and shall comply with ASTM A 36.
 2. Steel angle lintels should be at least 5/16 in. (6 mm) thick with a horizontal leg of at least 3 1/2 in. (90 mm) for use with nominal 4 in. (100 mm) thick brick.
 3. Sizing of lintels shall be as directed by the Structural Engineer.
 4. Length of lintels, including appropriate bearing for the opening, shall be as directed by the Structural Engineer.
- C. Exterior Guardrails:
1. Provide steel guardrails, as delineated on the Drawings, galvanized steel pipe conforming to ASTM A53/A53M. Provide steel railings of 1 1/2" OD, GALVANIZED and shop-primed for field paint finish.
- D. Stair Components;
1. Steel Frame Stairs:
 - a. NAAMM Stair Standard: comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in. NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.
 - b. Stair Framing: (NOT USED)
 - 1) Fabricate stringers of steel plates or channels.
 - 2) Provide closures for exposed ends of channel stringers.
 - 3) Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements indicated.
 - 4) Weld stringers to headers; weld framing members to stringers and headers.
 - 5) Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
 - c. Metal Pan Stairs: (NOT USED)
 - 1) Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.
 - d. Stair Railings; (handrails only)
 - 1) Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - 2) Rails and Posts: 1-1/2-inch OD diameter top rail and 1" channel bottom rail. Pickets: 3/4" x 3/4" square pickets spaced less than 4 inches clear.
 - 3) Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. 1. Finish welds to comply with NOMIMA's Voluntary Joint Finish Standards" for Type I welds: no evidence of a welded joint as shown in NAAMM AMP 521.
 - 4) Form changes in direction of railings by bending. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

- 5) Close exposed ends of railing members with prefabricated end fittings.
- 6) Provide wall returns at ends of wall-mounted handrails.
- 7) Connect posts to stair framing by direct welding.
- 8) Brackets, Ranges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
- 9) Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses.
- 10) All stair fabrication components shall be shop primed.

E. Miscellaneous Fasteners:

1. General:

- a. Provide galvanized for use with galvanized material.
- b. Provide stainless for use with corrosion resistant metals.
- c. Provide cadmium plated for use with all other materials.

2. Expansion bolts shall be the metal shield type.
3. Steel drive bolts shall be the split shank type.
4. Headed steel anchors shall be fabricated from cold finished carbon steel conforming to requirements of ASTM A 108.
5. Cast washers, ogee washers and special cast washers shall meet the requirements of ASTM A 47. Cast washers shall be mechanically or hot-dip galvanized. The coating shall meet the thickness, adherence, and quality requirements of ASTM A 153.

F. Finishes:

1. All exposed metals will Be painted with a 10-year Warranted Paint application (see Specifications Section #099113 – Exterior Painting and Section #099123 – Interior Painting)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Loose Angle Steel Lintels for Brick Veneer Installation:

1. After the Masonry walls have been built to the height of the opening, the lintel shall be placed over the opening, taking care to assure the lintel is level and has proper bearing on each side. The brick veneer construction can then continue.

B. Exterior Guard Rails:

1. Install handrail by means of base plates bolted to roof structure below.
2. Secure rail ends by steel pipe flanges anchored by expansion shields and bolts.
3. Prepare all surfaces for application of top coat painting (see Spec Section 099113 – Exterior Painting).

C. Stair Components: (NOT USED)

1. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack. B.
2. Install metal stairs by welding stair framing to weld plates cast into the concrete.
3. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.
4. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
5. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in Place Concrete."
6. Immediately after erection, clean field welds, bolted connections, and 'abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA I for touching up shop-primed surfaces.
7. Prepare all surfaces for application of 10-Year Warranted Top Coat Painting (see Spec Section 099113 – Exterior Painting and Section #099123 – Interior Painting).

END OF SECTION

Section #061000 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide rough carpentry work:
 - 1. Wood framing as delineated in Drawings.
 - 2. Treated wood framing where required.
 - a. Bottom plates on concrete slab.
 - 3. OSB Wall and Roof Sheathing
 - 4. Advantech Subfloor or equal
 - 5. Underlayment for LVT flooring installations.
 - 6. Provide blocking for installation of wall cabinets, bath accessories, and grab bars.

1.2 SUBMITTALS

- A. Submit for approval product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide wood products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber, finished 4 sides, 19% maximum moisture content:
 - 1. Light framing: Construction grade No. 2 or better Douglas Fir or Southern Yellow Pine as indicated in structural drawings, appearance grade where exposed.
 - 2. Structural framing and timbers: No. 1 grade Southern Yellow Pine (SYP), appearance grade where exposed or as indicated in the structural drawings.
 - 3. Boards: Construction grade.

- B. Wood for nailers, blocking, furring and sleepers: Construction grade No. 2 or better, finished 4 sides, 19% maximum moisture content. Pressure preservative treat items in contact with roofing, flashing, waterproofing, masonry, concrete or the ground. Provide blocking for all mounted items, including:
 - 1. Wall Cabinets
 - 2. Grab Bars as required to meet UD and Section 504 requirements.
 - 3. Toilet accessories.
 - 4. Window treatment.

- C. Preservative treatment for wood framing as needed.
 - 1. Pressure-treated with waterborne preservatives, to comply with AWPB LP-2 for above-ground items LP-22 for ground contact items. Kiln dry after treatment to 19% max. moisture content for lumber and 15% for plywood. Treat above-ground wood exposed to deterioration by moisture and all wood in contact with the ground or fresh water.
 - 2. Fire Retardant (FRT) treatment for framing members in entrance/exit canopies roofs.

- D. Plywood, and Oriented Strand Board (OSB) for use and exposure APA rated exposure 1 with span rating that exceeds the actual span:
 - 1. Wall sheathing: 7/16" OSB Sheathing.
 - 2. Roof sheathing: 19/32" OSB sheathing with H-clips.
 - a. Provide Fire Retardant (FRT) roof sheathing above Fire Barriers and on entrance/exit canopies as indicated on the Drawings.
 - 3. Subflooring: nominal 3/4" Advantech or equal (23/32"), T&G
 - 4. Underlayment: 1/4" plywood to be installed at Sheet Vinyl and LVT/LVP flooring installations where gypcrete is not used.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wood framing: Comply with recommendations of NFPA Manual for House Framing, NFPA Recommended Nailing Schedule, and NFPA National Design Specifications for Wood Construction.
 - 1. Wall studs at exterior and interior walls shall be spaced at 16" oc maximum. Provide wood members that are plumb or level. Replace bowed or twisted members.
 - 2. Provide sill sealer for sill plates at all exterior walls.

- B. Plywood: Comply with recommendations of APA Design and Construction Guide - Residential and Commercial.

- C. Provide nailers, blocking and grounds where required. Set work plumb, level and accurately cut.

- D. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with other work.

- E. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.

- F. Restore damaged components. Protect work from damage.

END OF SECTION

Section #062023 INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide finish carpentry for interior items exposed to view:
 - 1. Installation of all interior trim to include door casing, base trim, shoe molding, window sills, and Convenience Shelves. Prepare trim for painting. Wood base trim.

1.2 SUBMITTALS

- A. Submit for approval samples of typical trim and moldings, and product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Quality standard for fabrication and products: Architectural Woodwork Institute Quality Standards, Premium grade unless noted otherwise.
- B. Interior Finish Carpentry:
 - 1. Trim and boards for opaque finish: Softwood suitable for exposure and use.
 - 2. Base Trim: See drawings for trim type. finger-jointed, paint grade acceptable at paint finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide work to sizes, shapes, and profiles indicated. Install work to comply with quality standards referenced. Back prime work and install plumb, level and straight with tight joints; scribe work to fit.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Use non-corrosive fasteners for exterior work. Coordinate with work of other sections.

- C. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
- D. Replace any damaged or missing interior trim to include a door casing, base trim, and shoe molding. Prepare new trim for painting.
- E. Caulk trim around windows and doors and trim to wall to assure proper seal.
- F. Repair minor damage, clean and protect.

END OF SECTION

Madison Road Apartments
Orange, VA

DIVISION 07 WATERPROOFING

Section #071000 WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide Fluid-applied water proofing with protection board / membrane to all Exterior Foundation walls. Extend waterproofing from top of footing to top of concrete foundation walls all around structure.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete
- B. Section 04200 - Unit Masonry.

1.3 SUBMITTALS

- A. Submit for approval samples, product data.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Warranty: Submit a sample warranty identifying the terms and conditions stated in Warranty article. A minimum 10 year material and installation warranty is required.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials.
- C. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).
- D. 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. Rebuild mock-up area as required to produce acceptable work.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-Installation Conference: Prior to beginning work, convene a conference to review conditions, installation procedures, schedules and coordination with other work.
- B. Convene minimum two weeks prior to starting work of this section.

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DIVISION 07
WATERPROOFING

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information.
 - 1. Name of material.
 - 2. Manufacturer's stock number and date of manufacture.
- B. Store materials in protected and well ventilated area. Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

- A. Do not apply when surface temperature or weather conditions conflict with manufacturer's published requirements.
- B. Coordinate waterproofing work with other trades.
- C. Keep flammable products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- D. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.8 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 WARRANTY

- A. Provide manufacturer's minimum 10 year material & labor warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Damp Proofing:
- B. Single component, water-based, polymer-modified, cold liquid applied waterproofing membrane equal to W.R. Meadows MEL-ROL LM water-proofing system.
- C. Accessories: Meadow Patch 5 & 20 Concrete Repair Mortars; Perminator 10 mil protection course; MEL-DRAIN Rolled Matrix Drainage system or compatible with equal system used.
- D. Waterproofing membrane shall have the following properties as determined by laboratory testing:
 - a. Color: Black
 - b. Solids: 70%
 - c. Total Cure Time: 16-24 hours
 - d. Shore "00" Hardness, ASTM C836: Passes
 - e. Adhesion to Concrete, ASTM C836: Exceeds
 - f. Low Temperature Flex and Crack Bridging, ASTM C836: Passes
 - g. Stability, ASTM C836: Exceeds
 - h. Elongation, ASTM D412: 1500%
 - i. Water Absorption, ASTM D1970: 0.7%
 - j. Water Vapor Transmission, ASTM E96 (Method B): 0.03 perms

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WATERPROOFING

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before work is started, applicator shall thoroughly examine all surfaces for any deficiencies.
- B. Notify Architect in writing of any defects.

3.2 SURFACE PREPARATION

- A. Surface should be clean, free of oil, grease, dirt, laitance and loose material.
- B. Repair all cracks and holes as recommended by Manufacturer, before applying surface coating. Remove and Patch form ties
- C. Protect adjacent surfaces
- D. Apply primer coat of membrane diluted 4:1 with water at a coverage rate of 100-150 SF / US gallon by spraying or rolling. Allow primer to dry.

3.3 APPLICATION

- A. Comply with manufacturer recommendations and approved submittals. Mix as recommended by manufacturer.
- B. Apply membrane by spray, roller or brush providing a minimum thickness of 60 wet mils. Cured thickness to be minimum 45 mils dry.
- C. Avoid contact with products containing tars, solvents, pitches, polysulfide polymers or PVC.
- D. Protect membrane with application of water-proof protection course, drainage board or other approved material.
- E. Backfill immediately to avoid damaging membrane system.

END OF SECTION

Section #072100 THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Closed Cell polyurethane foam insulation in all attic areas sufficient to achieve minimum R-49 insulation value.
- B. Fiberglass Batt Insulation, R-21 in walls.
- C. R-10 - 2" Rigid Perimeter Insulation where indicated
- D. 3-1/2" minimum sound batts between units and 5-1/2" min. above all basement, first and second floor ceilings.

1.2 SUBMITTALS

- A. Submit for approval product data and test reports.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide insulation products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced insulation installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Closed cell polyurethane foam insulation (R-49) in attic.
- B. Fiberglass Batt Insulation, R-21 in exterior walls.
- C. R-10 2" Rigid Perimeter Insulation
- D. 3-1/2" Sound Batts walls; 5-1/2" sound batts floors (mineral wool)

PART 3 - EXECUTION

3.1 INSTALLATION – GRADE 1 REQUIRED IN ALL LOCATIONS

- A. Install insulation materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide full thickness in one layer over entire area, tightly fitting around penetrations.

- B. Before installing insulation in the attic:
 - 1. Inspect the attic and coordinate to insure all framing, bracing & blocking is installed & all rough-ins are in place.
 - 2. Install insulation dams at the outer edge of the exterior wall above the top plate to prevent added insulation from spreading into the eave area.
 - 3. Make sure that no insulation has spread into the eave area along the building's entire perimeter where eaves occur.

- E. Seal around roof access hatch.

- F. Protect installed insulation.

END OF SECTION

SECTION 074100 – METAL ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This section covers the pre-finished, pre-fabricated Architectural standing seam roof system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
- B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.
- C. Related Work Specified Elsewhere
 - 1. Roof Deck structural steel, flat roof systems, perimeter edge systems. Roof hatches, firestopping not included in this section.

1.2 SUMMARY

- A. Section Includes
 - 1. Factory formed Standing Seam metal roof panels
- B. Related work specified elsewhere. (Note: select from the below or add appropriate sections)
 - 1. Section 05100 - Structural Steel
 - 2. Section 05200 or 05400 - Steel Joists
 - 3. Section 07600 - Flashing and Sheet Metal

1.4 QUALITY ASSURANCE

- A. Petersen Aluminum Corp, Annapolis Junction, MD, 800-344-1400 products establish a minimum of quality required.
- B. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.
- C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.5 SUBSTITUTIONS

- A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

1.6 SYSTEM DESCRIPTION

- A. Material to comply with:
 - 1. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

1.6 ROOF SYSTEM PERFORMANCE TESTING

- A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.
- B. Roof System shall be designed to meet Standard Building Code Wind Load requirements.
- C. Panels to meet:
 - 1. Water Penetration: When tested per ASTM E-283/1680 and ASTM E-331/1646 there shall be no uncontrolled water penetration or air infiltration through the panel joints.
 - 2. Roof System shall be designed to meet a UL Class 90 wind uplift in accordance with UL standard 580 and panel system shall be ASTM 1592 Tested and approved
 - 3. UL 2218 - Impact Resistance rated

1.7 WARRANTIES

- A. Weathertight warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 Years from date of Substantial Completion
- B. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.
 - 1. Exposed Panels Finish - deterioration includes the following:
 - a. Color fading more than 5 hunter units when tested according to ASTM D 2244
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214
 - c. Cracking, checking, peeling or failure of a paint to adhere to a bare metal.
 - 2. Warranty Period: 20 Years from the date of substantial completion
- C. Applicator shall furnish written zero cost to Owner labor and materials warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition.

1.8 SUBMITTALS

- A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.
- B. Provide finish samples of all colors specified.
- C. Shop drawings: Show fabrication and installation layouts of metal roof panels, metal wall panels or metal soffit panels, details of edge conditions, side-seam joints, panel profiles, corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, based on input from installer of the items involved:

1. Roof panels and attachments
2. Metal trusses, bracings and supports
3. Roof-mounted items including snow guards and items mounted on roof curbs.

E. LEED Submittals

1. Product Test reports for Credit SS 7.2. For roof panels, indicating that the panels comply with Solar Reflective Index requirement
2. Product data for Credit MR 4.1 and credit MR 4.2: Indicating the percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.
- B. Deliver components, sheets, metal roof panels and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- C. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting and surface damage.
- D. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting or other surface damage.
- E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed.
- B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.11 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports and roof penetrations with actual equipment provided.
- B. Coordinate metal roof panels with rain drainage work, flashing, trim and construction of decks, parapet walls and other adjoining work to provide a leakproof, secure and noncorrosive installation.

PART 2 - PRODUCTS

2.1 PANEL DESIGN

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates and accessories required for a weathertight installation.
- B. Roof panels shall be standing seam Tite-Loc Plus in 18" widths with 2" high seams & striations that are mechanically seamed together @ 180 degrees. 40" OC maximum clip spacing
- C. Panels to be produced with Factory supplied hot melt mastic in the seams.
- D. Panels to be produced Smooth - Factory Standard.
- E. Panels to be designed for attachment with concealed fastener clips, spaced as required by the manufacturer to provide for both positive and negative design loads, while allowing for the expansion and contraction of the entire roof system resulting from variations in temperature.
- F. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

2.2 ACCEPTABLE MANUFACTURERS

- A. This project is detailed around the roofing product of Petersen Aluminum Corporation Petersen Aluminum Corp, Annapolis Junction, MD, 800-344-1400, Tite-Loc Plus.

2.3 MATERIALS AND FINISHES

- A. Preformed roofing panels shall be fabricated of 24 GA galvalume Steel
- B. Color shall be as indicated in Finish Schedule
- C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
- D. If Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.
- E. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer of their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.
- F. Closures: use composition or metal profiled closures at the top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.
- G. Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates.
- H. Substrate shall be galvanized metal deck with bearing plates & treated wood blocking where indicated or required for system attachment.
- I. Roofing Underlayment

1. On all surfaces to be covered with roofing material, furnish and install a 40 mil Peel & Stick membrane, required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, high temperature. **Basis of design:** Carlisle WIP 300 HT High Temperature Protection Self Adhering Roofing Underlayment. Other acceptable manufacturers include:
 - a. W.R Grace "Ice & water Shield"
 - b. Interwrap Titanium PSU-30
 - c. Carlisle CCW WIP 300HT
 - d. Interwrap Titanium PSU
 - e. Tamko TW Tile and Metal Underlayment
2. Underlayment shall be laid in horizontal layers with joints lapped toward the eaves a minimum of 6, and well secured along laps and at ends as necessary to properly hold the felt in place. All underlayment shall be preserved unbroken and whole.
3. Peel and Stick Underlayment shall lap all hips and ridges at least 12 to form double thickness and shall be lapped 6 over the metal of any valley or built-in gutters and shall be installed as required by the Standing Seam Panel Manufacturer to attain the desired 20 Year Weathertightness Warranty.

J. Sealants

1. Provide two-part polysulfide class B non-sag type for vertical and horizontal joints or
2. one part polysulfide not containing pitch or phenolic extenders or
3. Exterior grade silicone sealant recommended by roofing manufacturer or
4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

2.4 FABRICATION

- A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
- B. Fabricate components of the system in factory, ready for field assembly.
- C. Fabricate components and assemble units to comply with fire performance requirements specified.
- D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation.

- B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FASTENERS

- A. Secure units to supports
- B. Place fasteners as indicated in manufacturer's standards.

3.3 INSTALLATION

- A. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.
- B. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation.
- C. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

3.4 DAMAGED MATERIAL

- A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

END OF SECTION

SECTION 074600 – EXTERIOR SIDING AND

TRIM PART 1 - GENERAL

1.1 SUMMARY

- A. Provide Exterior Siding and Trim.
 - 1. Provide smooth HardiePlank lap siding, 6” exposure, as noted on Drawings constructed of cement-reinforced exterior siding panels and trim strips.
 - 2. Provide Hardie Panel with Batten Strips for Board and Batten installation as noted on Drawings constructed of cement-reinforced exterior siding panels and trim strips.
 - 3. Provide exterior HardieTrim or Boral trim, including window and exterior door trim, inside/outside corner trim, fascia, and soffits, all constructed of cement-reinforced components.
 - 4. Provide Beaded HardiePanel porch roof ceilings or pre-finished vinyl ceilings where indicated.
 - 5. Provide HardiePanel wrap for entablatures (beams) at covered Entry and Porch Entry canopies
 - 6. Provide 6 x 6 treated wood columns, wrapped in HardiePanel (or pre-finished metal where indicated), with 1 x 8 column caps and 1 x 12 column bases, painted, as delineated on the Drawings.
 - a. Column Cap and Base trim shall be PVC Composite Trim.
 - 7. Provide vented Vinyl Soffit material for all gutter overhanging soffits and non-vented for

sloped eaves.

1.2 SUBMITTALS

- A. Submit for approval samples and product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use installers experienced in the installation of the cement-reinforced siding and trim. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Exterior siding shall be cement-reinforced exterior siding panels, Sierra 8, HardiePlank, 6" exposure, textured finish as manufactured by James Hardie or approved equal, primed.
- B. Board and Batten siding shall be cement-reinforced exterior HardiePanel, 4' x 8' x 1/4" panels, textured finish with 1 x 2 Hardie Batten Strips, all as manufactured by James Hardie or approved equal, primed.
- C. Porch roof ceilings shall be cement-reinforced panels, HardieSoffit 4' x 8' x 1/4" Beaded Porch Panel components as manufactured by James Hardie or approved equal, primed, U.N.O.
- D. Roof eave soffits shall be Solid Vinyl or Vented Soffit Panels equal to GP triple 4 basketweave fully vented, min. 14 square inches free area per square foot.

- E. Porch Beam and Column wrap shall be HardiePanel 4' x 8' x 1/4" textured panel components as manufactured by James Hardie or approved equal, primed.
- F. Exterior trim components (window and door trim, inside and outside corner boards, fascia, etc.) shall be cement-reinforced components, 5/4 HardieTrim Boards, textured as manufactured by James Hardie, Boral Trim, or approved equal, painted.
 - 1. 3.5" x 1" at window/door jamb, window apron, and corner boards. See Drawings
 - 2. 3.5" x 1" at window/door head. See Drawings
 - 3. 7.5" x 1" for underside of canopy/porch beams. See Drawings
 - 4. See drawings for additional trim width x 1" thickness.
 - 5. Install mounting blocks for all penetrations in siding such as electrical, plumbing, HVAC, and ductwork etc.
- G. All siding and trim shall be installed over a Drainage Plane, Tyvek commercial wrap, or approved equal. Drainage Plane shall be installed per the Manufacturer's instructions and shall be inspected/approved by the Architect and VA Housing CCO prior to the installation of the siding and trim components.
- H. Provide 6 x 6 treated wood posts, wrapped in textured HardiePanel, primed or pre-finished metal (see drawings).
 - 1. Column Cap and Base Trim shall be PVC Composite Trim as manufactured by CertainTeed or approved equal.
 - a. 1" x 7.5" Column Cap Trim or as indicated on details.
 - b. 11.25" x 1" Columns Base Trim or as indicated on details.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- B. Restore damaged components. Clean and protect work from damage.

END OF SECTION

SECTION 075200 – MEMBRANE ROOFING

PART 1 GENERAL

1.01 DESCRIPTION

- A. The project consists of installing Carlisle's Sure-White (white) Adhered Roofing System as outlined below:
- Apply the Adhered EPDM Roofing System in conjunction with Insulation substrate over the new roof deck where indicated.

1.02 EXTENT OF WORK

- A. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of a Sure-White 60-mil EPDM membrane Fully Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.
- B. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.
- C. The roofing contractor shall confirm all given information and advise the building owner, prior to bid, of any conflicts that will affect their cost proposal.
- D. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing fourteen (14) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection. Bids stating "as per plans and specs" will be unacceptable.

1.03 SUBMITTALS

- A. Prior to starting work, the roofing contractor must submit the following:
1. Shop drawings showing layout, details of construction and identification of materials.
 2. Sample of the manufacturer's Total Systems Warranty covering all components of the roofing system.
 3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
 4. Certification of the manufacturer's warranty reserve.
- B. Upon completion of the installed work, submit copies of the manufacturer's final inspection report to the specifier prior to the issuance of the manufacturer's warranty.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.
- B. Comply with the manufacturer's written instructions for proper material storage.
1. Store materials between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60°F minimum temperature before using.

2. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions. Keep lids on tight. Use before expiration of their shelf life.
- C. Insulation and underlayment products must be on pallets, off the ground and tightly covered with waterproof materials. Manufacturer's wrap does not provide sufficient waterproofing. Insulation and underlayment products that become wet or saturated are to be discarded.
- D. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

1.05 WORK SEQUENCE

- A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.

1.06 SAFETY

The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. **Safety shall be the responsibility of the roofing contractor.** All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment for the facility's occupants including staff, visitors, customers and the occurrence of the general public on or near the site.

1.07 WORKMANSHIP

- A. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.
- B. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.
- C. There shall be a supervisor on the job site at all times while work is in progress.
- D. All field seams and flashing details are to be completed according to manufacturer's specifications and details by the end of each work day.

1.08 QUALITY ASSURANCE

- A. The Sure-Seal/Sure-White/Sure-Tough Roofing System must achieve a UL Class B
- B. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.
- C. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the specifier. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.
- D. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a non-sales technical representative of the membrane manufacturer in order to identify any needed corrective repairs that will be required for warranty issuance. Notify the building owner seventy-two (72) hours prior to the manufacturer's final inspection.
- E. Inspector shall be employed and trained by the manufacturer and have received product-specific training from the manufacturer of the products.
- F. The Sure-White EPDM membrane meets the CRRC (Cool Roof Rating Council) requirements for reflectance and emittance. When tested in accordance with ASTM C1549, the Sure-White material has an initial solar reflectance of .76 and a 3-year aged reflectance of .64.

1.09 JOB CONDITIONS, CAUTIONS AND WARNINGS

- A. Safety Data Sheets (SDS) must be on location at all times during the transportation, storage and application of materials.
- B. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
- C. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.
- D. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
- E. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- F. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
- G. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- H. New roofing shall be complete and weathertight at the end of the work day.
- I. Contaminants such as grease, fats and oils shall not be permitted to come in direct contact with the roofing membrane. An overlay of Epichlorohydrin membrane must be adhered around units which have the potential to emit solvents, grease or oil.

1.10 WARRANTY

- A. Provide manufacturer's 20 year Total System Warranty covering both labor and all materials with no dollar limitation. The maximum wind speed coverage shall be peak gusts of 90 mph measured at 10 meters above ground level. Certification is required with bid submittal indicating the manufacturer has reviewed and agreed to such wind coverage.
- B. Warranty shall also cover leaks caused by accidental punctures: 16 man-hours per year for 60-mil Sure-Tough reinforced membranes.
- C. Warranty shall also cover leaks caused by hail:
 - 1. Hail up to 1" diameter when 60-mil Sure-Seal or Sure-White OR 60-mil Sure-Tough is installed over Carlisle SecurShield HD, Dens Deck Prime, DensDeck StormX Prime or Securock adhered with Flexible FAST adhesive (For Adhered Systems Only).
- D. Pro-rated System Warranties shall not be accepted.

PART 2 PRODUCTS

2.01 GENERAL

- A. All components of the specified roofing system shall be products of Carlisle SynTec or accepted by Carlisle SynTec as compatible. Firestone is an acceptable alternate manufacturer.
- B. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including insulation, fasteners, fastening plates and edgings) must be **manufactured and supplied** by the roofing system manufacturer and covered by the warranty.

2.02 MEMBRANE

Furnish Sure-White 60-mil EPDM (Ethylene, Propylene, Diene Terpolymer) in the largest sheet possible with 3" or 6" Factory-Applied Tape (FAT). (Splice tape shall be a butyl/EPDM based polymer with a minimum thickness of 25-mil.) The membrane shall conform to the minimum physical properties of ASTM D4637. When a 10 foot wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections. Sure-White EPDM shall be ENERGY STAR® - qualified.

2.03 INSULATION/UNDERLAYMENT

- A. When applicable, insulation shall be installed in multiple layers. The first and second layer of insulation shall be mechanically fastened or adhered to the substrate in accordance with the manufacturer's published specifications.
- B. Insulation shall be **Polyisocyanurate** as supplied by Carlisle SynTec. Minimum thickness of 3/4".
 - 1. **Carlisle Insulbase Polyisocyanurate** – A foam core insulation board covered on both sides with a medium weight fiber-reinforced felt facer meeting ASTM C 1289-06, Type II, Class 1, Grade 2 (20 psi) or Grade 3 (25 psi). The product is available in 4' x 8' standard size with a thickness from 1 to 4 inches. 4' x 4' tapered panels are also available.

2.04 FASTENING COMPONENTS

To be used for mechanical attachment of insulation and to provide additional membrane securement provide fasteners as recommended by the manufacturer to obtain the required warranty.

A. Fasteners, Plates and Bars

- 1. **Insulation Fastening Plates:** a nominal 3 inch diameter plastic or metal plate used for insulation attachment.
- 2. **Sure-White Pressure-Sensitive RUSS** (Reinforced Universal Securement Strip): a 6" wide, nominal 45-mil thick clean, cured, white reinforced EPDM membrane with 3" wide SecurTAPE laminated along one edge. Used on Sure-White Adhered Roofing Systems.

B. Insulation Adhesives

- 1. **Flexible FAST Adhesive:** An elongating impact resistant two component insulating urethane adhesive used to attach insulation. Packaging formats include 50 and 15 gallon drums as well as Dual Tanks, Dual Cartridges and 5 gallon Jug formats.
 - a. Adhesive to provide 150% elongation in conjunction with fleece backed membrane – ASTM D412
 - b. MDI content of Part A material less than 25%

2.05 ADHESIVES, CLEANERS AND SEALANTS

All products shall be furnished by Carlisle and specifically formulated for the intended purpose.

- A. **Low VOC Bonding Adhesive 1168:** A low VOC (volatile organic compound) bonding adhesive that has < 250 gpl and is designed to comply with the regulations of the South Coast Air Quality Management District's Rule 1168. See Carlisle's Product Data Sheet for a listing of the counties involved. The high strength, solvent-based contact adhesive allows bonding of EPDM membrane to various porous and non-porous substrates. Apply at a rate of 60 ft² per gallon finished surface. Available in 5-gallon cans.

- B. **Carlisle Weathered Membrane Cleaner:** A clear, solvent-based cleaner used to loosen and remove dirt and other contaminants from the surface of exposed EPDM membrane (for repairs, etc.) prior to applying EPDM Primer. Weathered Membrane Cleaner can also be used when applying Splicing Cement. Available in 1 and 5-gallon pails.
- C. **Sure-Seal/Sure-White Pressure-Sensitive SecurTAPE™ (Factory Applied):** A 3" or 6" wide by 100' long splice tape used for splicing adjoining sections of EPDM membrane. Complies with the South Coast Air Quality Management District Rule 1168.
- D. **Low-VOC EPDM Primer** - A low VOC (volatile organic compound) primer (less than 250 grams/liter) for use with SecurTape or Pressure-Sensitive products. Available in 1 or 3 gallon pails and as CAV-PRIME Pressurized Cylinders.
- E. **Lap Sealant:** A heavy-bodied material used to seal the exposed edges of a membrane splice. Available in tubes.
 - 1. Sure-Seal Lap Sealant is a black sealant for use with Sure-Seal (black) Roofing Systems.
 - 2. Sure-White Lap Sealant is a white sealant for use with Sure-White (white-on-black) Roofing Systems.
- F. **Water Cut-Off Mastic:** A one-component, low viscosity, self wetting, Butyl blend mastic used to achieve a compression seal between the EPDM membrane or Elastoform Flashing and applicable substrates. Available in tubes.
- G. **Pourable Sealer:** A black, two-component, solvent-free, polyurethane based product used for tie-ins and as a sealant around hard-to-flash membrane penetrating objects such as clusters of pipes and for a daily seal when the completion of flashings and terminations cannot be completed by the end of each work day.
- H. **One-Part Pourable Sealer:** Available in black or white, a one-component, moisture curing, elastomeric polyether sealant used for attaching lightning rod bases and ground cable clips to the membrane surface and as a sealant around hard-to-flash penetrations such as clusters of pipes.
- I. **Universal Single-Ply Sealant** A one-part polyether, non-sagging sealant designed for sealing expansion joints, control joints and counterflashings. Available in white only.

2.06 METAL EDGING AND MEMBRANE TERMINATIONS

- A. **General:** All metal edgings shall be tested and meet ANSI/SPRI ES-1 standards and comply with International Building Code. All metal work is to be supplied and warranted by the manufacturer.
 - 1. **SecurEdge 300:** a coping or fascia, snap-on edge system consisting of a 24 gauge galvanized metal water dam and .063" thick Kynar 500 finish. Metal fascia color shall be as designated by the Owner's Representative. ANSI/SPRI ES-1 Certified.
- B. **Drip Edge:** a metal fascia/edge system with a 22 or 24 gauge continuous anchor cleat and .032 inch thick aluminum or 24 gauge steel fascia. Metal fascia color shall be as designated by the Owner's Representative.
- C. **SecurEdge Coping:** incorporates a 20 gauge anchor cleat with 4 pre-slotted holes, a concealed joint cover and 10 foot continuous sections of coping cap; can accommodate minimum 5 " wide parapet walls. Metal coping cap color shall be as designated by the Owner's Representative.
- D. **Termination Bar:** a 1" wide and .098" thick extruded aluminum bar pre-punched 6" on center; incorporates a sealant ledge to support Lap Sealant and provide increased stability for membrane terminations.
- E. **SecurEdge Term Bar Fascia:** A 1.75" wide formed aluminum termination bar with pre-slotted fastening holes for ease of locating and installing. The decorative cover is available in 0.040" aluminum or 24-gauge galvanized steel. SecurEdge Term Bar Fascia is manufactured in 12' lengths for fewer joints/seams, fewer sections to handle and faster installation.

2.07 WALKWAYS

Protective surfacing for roof traffic shall be Sure-White (white) Pressure-Sensitive Walkway Pads (with Factory-Applied Tape on the underside of the walkway) adhered to the membrane surface in conjunction with Sure-Seal Primer. *Provide walkways from roof access point to and around all service sides of all equipment and to roof screen door.*

PART 3 EXECUTION

3.01 GENERAL

- A. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
- B. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.

3.03 INSULATION PLACEMENT

- A. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers are provided.
- B. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive Carlisle Flexible FAST Adhesive in accordance with the manufacturer's specifications.

3.04 MEMBRANE PLACEMENT AND BONDING

- A. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.
- B. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions and coverage rates, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
 - 1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
 - 2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
- C. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.

3.05 MEMBRANE SPLICING

- A. Position membrane sheet to allow for required splice overlap. Mark the bottom sheets with an indelible marker approximately 1/4" to 1/2" from the top sheet edge. The pre-marked line on the membrane edge can also be used as a guide for positioning splice tape.
- B. When the membrane is contaminated with dirt, fold the top sheet back and clean the dry splice area (minimum 3" wide) of both membrane sheets by scrubbing with clean natural fiber rags saturated with Sure-Seal Weathered Membrane Cleaner. When using Sure-Seal (black) PRE-KLEENED membrane, cleaning the splice area is not required unless contaminated with field dirt or other residue.
- C. Apply EPDM Primer or Low VOC EPDM Primer to splice area and permit to flash off. Primer must be applied to both the top membrane layer and the bottom membrane layer.
- D. When adhering Factory Applied Tape (FAT), pull the poly backing from FAT beneath the top sheet and allow the top sheet to fall freely onto the exposed primed surface. Press top sheet on to the bottom sheet

using firm even hand pressure across the splice towards the splice edge

- E. For end laps, apply 3" or 6" SecurTAPE to the primed membrane surface in accordance with the manufacturer's specifications. Remove the poly backing and roll the top sheet onto the mating surface.
- F. Tape splices must be a minimum of 2-1/2" wide using 3" wide (Butyl/EPDM) SecurTAPE that is a minimum 25-mil thick. SecurTAPE must extend 1/8" minimum to 1/2" maximum beyond the splice edge. Field splices at roof drains must be located outside the drain sump.

Note: For projects where a 90-mil membrane OR 20-year or longer System Warranty is specified, splice enhancements are required. Refer to Carlisle Sure-Seal/Sure-White Roofing System Specification.

- G. Immediately roll the splice using positive pressure when using a 2" wide steel roller. Roll across the splice edge, not parallel to it. When FAT is used, Carlisle's Stand-Up Seam Roller can be used to roll parallel to the splice edge.
- H. **At all field splice intersections**, apply Lap Sealant along the edge of the membrane splice to cover the exposed SecurTAPE 2" in each direction from the splice intersection. Install Carlisle's Pressure-Sensitive "T" Joint Covers or a 6" wide section (with rounded corners) of Sure-Seal Pressure-Sensitive Elastoform Flashing over the field splice intersection.

3.06 FLASHING

- A. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practicable. Use Pressure-Sensitive Curb Wrap when possible to flash curb units.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.07 WALKWAYS

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.
- B. Adhere walkways pads or rubber pavers to the EPDM membrane in accordance with the manufacturer's specifications.

3.08 DAILY SEAL

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed.

3.09 CLEAN UP

- A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SPECIFICATION

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DIVISION 07

07460-2

SECTION 076000 – GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide manufactured gutters and downspouts as delineated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval samples and product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide gutter and downspout products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced gutter and downspout installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Gutters and downspouts:
 1. Gutters: standard 7" extruded seamless prefinished aluminum gutters .032" thick, color shall be as selected by Architect.
 - a. Stamped downspout cut-outs in new gutters shall match the size of the new downspouts. An alternate is to install properly sized boots in the gutters to receive the downspouts.
 2. Downspouts: standard prefinished 3" x 4" aluminum.
 - a. Downspouts shall connect to underground PVC piping with cast iron boot transition (see Civil drawings).
 3. Factory-Applied Finish:
 - a. Gutter/Downspout exterior finish: thermo setting polyester enamel, roller coated and baked at high temperatures for the outside coating.
 - b. Gutter/Downspout interior finish: thermo setting polyester enamel applied to help resist corrosion and promote formability.
 - c. Color range of the applied finish: 0.8 mils, plus or minus 0.2 mils (1.0).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. After installation roofing and new fascia (including painting of fascia), install gutters per manufacturer's recommendations.
- B. Follow recommendations of SMACNA "Sheet Metal Manual". Allow for expansion. Isolate dissimilar materials.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- D. Restore damaged components and finishes. Clean and protect work from damage.

END OF SECTION

Section #076200 FLASHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide flashing for any roof penetrations as delineated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide flashing products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Flashing:
 1. Aluminum Sheet: 20 gage alloy 3003 clear anodized aluminum, ASTM B 209.
 2. Flashing type as recommended by roof system manufacturer and / or specified in other locations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Follow recommendations of SMACNA "Sheet Metal Manual". Allow for expansion. Isolate any dissimilar materials.
- B. Flash all new openings in roof. Provide new vent caps for any exhaust vents penetrating the roof or walls. Provide new pre-molded aluminum or vinyl flashing boots at all plumbing vent pipes secure and tight around pipe. (see plumbing).
- C. Flashing for roofing adjacent to any wall shall be step flashing or as recommended by roofing manufacturer for warranty.
- D. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- E. Restore damaged components and finishes. Clean and protect work from damage.

END OF SECTION

SECTION 077216 – ROOFTOP SUPPORTS FOR EQUIPMENT SCREENS

GENERAL

SUMMARY

Section Includes:

Fixed, aluminum rooftop supports for equipment screens

See Division 5 Section "Structural Metal Framing" and "Steel Decking" for attachment of equipment rails to roof structure.

See Division 7 Section applicable to roofing material penetrations and resealing

PERFORMANCE REQUIREMENTS

Design: Design framing and equipment rails, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

Structural Performance: Framing shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of framing components, noise or metal fatigue, or permanent damage to fasteners and anchors.

Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

Deflection Criteria: Framing member deflection shall not exceed L/120

SUBMITTALS

Product Data: For each type of product indicated.

Shop Drawings: For structural framing system and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame locations, sizes, and components required.

Samples: For each type of metal finish required.

Submittal: For structural framing system indicated to comply with structural performance requirements and design criteria indicated.

PRODUCTS

MATERIALS

Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.

Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.

Fasteners: Use types and sizes to suit unit installation conditions.

Use 300 series stainless-steel fasteners.

FABRICATION, GENERAL

Join frame members to each other and to connection brackets with threaded fasteners. Join equipment rail components with fillet welds.

ROOFTOP SUPPORTS FOR EQUIPMENT SCREENS

Aluminum Base Supports and Structural Framing

Basis-of-Design Product: "Sturdistruct" framing by Architectural Louvers Co. (Harray, LLC). Architectural Louvers - <http://www.archlouvers.com> - phone: 888-568-8371. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:

Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.

Base Support Thickness: Not less than 0.080 inch (2.03 mm)

Frame Member Thickness: Not less than 0.125 inch (3.2 mm)

Curb Cap Thickness: Not less than 0.125 inch (3.2 mm)

Connection Bracket Thickness: Not less than 0.250 inch (6.4 mm)

Component Design Requirements:

Posts and Girts shall be 3 inch x 3 inch (76 mm x 76 mm) profiles with slots for easy attachment to other components

Kicker Braces and Racking Braces shall be 1-1/2 inch x 1-1/2 inch (38 mm x 38 mm) profiles with slots for easy attachment to other components.

Connection Brackets shall have minimum 4 holes per leg for acceptance of 5/16 inch (8 mm) fasteners.

ALUMINUM AND STAINLESS STEEL FINISHES

Mill finish

EXECUTION

INSTALLATION

Install base supports and framing in accordance with manufacturer's printed instructions.

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THERMAL AND MOISTURE PROTECTION

Locate and place base supports level, plumb, and at indicated locations per project drawings provided by the manufacturer.

Repair any roof penetrations per the original roofing material manufacturer's instructions.

Posts and Girts shall be level and plumb to accept equipment screens being supported.

Repair damaged surfaces so no evidence remains of corrective work. Return items that cannot be repaired to the manufacturer for replacement.

END OF SECTION

Section #07723 ROOF HATCH

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Provide factory-fabricated roof hatches for ladder access.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

- A. Manufacturer: A minimum of 5 years experience manufacturing similar products.
- B. Installer: A minimum of 2 years experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Manufacturer: Type S-50TB Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.BILCO.com.

2.2 ROOF HATCH

- A. Furnish and install where indicated on plans metal roof hatch Type S-50TB, size width: 30" (914mm) x length: 36" (762mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- B. Performance characteristics:
 - 1. Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
 - 2. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span or 20 psf (97kg/m²) wind uplift.

3. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 4. Operation of the cover shall not be affected by temperature.
 5. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- C. Cover: Shall be 11 gauge (2.3mm) aluminum with a 5" (127mm) beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- D. Cover insulation: Shall be 3" (75mm) thick polyisocyanurate with an R-value = 20.3 ($U=0.279 \text{ W/m}^2\text{K}$), fully covered and protected by an 18 gauge (1mm) aluminum liner.
- E. Curb: Shall be 12" (305mm) in height and of 11 gauge (2.3mm) aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5-1/2" (140mm) flange with 7/16" (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- F. Curb insulation: Shall be 3" (75mm) thick polyisocyanurate with an R-value = 20.3 ($U=0.279 \text{ W/m}^2\text{K}$).
- G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.
- H. Hardware
1. Heavy stainless steel pintle hinges shall be provided
 2. Cover shall be equipped with a spring latch with interior and exterior turn handles
 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 4. The latch strike shall be a stamped component bolted to the curb assembly.
 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
 6. All hardware shall be zinc plated and chromate sealed. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware].
 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- I. Finishes: Factory finish shall be mill finish aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
1. Test units for proper function and adjust until proper operation is achieved.
 2. Repair finishes damaged during installation.
 3. Restore finishes so no evidence remains of corrective work.

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DIVISION 07
THERMAL AND MOISTURE PROTECTION

3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

Section #079200 LOW VOC JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide **Low VOC joint sealants** at intersection of building components.

1.2 SUBMITTALS

- A. Submit for approval samples, product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide joint sealant products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Joints designed for expansion and movement conditions at site:
 - 1. Exterior joints on vertical surfaces: Non-sag polyurethane; Pecora Dynatrol II or Tremco Dymeric or approved equal.
 - 2. Exterior masonry equal to Pecora 890 NST with continuous backer rod at control joints
 - 3. Horizontal paving joints, interior and exterior: Self-leveling polyurethane; Tremco THC 900, Pecora traffic 301 NS, or approved equal.
 - 4. Toilet fixture joints: Silicone rubber; Tremco Proglaze or Dow 786 or approved equal.
 - 5. Interior joints: Acrylic latex; Tremco Acrylic Latex or approved equal.
 - 6. Precompressed expanding sealant tape; Emseal PC-SA or approved equal.
 - 7. Pavement joint filler: Resilient, premolded asphalt impregnated fiberboard.
 - 8. Primers, bond breakers, and backer rods compatible with sealant and adjacent surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All penetrations in brick and siding shall be sealed using **Low VOC acrylic caulk**, color to match brick color (at brick veneer) or siding.
- B. Caulk all joints where new brick veneer abuts siding or trim.
- C. Caulk all gaps between window or door casing and adjacent brick veneer.

- D. Caulk all gaps between brick lintel above windows and doors and the adjacent brick veneer and between the brick lintel and the window or door.
- E. Seal gap between water supply and drain pipes and the interior walls where they penetrate before the installation of the cabinets.
- F. Caulk trim around windows and doors to assure proper seal.
- G. After removing existing carpet and sheet vinyl, caulk along joint between base trim and subfloor to assure proper seal.
- H. Seal around all plumbing, electrical, and HVAC penetrations at walls (both interior and exterior), ceiling, and floor in preparation for final EarthCraft 'blow-door' testing.
- I. Examine substrate; report unsatisfactory conditions in writing. Beginning work means acceptance of substrates.
- J. Provide sealants in colors as selected from manufacturer's standards.
- K. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Clean and prime joints, and install bond breakers, backer rods and sealant as recommended by manufacturers.
- L. Depth shall equal width up to 1/2" wide; depth shall equal 1/2 width for joints over 1/2" wide.
- M. Cure and protect sealants as directed by manufacturers. Replace or restore damaged sealants. Clean adjacent surfaces to remove spillage.

END OF SECTION

Section 081100
Steel Doors and Frames

1 GENERAL

1.1 Related Documents: Drawings and general provisions of the Contract apply to this Section.

1.2 Doors on the exterior walls are Owner furnished. The Contractor shall supply all other required doors.

1.3 Summary

1.3.1 Section includes:

1.3.1.1 Standard hollow metal doors and frames.

1.3.2 Related sections:

1.3.2.1 Division 8 Section "Door Hardware"

1.4 Definitions

1.4.1 Minimum Thickness: Minimum thickness of base metal without coatings.

1.4.2 Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.5 Submittals

1.5.1 Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.

1.5.2 Shop Drawings: Include the following:

1.5.2.1 Elevations of each door design.

1.5.2.2 Details of doors, including vertical and horizontal edge details and metal thicknesses.

1.5.2.3 Frame details for each frame type, including dimensioned profiles and metal thicknesses.

1.5.2.4 Locations of reinforcement and preparations for hardware.

1.5.2.5 Details of each different wall opening condition.

1.5.2.6 Details of anchorages, joints, field splices, and connections.

1.5.2.7 Details of accessories.

1.5.2.8 Details of moldings, removable stops, and glazing.

1.5.3 Other Action Submittals:

1.5.3.1 Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

1.5.4 Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.6 Quality Assurance

1.6.1 Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.7 Delivery, Storage, and Handling

1.7.1 Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.

1.7.1.1 Provide additional protection to prevent damage to finish of factory-finished units.

1.7.2 Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1.7.3 Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum **4-inch- (102-mm-)** high wood blocking. Do not store in a manner that traps excess humidity.

1.7.3.1 Provide minimum **1/4-inch (6-mm)** space between each stacked door to permit air circulation.

1.8 Project Conditions

1.8.1 Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 Coordination

1.9.1 Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.9.2 Coordinate rough opening size with building manufacturer prior to ordering frames or building.

2 PRODUCTS

2.1 Manufacturers

2.1.1 Manufacturers: available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.1.1.1 Ceco Door Products; an Assa Abloy Group company.

- 2.1.1.2 Curries Company; an Assa Abloy Group company.
- 2.1.1.3 Steelcraft; an Ingersoll-Rand company.
- 2.1.1.4 Allied Steel Products, Inc.
- 2.1.1.5 Republic Builders Products Corp./ Subsidy of Republic Steel
- 2.1.1.6 Approved equal.

2.2 Materials

- 2.2.1 Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- 2.2.2 Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- 2.2.3 Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) metallic coating.
- 2.2.4 Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
 - 2.2.4.1 For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- 2.2.5 Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- 2.2.6 Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- 2.2.7 Glazing: Comply with requirements in Division 8 Section "Glazing." Glazing shall be double pane, low-E argon gas filled.
- 2.2.8 Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 Standard Hollow Metal Doors

- 2.3.1 General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 2.3.1.1 Design: Flush panel, 16 ga, fully welded seams ground smooth.
 - 2.3.1.2 Core Construction: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

2.3.1.2.1 Thermal-Rated (Insulated) Doors: At exterior locations, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W) when tested according to ASTM C 1363.

2.3.1.3 Vertical Edges for Single-Acting Doors: Manufacturer's standard.

2.3.1.4 Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.

2.3.1.5 Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

2.3.2 Exterior Doors: 16 ga. Fully welded seams ground smooth. Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

2.3.2.1 Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

2.3.3 Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.3.4 Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 Standard Hollow Metal Frames

2.4.1 General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

2.4.2 Exterior Frames: Fabricated from metallic-coated steel sheet, 16 gage, drywall returns all frames interior and exterior.

2.4.2.1 Fabricate frames with mitered corners.

2.4.2.2 Fabricate frames as full profile welded unless otherwise indicated.

2.4.2.3 Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.

2.4.3 Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 Custom Hollow Metal Frames

2.5.1 General: Fabricate frames of construction indicated. Close contact edges of corner joints tight with faces mitered and stops butted or mitered. Continuously weld faces and soffits and finish faces smooth. Comply with ANSI/NAAMM-HMMA 861.

2.5.1.1 Door Frames for Openings 48 Inches Wide or Less: Fabricated from 0.053-inch-thick steel sheet. 16 gage minimum.

2.5.1.2 Door Frames for Openings More Than 48 Inches Wide: Fabricated from 0.067-inch-thick steel sheet.

2.5.2 Exterior Frames: Formed from metallic-coated steel sheet.

2.5.3 Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from the same material as frame.

2.5.4 Head Reinforcement: Provide Minimum 0.093-inch-thick, steel channel or angle stiffener for opening widths more than 48 inches.

2.6 Frame Anchors

2.6.1 Jamb Anchors:

2.6.1.1 Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.042 inch (1.0 mm)** thick.

2.6.2 Floor Anchors: Formed from same material as frames, not less than **0.042 inch (1.0 mm)** thick, and as follows:

2.6.2.1 Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.7 Fabrication

2.7.1 Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

2.7.2 Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

2.7.3 Hollow Metal Doors:

2.7.3.1 Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

2.7.3.2 Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

2.7.4 Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

2.7.4.1 Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

2.7.4.2 Provide countersunk, flat-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

- 2.7.4.3 Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- 2.7.4.4 Jamb Anchors: Provide number and spacing of anchors as follows:
 - 2.7.4.4.1 Stud-Wall Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - 2.7.4.4.1.1. Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 2.7.4.4.1.2. Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
 - 2.7.4.4.1.3. Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.
 - 2.7.4.5 Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - 2.7.4.5.1 Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - 2.7.4.5.2 Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- 2.7.5 Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- 2.7.6 Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 2.7.6.1 Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2.7.6.2 Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
 - 2.7.6.3 Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 2.7.6.4 Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

2.8 Steel Finishes

- 2.8.1 Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

- 2.8.1.1 Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

3 EXECUTION

3.1 Installation

3.1.1 Hollow Metal Frames: Comply with ANSI/SDI A250.11.

- 3.1.1.1 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - 3.1.1.1.1 At fire-protection-rated openings, install frames according to NFPA 80.
 - 3.1.1.1.2 Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - 3.1.1.1.3 Install frames with removable glazing stops located on secure side of opening.
 - 3.1.1.1.4 Install door silencers in frames before grouting.
 - 3.1.1.1.5 Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - 3.1.1.1.6 Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 3.1.1.1.7 Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
- 3.1.1.2 Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - 3.1.1.2.1 Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 3.1.1.3 Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
- 3.1.1.4 Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

- 3.1.1.5 In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 3.1.1.6 In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 3.1.1.7 Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
- 3.1.1.8 Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb.
 - 3.1.1.8.1 Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 3.1.1.8.2 Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3.1.1.8.3 Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 3.1.1.8.4 Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- 3.1.2 Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 3.1.2.1 Non-Fire-Rated Standard Steel Doors:
 - 3.1.2.1.1 Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - 3.1.2.1.2 Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - 3.1.2.1.3 Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
 - 3.1.2.1.4 Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
 - 3.1.2.2 Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- 3.1.3 Glazing: Comply with hollow metal manufacturer's written instructions.
 - 3.1.3.1 Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 Adjusting and Cleaning

- 3.2.1 Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- 3.2.2 Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- 3.2.3 Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions

End of Section

Section #081416 INTERIOR DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide prehung solid core interior door assemblies as scheduled and as indicated on the Drawings. See door schedule for commercial pre-finished doors in hollow metal frames
- B. Provide 20 minute-rated doors with rated wood frames as scheduled and as indicated for the Apartment Entry Doors.
- C. Provide door hardware where indicated and as specified below.

1.2 SUBMITTALS

- A. Submit for approval product data, and warranty.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide interior door products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide solid core 1-3/8" thick prehung door units, as scheduled and where indicated on Drawings inside Apartment Units only.
- B. Provide scheduled doors as indicated for the Apartment Entry Doors.
 - 1. Door assembly, including both door and frame, shall provide the required rating.
 - 2. Door shall be provided with appropriate rating label.
 - 3. Provide assembly with two spring-loaded hinges.
 - 4. Provide levered latchsets (Keyed function) and lockset, for Unit Entry Doors. Installations shall include two spring-loaded hinges per door.
 - 5. Provide two peep holes per Unit Entry Door.

6. All interior doors shall be factory primed. See door schedule & Hardware schedule.
- C. Provide latchsets for all door installations. Provide levered latchsets for all apartment doors. Latchsets shall be as manufactured as scheduled or approved equal.
 1. Latchset functions:
 - a. At Bedrooms and Bathrooms; (Privacy) function (push button lock)
 - b. At Closet doors; Passage function.
 - c. At Mechanical Closets: Keyed function.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NWMA I.S.-1 and AWI quality standard. Prefit doors to frames. Premachine doors for hardware listed on final schedules. Factory bevel doors.
- B. Install new prehung interior solid core doors as scheduled and where identified on the Drawings. Sizes shall be as directed by the Drawings. Installation shall include rough framing for rough opening in preparation for installation of prehung door assembly. New door unit shall come predrilled for latchset. Install new latchset assembly.
- C. Installation of Rated Unit Entry doors shall comply with manufacturer's installation requirements to maintain assembly's rating.
- D. All interior door installations shall close properly without binding on the door jambs, strike plates, or carpet.
- E. Install doors with not more than 1/8" clearance at top and sides, 1/4" at bottom. Comply with NFPA 80 for rated assemblies.
- F. Prepare interior door assemblies for final topcoat painting (see Spec Section #0999123 – Interior Painting).
- G. Adjust, clean, and protect final installations.

END OF SECTION

Section #085313 VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide Energy Star rated solid vinyl insulated windows, with screens and window locks as scheduled and as indicated on the Drawings.
- B. Window types:
 1. Single-hung units.

1.2 SUBMITTALS

- A. Submit for approval window product data, warranty, test reports, maintenance data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide windows of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced window installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide **Energy Star rated** solid vinyl sliding units, each type provided with insulated glass and screens, Series 1500 as manufactured by PlyGem, or approved equal. Windows shall carry a minimum 10-year material warranty.
1. Exterior color: White.
 2. Integral vinyl interlock with dual weather-stripping.
 3. Stainless steel constant force coil spring balance (single hung units).
 4. Window units must meet or exceed Energy Star qualifications for regional requirements (North Central region) and EarthCraft Virginia.
 - a. 1/2" double pane insulating glass, Low E, with a 10-year warranty for breakage of seal.
 - b. U-Factor = 0.30, SHGC = 0.27
 7. In the **UD/HC** apartments, window locks must be located no higher than 48" AFF.
 8. Window sizes must conform to egress requirements in Bedrooms as directed by Code.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Before installing windows, perform initial installation with the Construction Control officer.
 - 1. Install new windows in per manufacturer's recommendations for installation and proper flashing, securely fastening new windows in place, plumb, level and square without distortion, twisting, bowing, or springing of frame members.
 - 2. Flashing for window installations shall strictly follow the manufacturer's requirements for the window installations. Provide back dam flashing at sill.
 - 3. Head and sill members shall be properly supported and leveled along entire length as recommended by window manufacturer.
 - 4. Installation shall include repair of all adjacent interior wall and sill surfaces, and the caulking of all joints between new windows and new trim.
 - 5. After window each window installation Contractor shall confirm that each window functions and locks properly.

- B. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION

Section #092200 GYPSUM WALLBOARD SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide gypsum drywall systems as delineated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide Gypsum Wallboard products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced Gypsum Wallboard installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Tolerances: Not more than 1/16" difference in true plane at joints between adjacent boards before finishing. After finishing, joints shall not be visible. Not more than 1/8" in 10' deviation from true plane, plumb, level and proper relation to adjacent surfaces in finished work.
- C. Fire resistance: Provide fire-rated assemblies where needed with ratings delineated on the Drawings and as determined by ASTM E 119.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Gypsum board (GWB):
 - 1. Interior non-rated use: ASTM C 36, 1/2" thick regular GWB as indicated on the Drawings; U. S. Gypsum, Gold Bond Div. National Gypsum, Domtar Gypsum or approved equal.
 - 2. Interior rated use, ceilings: ASTM C 36, 5/8" thick, Fire Code C (fire resistant) as indicated on the Drawings; U. S. Gypsum, Gold Bond Div. National Gypsum, Domtar Gypsum or approved equal.
 - 3. Interior rated use, walls: ASTM C 36, 5/8" thick, Fire Code Type X (fire resistant) as indicated on the Drawings; U. S. Gypsum, Gold Bond Div. National Gypsum, Domtar Gypsum or approved equal.
- B. Fasteners: ASTM C 514 and ASTM C 646. Provide Type S bugle head screws at interior, cadmium plated at humid and exterior areas. Provide additional anchors and fasteners as required.

- C. Joint reinforcement: ASTM C 587 paper or fiberglass tape and ready-mixed vinyl compound.
- D. Accessories: Galvanized steel corner beads, casing beads, control joints; U. S. Gypsum 800 series as applicable.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 840 and GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Board. Fill wall cavities with insulation. Except as otherwise indicated, extend fire-rated partitions to underside of deck above ceiling and extend other partitions to underside of floor finish above. Include blocking for wall cabinets, bath accessories, shelving, grab bars, accessories and similar items.
- B. Check the condition of all drywall and repair or refinish to include the following:
 - 1. Type and thickness of drywall shall match existing.
 - 2. Patch or repair any surfaces damaged during construction and refinish as needed.
- C. Provide fire-rated systems as needed and where required by authorities having jurisdiction.
- D. Install boards vertically or horizontally. Do not allow butt-to-butt joints and joints that do not fall over framing members.
- E. Install trim and 3-coat joint treatment in strict compliance with manufacturer's instructions and recommendations. Joint treatment is required at all fasteners and edges between boards. Fill all surface defects. Sand between and after joint treatment coatings and leave ready for finish painting or wall treatment.
- F. See drawings for designated control joint locations. Installer may recommend & provide additional control joint locations where specific field conditions warrant. Review all control joint locations with Architect before installation.
- G. See drawings for Level 5 finish locations.

END OF SECTION

SECTION 093000 – CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide ceramic tile work on the floors of Bathrooms where roll-in showers are installed and where indicated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval samples, product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide tile products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced tile installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Textured finish porcelain tile floors; 12" x 24" x 3/16". See schedule
- B. Laticrete or equal Latipoxy 300 adhesive
- C. Colored epoxy grout – Laticrete Spectralock Pro.
- D. Decoupling mat – Laticrete Strata Mat
- E. Waterproofing - Hydroban
- F. Underlayment – NXT patch on gypcrete with 2000 minimum psi. Coordinate gypcrete compatibility with tile adhesive manufacturer. Provide underlayment over gypcrete if required.
- G. Floor transition – Schulter ADA SS threshold
- H. Sealant – Latisil

PART 3 - EXECUTION

3.01 INSTALLATION

- B. Comply with Tile Council of America and ANSI Standard Specifications for Installation for substrate and installation required. Comply with manufacturer's instructions and recommendations.

- C. Lay tile in grid pattern running bond 1/3 lap as indicated. Layout to provide uniform 3/16" joint widths (as small joints as recommended by tile manufacturer and to minimize cutting. Do not use less than 1/2 tile units.
 - 1. Tile installation as scheduled for the floors where roll-in showers are installed shall be the full width and depth of the Bathroom floor area.
- C. Seal joints where recommended by TCA and as approved by Architect.
- D. Grout and cure, clean and protect installation.

END OF SECTION

Section #096519 RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Install new resilient flooring; Luxury Vinyl Tile (LVT) or Luxury Vinyl Plank (LVP) in all apartment areas, as scheduled.

1.2 SUBMITTALS

- A. Submit for approval samples, product data, and extra stock.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide flooring products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced flooring installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

- B. Provide materials and adhesives which do not contain asbestos.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials:
 - 1. LVT tiles or random length LVP, incorporating a minimum 50% recycled material as manufactured by Armstrong, or approved equal.
 - a. Edging: Rubber molding with concealed fastenings.
 - b. Adhesive: Waterproof as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations. Install in proper relation to adjacent work.
- B. Preparation; flooring:
 - 1. Before installing new flooring verify gypcrete underlayment compatibility with adhesives or provide additional underlayment layer.
 - 2. Prepare surfaces by cleaning, leveling and priming as required. Test adhesive for bond before general installation. Existing floors shall be level to 1/8" in 10' tolerance.
 - 3. Store resilient materials in original packages, at a temperature of not less than 70 F. for at least 24 hours prior to laying.
- C. Adhesives:
 - 1. Mix and apply adhesives according to manufacturer's instructions and recommendations.
 - 2. Apply adhesive at a rate to permit installation of flooring within working time of adhesive.
- F. Installation, flooring:
 - 1. Install tiles with tight joints and pattern in adjoining areas running in the same direction
 - 2. Install tread and riser covers, cut to fit tight against risers and stringers, per manufacturer's recommendations.
 - 3. Install flooring per manufacturer's instructions and recommendations.
 - 4. Install edging strip (flooring installation) where edge would be exposed.
 - 5. Maintain temperature of not less than 70 F. while laying flooring and tread covers.
 - 6. Installation of transition strips (flooring installations) shall minimize joints in strips.
 - 7. Clean installations per manufacturer's recommendations and protect installation.
 - 8. Remove and re-install any loose or bubbled tile in all locations.

END OF SECTION

Section #099113 EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide surface preparation and painting for all unfinished exterior surfaces, including electrical and mechanical equipment with shop primed surfaces.

- 1. Paint all exterior bare or primed ferrous metal surfaces.
- 2. Paint all new Hardie Plank siding and trim installations.

B. 1.02 SUBMITTALS

- A. Submit for approval samples and product data.

1.03 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide paint products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced painters. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use **low VOC paint (150g/L or less) products** as manufactured by Sherwin Williams Co., Glidden, Benjamin Moore, or approved equal.
- B. Exterior paint systems: see Sheet CS1.2 for coating schedule

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.
- B. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.
- C. All exterior metal surfaces shall be factory or field painted.
- D. Clean each surface of dirt or any attached material including excess paint in order to provide a smooth, clean surface for new paint.
- E. Match approved colors for texture finish and color. Re-coat or remove and replace work which does not match or shows loss of adhesion. Clean up, touch up and protect work.

END OF SECTION

Section #099123 INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide surface preparation and painting for all interior paintable surfaces to include walls, ceilings, trim, and doors.
- B. Paint all exposed metal surfaces including railings.

1.2 SUBMITTALS

- A. Submit for approval color samples, product data, and extra stock.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide paint products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced painters. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Interior paint systems: See
 1. **Use low VOC paint (150g/L or less) products** as manufactured by Sherwin Williams Co., Glidden, Benjamin Moore, or approved equal.
 2. Paint Finish Schedule: See Sheet CS1.2 for coating schedule

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.
- B. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.
- C. Match approved colors for texture finish and color. Re-coat or remove and replace work which does not match or shows loss of adhesion. Clean up, touch up and protect work.

END OF SECTION

Section #101200 POSTAL BOXES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide Postal Boxes wall mounted, exterior surface mounted, and fully accessible for all units as indicated on the floor plan.

1.2 SUBMITTALS

- A. Submit for approval product data and warranty.

1.3 QUALITY ASSURANCE

- A. Provide Postal Boxes products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Horizontal 3800 Series Surface Mounted Exterior Front-loading mailboxes as manufactured by Salsbury Industries, or approved equal. 3810D-10 (2) units, 3810S-04 (1) Unit
 - 2. Locking: USPS-1172 910A, 3 keys each lock.
 - 3. Box Identification: Numerical ID Decals.
 - 4. Mail Distribution: USPS.
 - 5. Material and Finish: Aluminum.
 - 6. Wall mounted

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify that openings in wall are correctly located, aligned, and sized for mailboxes.
- B. Install in accordance with manufacturer's instructions.
- C. Clean surfaces with mild dish detergent. Do not use harsh abrasive cleaners. Lubricate locks with graphite type lubricants only.
- D. Protect finishes from damage by construction activities.
- E. Mount mailbox height at 48" AFF max. to highest operable box

END OF SECTION

Section #101300 WIRE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide Wire Shelving for Unit Laundry Closets.
- B. Provide Wire Shelf and Rod assemblies for Bedroom and Coat Closets

1.2 SUBMITTALS

- A. Submit for approval product data and warranty.

1.3 QUALITY ASSURANCE

- A. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 Shelving and Shelf and Rod

- A. White vinyl coated wire shelving, as manufactured by ClosetMaid, or approved equal.
 - 2. Anchors: for screw-in anchorage into wood blocking behind GWB.
 - 3. Brackets: Provide intermediate supports for lengths over 48"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Confirm wood blocking has been installed prior to shelving/shelf and rod installation.
- B. Provide minimum 4 shelves per Linen Closet.
 - 1. Mount 50% of shelving below 48" AFF
- C. Mount Bedroom and Coats Shelf and rods at 48" AFF
- D. Mount Laundry shelves at 48" AFF or higher if needed for appliances to fit and operate
- E. Mount units level.
- F. Patch/clean adjacent surfaces after installation.
- G. Protect finishes from damage after installation.

END OF SECTION

Section #101400 SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide building signage as follows:
1. Permanent 12" x 16" Building Signs at each entrance (3) required.
 2. Permanent 4" x 8" signs with Braille at each Apartment entry door.
 3. Temporary Construction Sign at the entrance to the site.
 4. Painted Permanent 4' x 6' Project Sign (By Owner)
 5. H/C parking signs at each H/C parking space per local zoning ordinance.
 6. All interior and exterior code required signs for occupancy
 7. See sheet CS1.2 for additional interior signs

1.2 SUBMITTALS

- A. Submit for approval shop drawings and product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide sign products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Permanent Building Signs: Install a 12" x 16" permanent signs at each Apartment Building Entry and Community Room entry. Apartment Building sign shall display the Building Number. Signs shall be vinyl letters on prefinished 1/4" MDO board mounted to exterior in all four corners
- B. Permanent Apartment Signs: Install a 4" x 8" permanent sign at each apartment entry door displaying the apartment number. Sign lettering shall be vinyl letters on prefinished 1/4" MDO board mounted to exterior in all four corners.
- C. Provide a temporary Construction Sign shall be located at the entrance to the site supported by two 4" x 4" treated wood posts.
- D. Permanent Site Project Sign will be provided by the Owner.
- E. Provide signage at all H/C parking and H/C-Van parking areas. Signs shall be painted metal signs installed in accordance with 2018 Virginia Construction Code, mounted to 4 x 4 treated wood posts. Signs at H/C-Van parking areas shall include the term "Van". See site plan.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install sign materials and systems in accordance with manufacturer's and regulatory standards and instructions, and per approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
 - 1. Building Signs and Apartment Signs shall be mounted alongside the entry doors on the latch side and be mounted at a height between 54" and 66" above the finished floor.
- B. Restore damaged finishes. Clean and protect work from damage.

END OF SECTION

Section #102816 RESIDENTIAL BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide Bath Accessories as scheduled and where indicated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval product data, and accessory schedule.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide bath accessories of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Accessories: See Drawings; Bathroom Plans and Elevations for locations and quantities.
 - 1. 24" x 36" tilt mirror, one per Apartment Bathroom and one per Public Toilet.
 - 2. Toilet paper holder, one per Apartment Bathroom, and one per Public Toilet.
 - 3. 24" long towel bars with 3/4" polished stainless steel, one per apartment.
 - 4. 20"x36" recessed medicine cabinet, one per Apartment Bathroom.
 - 5. Tub/Shower curtain rods, one per Apartment Full Bathroom
 - 6. 42" x 1-1/2" OD stainless steel Side Horizontal Grab Bar, one per Apartment Accessible Bathroom and Public Toilet.
 - 7. 36" x 1-1/2" OD stainless steel Rear Horizontal Grab Bar, one per Apartment Accessible Bathroom and Public Toilet.
 - 8. 18" x 1-1/2" OD stainless steel Horizontal Grab Bar, one per Apartment Accessible Bathroom for use as Towel Bar.
 - 9. 18" x 1-1/2" OD stainless steel Vertical Side Grab Bar, one per Public Toilet.
 - 10. Paper Towel Dispenser, one per Public Toilet unless hand dryer provided.
 - 11. Free Standing Waste Basket, one per Public Toilet (By Owner)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories and grab bars in accordance with manufacturer's instructions and approved submittals.
- B. Install accessories and grab bars in proper relation with adjacent construction and with uniform appearance.
- C. Provide blocking in walls for proper anchorage of accessories and grab bars.
- D. Clean and protect work from damage.
- E. Replace any accessories damaged during construction.

END OF SECTION

SECTION 108200 – LOUVERED ROOF TOP EQUIPMENT SCREENS

GENERAL

SUMMARY

Section Includes:

Fixed, extruded-aluminum louvered roof top equipment screens

See Division 5 Section "Structural Metal Framing" for structural framing supporting louver sections.

PERFORMANCE REQUIREMENTS

Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.

Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

SUBMITTALS

Product Data: For each type of product indicated.

Shop Drawings: For equipment screens and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

Samples: For each type of metal finish required.

Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.

PRODUCTS

MATERIALS

Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.

Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.

Fasteners: Use types and sizes to suit unit installation conditions.

For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

FABRICATION, GENERAL

Join concealed frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

EXTRUDED-ALUMINUM ROOF TOP EQUIPMENT SCREEN

Horizontal Blade Louvered Roof Top Equipment Screen

Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model V4JS. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:

Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.

Louver Blade Depth: 4 inches (100 mm)

Blade Profile: Plain blade without center baffle.

Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).

Framing Support Nominal Thickness: Not less than 0.125 inch (3.2 mm)

Louver Performance Requirements:

Free Area: Not less than 8.0 sq. ft. (0.74 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver assembly.

Horizontal Drag Coefficient: Not greater than 0.63 on a cross sectional profile, allowing for a 37% reduction in wind load imposed horizontally upon supporting structural framing.

ALUMINUM FINISHES

High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Color and Gloss: As selected by Architect from manufacturer's full range.

EXECUTION

INSTALLATION

Locate and place equipment screens level, plumb, and at indicated alignment with adjacent work.

Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

Provide perimeter reveals and openings of uniform width to allow for thermal expansion, as indicated.

Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

END OF SECTION 10 82 00

Section #112600 KITCHEN AND VANITY CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide kitchen cabinets for all apartments.
 - 1. UFAS compliant cabinetry in all **UD/HC** and **UD** Apartments.
 - 2. UFAS compliant cabinetry in the **Community Room**.
- B. Provide counters as indicated on the Drawings.

1.2 SUBMITTALS

- A. Submit for approval color/pattern samples, shop drawings, and product data.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide cabinets and counters from acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide kitchen cabinets and bath vanities (non-handicap baths only) with wood face material, transparent finish. Cabinet units shall comply with the American National Standard Institute (ANSI), the Kitchen Cabinet Manufacturer's Association (KCMA), and the Virginia Housing Development Authority's (VHDA) Minimum Cabinet Requirements.
- B. Cabinet construction:
 - 1. Provide new Kitchen and Bath Cabinetry that complies with the following:
 - 2. **FACE FRAMES:** solid wood, minimum dimensions 3/4 inch by 1½ inch.
 - 3. **END PANELS, TOPS, and BOTTOMS:** plywood, or medium-density fiberboard, minimum thickness 3/4 inch. Exception: All kitchen sink base bottoms and bathroom vanity sink bottoms to be plywood. Plywood to be dadoed into sides and face frames.
 - 4. **BACKS:** plywood or hardboard, minimum thickness 1/2 inch. Medium-density fiberboard, minimum thickness 3/8th inch. Backs to be dadoed or rabbeted into end panels. Seal gap between water supply and drainpipes and the walls they penetrate before the installation of the cabinets. Holes cut in cabinet backs for plumbing and electrical are to be sealed (caulked) and the holes covered with escutcheon plates. Escutcheon plates shall fully cover holes. Where cut-out opening is

- larger than the escutcheon plate, install 1/4" plywood cover to reduce that opening size and then install the escutcheon plate
5. **SHELVES:** solid wood, plywood, or medium-density fiberboard. Adjustable shelves, minimum thickness 3/4 inch. Fixed shelves, minimum thickness 3/4 inch. Edge banding required except on solid wood.
 6. **DOORS and DRAWER FRONTS:** solid wood with laminate finishes on all concealed sides. Minimum thickness 3/4 inch. Plywood panels in "frame and panel" doors, minimum thickness 1/2 inch.
 7. **DRAWER BOXES:** solid wood or plywood. Minimum thickness 1/2 inch. Sides to be dadoed, rabbeted, or dovetailed to receive the front and back members of the drawer box. No butt joints will be accepted.
 8. **DRAWER BOTTOMS:** plywood, minimum thickness 1/4th inch. Bottoms dadoed and glued into drawer box.
 9. **DRAWER GUIDES:** side mounted steel rails.
- C. Kitchen Countertops to be post-formed plastic laminate with 3/4" MDF formed with seamless turned down front edge and cove at the 4" high back splash. Sidewall splashes and back/side splashes at Kitchen ranges shall be porcelain metal panels adhered to match appliances.
- D. Kitchen wall cabinets shall be anchored (screwed) to studs or blocking with a minimum (4) screws per cabinet; (2) each in upper and lower cabinet nailing strips.
- E. Kitchen cabinets in **all** apartment **UD/HC Kitchens** and **Community Room Kitchenette** shall be set so sink rim is a maximum of 34" AFF.
- F. Work area pull out counters in **UD/HC Kitchens** shall be at 30" AFF.
- G. Sink areas in **UD/HC Kitchens** shall be open below.
- H. Vanity tops with a wood apron and side supports will be used in lieu of vanities in the **UD/HC Full Baths** and Toilets in the Community Room.
- I. Doors and drawers on **all** apartment Kitchen cabinets and the **Community Room Kitchenette** cabinets shall have gripable handles.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Take field measurements prior to fabrication to ensure fit.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
 - 1. Before installation, confirm that walls are sufficiently plumb, that blocking is in place, and that related utilities are correctly located.
- C. Anchor securely in place; coordinate with countertop installation.
- D. All opening cuts in cabinetry for utility penetrations shall be accurate and neat. Seal openings to penetrations.
- E. Adjust and lubricate hardware.
- F. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION

Section #113113 KITCHEN APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide residential appliances for each apartment Kitchen as delineated in the Drawings.

1.2 SUBMITTALS

- A. Submit for approval product data, and warranty.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide appliances of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Kitchen Appliances by GE, Kenmore, Whirlpool, Frigidaire, or approved equal:
 1. Where appliances listed below are required to be **Energy Star rated**, the Contractor shall verify that the model numbers specified still maintain the Energy Star rating before ordering.
 - a. Refrigerators in all **UD/HC** apartment Kitchens shall be 18.0 cu ft side-by-side units with ice makers. Refrigerator controls shall be located within 54" of the floors.
 - b. Refrigerator installations shall include all work associated with the installation of the refrigerator and its ice maker.
 2. Ranges in all **UD/HC** apartment Kitchens shall be 30" wide electric ranges with temperature-limiting controls, self-cleaning oven, and front controls.
 - a. Installation shall include 'no tip' brackets.
 3. Range hoods in all apartments shall be **30" wide vented Rangehoods with two-speed fan and integral light**.
 - a. Installations in all **UD/HC** apartment Kitchens shall include separate remote electric switches for the light and for the fan, located in a reachable location as directed by the Architect.
 - b. Installations shall tie to ducting to the exterior.
 4. Dishwashers in all **UD/HC** apartment Kitchens shall be 24" wide, **Energy Star rated** models.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor shall donate removed kitchen appliances to local non-profit agencies, receiving and retaining a receipt, on the agency's letterhead, for donations for the Owner's records (see Section 012900 Project Procedures).
- B. Before ordering **Energy Star rated** kitchen appliances where specified, the Contractor shall verify that the model numbers specified for those appliances still maintain the Energy Star rating.
- C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- D. Installation of kitchen appliances shall include hook up to appropriate utilities.
 - 1. Plumbing, electric.
- E. Restore damaged finishes and test for proper operation. Clean and protect appliances from damage.

END OF SECTION

Section #113114 LAUNDRY EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

1. Washers and Dryers for each Apartment Unit will be furnished by the Contractor.

1.2 SUBMITTALS

- A. None required

1.3 QUALITY ASSURANCE

- A. Per Equipment Leasing Contract

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Washer and Dryer Appliances:

1. Standard Washer and Dryer Units with venting capacity to exceed actual installed vent length: Electric Washer and Dryer units.
2. Accessible Washer and Dryer Units): Front Loading Electric Washer and Dryer units.
 - a. All controls shall be located at the front of each unit and be within Accessible Reach Ranges.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation and Maintenance shall be the responsibility of the.

END OF SECTION

Section #122100 WINDOW BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide horizontal window blinds in all windows.

1.2 SUBMITTALS

- A. Submit for approval product data and warranty.

1.3 QUALITY ASSURANCE

- A. Provide window blind products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Horizontal 1" wide vinyl blinds with raising and tilting capabilities, wand and cord (manual) operation as manufactured by Levelor or approved equal.
 - 1. Head bar of blind shall be metal channel and have center support when over 28" wide.
 - 2. Length of blind shall extend from head of window to ½" above window sill. Longer blinds will not be accepted.
 - 3. In all **UD/H/C** apartments and all public areas, tilt wands for window blinds shall extend to (minimum) 4'-0" AFF.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Take field measurements prior to fabrication to ensure fit.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install window blind systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
- C. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION

Section #133419 DUMPSTER SCREENING AND BOLLARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide three-sided Dumpster Screen as indicated on the Site Plan.
- B. Provide Bollards as indicated on the Site Plan

1.2 SUBMITTALS

- A. Submit for approval, product data and warranty.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dumpster Screen:

1. Install 6'-0" high solid vinyl Dumpster screen as indicated on the Drawings anchored to 4 x 4 Vinyl Posts provided with integral aluminum post stiffeners and top caps set in 12" diameter x 30" deep concrete footings. Posts shall be located at corners and at 6'-0" oc (maximum). Vinyl Screens shall anchor to the vinyl Posts per manufacturer's standard anchorage. Provide for accessible opening from accessible path to the dumpster.
2. Provide two (2) bollards at the rear of the dumpster pad constructed of 4" diameter pipes set 30" in 16" diameter x 30" deep concrete footings. Bollards shall extend 42" above the concrete slab and be concrete filled and painted.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Construct new Dumpster screen size and location as indicated on the Drawings.

END OF SECTION

**SECTION 14 24 00
HYDRAULIC PASSENGER ELEVATORS**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes: Hydraulic passenger elevators as shown and specified. Elevator work includes:
1. Standard pre-engineered hydraulic passenger elevators.
 2. Elevator car enclosures, hoistway entrances and signal equipment.
 3. Operation and control systems.
 4. Jack(s).
 5. Accessibility provisions for physically disabled persons.
 6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
 7. Materials and accessories as required to complete the elevator installation.
- B. Related Sections:
1. Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
 2. Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
 3. Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
 4. Division 5 Metals:
 - a. Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
 - b. Providing steel angle sill supports and grouting hoistway entrance sills and frames.
 5. Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
 6. Division 16 Sections:
 - a. Providing electrical service to elevators, including fused disconnect switches.
 - b. Emergency power supply, transfer switch and auxiliary contacts.
 - c. Heat and smoke sensing devices.
 - d. Convenience outlets and illumination in control room, hoistway and pit.
 7. Division 22 Plumbing
 - a. Sump pit and oil interceptor.
 8. Division 23 Heating, Ventilation and Air Conditioning
 - a. Heating and ventilating hoistways and/or control room.
- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the TK Elevator's proposal, since it is a part of the building construction.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
 2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.

3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2" at any point.
4. Elevator hoistways shall have barricades, as required.
5. Install bevel guards at 75° on all recesses, projections or setbacks over 2" (4" for A17.1 2000 areas) except for loading or unloading.
6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42" minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
9. Machine room to be enclosed and protected.
10. Machine Room temperature must be maintained between 55° and 90° F.
11. If machine room is remote from the elevator hoistway, clear access must be available above the ceiling or metal/concrete raceways in floor for oil line and wiring duct from machine room.
12. Access to the machinery space and machine room must be in accordance with the governing authority or code.
13. Provide an 8" x 16" cutout through machine room wall, for oil line and wiring duct, coordinated with elevator contractor at the building site.
14. All wire and conduit should run remote from the hoistways.
15. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
16. Install and furnish finished flooring in elevator cab.
17. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.
18. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
19. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
20. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
21. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
22. General Contractor shall fill and grout around entrances, as required.
23. Elevator sill supports shall be provided at each opening.
24. All walls and sill supports must be plumb where openings occur.
25. For applications with jack hole, free and clear access to the elevator pit area for the jack hole-drilling rig is required.
26. Where jack hole is required, remove all spoils from jack hole drilling.
27. When not provided by Elevator Contractor, jack hole shall accommodate the jack unit. If required the jack hole is to be provided in strict accordance with the elevator contractor's shop drawings.

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28. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
29. A light switch and fused disconnect switch for each elevator should be located inside the machine room adjacent to the door, where practical, per the National Electrical Code (NFPA No. 70).
30. For signal systems and power operated door: provide ground and branch wiring circuits, including main line switch.
31. For car light and fan: provide a feeder and branch wiring circuits, including main line switch.
32. Wall thickness may increase when fixtures are mounted in drywall. These requirements must be coordinated between the general contractor and the elevator contractor.
33. Provide supports, patching and recesses to accommodate hall button boxes, signal fixtures, etc..
34. Locate telephone and convenience outlet on control panel.

1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
 1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.
 2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
 3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
 4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
 1. Owner's manuals and wiring diagrams.
 2. Parts list, with recommended parts inventory.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
 1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.

- a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
 2. The manufacturer shall have a documented, on-going quality assurance program.
 3. ISO-9001:2000 Manufacturer Certified
 4. ISO-14001:2004 Environmental Management System Certified
 5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.
- C. Regulatory Requirements:
1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
 2. Building Code: National.
 3. NFPA 70 National Electrical Code.
 4. NFPA 80 Fire Doors and Windows.
 5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG)
 6. Section 407 in ICC A117.1, when required by local authorities
 7. CAN/CSA C22.1 Canadian Electrical Code
 8. CAN/CSA B44 Safety Code for Elevators and Escalators.
 9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350
- D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).
- E. Inspection and testing:
1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
 2. Arrange for inspections and make required tests.
 3. Deliver to the Owner upon completion and acceptance of elevator work.
- F. Sustainable Product Qualifications:
1. Environmental Product Declaration:
 - a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
 - b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life-cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.
 2. Material Transparency:
 - a. GOOD: Provide Health Product Declaration at any level

- b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
- c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
- 3. LEED v4 – Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
- 4. Living Building Challenge Projects: Provide Declare label for products specified.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing shall deliver elevator materials, components and equipment and the contractor is responsible to provide secure and safe storage on job site.

1.05 PROJECT CONDITIONS

- A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.
- B. Provide the hole for the jack unit (if required by the type of jack provided), based on excavation through normal soil or clay which can be removed by manual digging or by standard truck-mounted regular drilling unit. Provide a casing if required to retain the walls of the hole. General contractor shall remove excavation spoils deposited in the elevator pit.
 - 1. If a physical obstruction or hindrance is encountered below the ground surface, including boulders, rock, gravel, wood, metal, pilings, sand, water, quick sand, caves, public utilities or any other foreign material, obtain written authorization to proceed with excavating using special excavation equipment.
 - 2. Maintain a daily log of time and material costs involved.
 - 3. Elevator contractor will be compensated on a time and material basis for additional costs incurred after encountering the physical obstruction or hindrance, including the cost of the special excavation equipment.

1.06 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.
 - 1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.

2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer: Design based around TK Elevator's Endura HMRL hydraulic elevator. 3,000 pound capacity, 150 FPM, twin post telescoping 3 stage jack

2.02 MATERIALS, GENERAL

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1-2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- C. Steel:
 1. Shapes and bars: Carbon.
 2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
 3. Finish: Factory-applied powder coat for structural and architectural parts. Color selection must be based on elevator manufacture's standard selections.
- D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness. Laminate selection must be based on elevator manufacture's standard selections.
- E. Flooring by others.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25% of the rated capacity.
- B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guides: Slide guides shall be mounted on top and bottom of the car.

- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 3-stage. Two jacks piped together, mounted one on each side of the car with each having three telescopic sections designed to extend in a synchronized manner when oil is pumped into the Assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. A follower guide shall be furnished for the top of the lower two plungers and be guided by rollers running inside a steel guide channel which is firmly attached to the guide rail system. This plunger guide system shall maintain a stabilized support for the plunger sections. Each Jack Assembly shall have check valves built into the assembly to allow for automatically re-syncing the three plunger sections by moving the jack to its fully contracted position..
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. Provide proper grade inherently biodegradable oil as specified by the manufacturer of the power unit (see Power Unit section 2.04.G for further details)

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
 - 1. An oil reservoir with tank cover.
 - 2. An oil hydraulic pump.
 - 3. An electric motor.
 - 4. An oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall be selected for specified speed and load.

- D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
 5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
 6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
 7. Oil Type: Provide a zinc free, inherently biodegradable lubricant formulated with premium base stocks to provide outstanding protection for demanding hydraulic systems, especially those operating in environmentally sensitive areas.

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
 2. Main landing door & frame finish: ASTM A1008 steel panels, factory applied powder coat finish with factory-applied powder coat finish entrance frame.
 3. Typical door & frame finish: ASTM A366 steel panels, factory applied powder coat enamel finish with factory-applied powder coat finish entrance frame.
- B. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- D. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

2.06 PASSENGER ELEVATOR CAR ENCLOSURE

A. Car Enclosure:

1. Walls: Cab type TKAP, reinforced cold-rolled steel with two coats factory applied baked enamel finish, with applied vertical wood core panels covered on both sides with high pressure plastic laminate.
2. Reveals and frieze: a. Reveals and frieze: Stainless steel, no. 4 brushed finish
3. Canopy: Cold-rolled steel with hinged exit.
4. Ceiling: Suspended type, LED lighting with translucent diffuser mounted in a metal frame. Framework shall be finished with a factory applied powder coat finish.
5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with brushed stainless steel
6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
 - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
 - b. Cab Sills: Extruded aluminum, mill finish.
7. Handrail: Provide 1.5' diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, no. 4 brushed finish.
8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
9. Protection pads and buttons: Provide one set of vinyl protection pads with metal grommets for the project. Provide pad buttons on cab front(s) and walls.

B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

2.07 DOOR OPERATION

A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.
2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
 4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
 5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
 6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
 7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
 8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel:
- D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment: Not Applicable

2.09 CONTROL SYSTEMS

- A. Controller: The elevator control system shall be microprocessor based and software oriented. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- C. Emergency Power Operation: (10-DOA) Upon loss of the normal power supply, building-supplied standby power is available on the same wires as the normal power supply. Once the loss of normal power is detected and standby power is available, the elevator is lowered to a pre-designated landing and the doors are opened. After passengers have exited the elevator, the doors are closed and the car is shut down. When normal power is restored, the elevator automatically resumes operation.
- D. Special Operation: Not Applicable

2.10 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
 - 1. Provide one pushbutton riser with faceplates having a brushed stainless steel finish.
 - a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Not Applicable
- D. Hall lanterns: Not Applicable
- E. Special Equipment: Not Applicable

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
 - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
 - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Jack unit excavation (if required by the type of jack provided): Drill or otherwise excavate below elevator pit construction as required to install the jack unit.
 - 1. Install casing for jack unit.
 - 2. Provide HDPE jack protection system for all in ground jacks.
 - 3. Set casing for jack unit assembly plumb, and partially fill with water set-tled sand, eliminating voids. Back fill depth shall be sufficient to hold the bottom of the jack in place over time.
- C. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- D. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.
- E. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- F. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- G. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- H. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.

- I. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
- J. Lubricate operating parts of system, where recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from site. Clean equipment rooms and hoistway. Remove trash and debris.
 - 1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at

time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.

- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

3.08 ELEVATOR SCHEDULE

A. Elevator Qty. 1

1. Elevator Model: Endura Twinpost above-ground 3-stage
2. Elevator Type: Hydraulic Passenger
3. Rated Capacity: 3000 lbs.
4. Rated Speed: 150 ft./min.
5. Operation System: TAC32H
6. Travel: 31'-1-1/4"
7. Landings: 4 total
8. Openings:
 - a. Front: 4
 - b. Rear: 0
9. Clear Car Inside: 6'-8" wide x 4'-7" deep
10. Inside clear height: 7'-4" standard
11. Door clear height: 7'-0" standard
12. Hoistway Entrance Size: 3'-6" wide x 7'-0" high
13. Door Type: One-speed | LH Side opening
14. Power Characteristics: 208 volts, 3 Phase, 60 Hz.
15. Seismic Requirements: No
16. Hoistway Dimensions: 8'-8" wide x 5'-9" deep
17. Pit Depth: 4'-0"
18. Button & Fixture Style: Traditional Signal Fixtures
19. Special Operations: None

3.09 SPECIAL CONDITIONS (Note: Add Special Conditions as Needed)

END OF SECTION

Section 210000 FIRE SUPPRESSION

PART 1 GENERAL

1.1 REFERENCES

1.1.1 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- A. NFPA 13 (2018) Standard for the Installation of Sprinkler Systems
- B. NFPA 13R (2018) Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height

1.2 SYSTEM DESCRIPTION

- A. Delegated Design: Design and provide new automatic wet pipe fire extinguishing sprinkler systems for complete fire protection coverage throughout, except sprinklers may be omitted from areas as allowed by NFPA 13R.
- B. Provide a local water flow and tamper alarm.

1.3 SPRINKLER SYSTEM DESIGN (See Also Plumbing Sheet P0.1)

- A. Design automatic wet pipe fire extinguishing sprinkler systems in accordance with the required and advisory provisions of NFPA 13R by hydraulic calculations, except as modified herein. Each system shall include materials, accessories, and equipment inside and outside the building to provide each system complete and ready for use. Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed working drawings to be submitted for approval. Locate sprinkler heads in a consistent pattern with ceiling grid, lights, and air supply diffusers. Provide sprinkler heads and piping system layout. Devices and equipment for fire protection service shall be UL Fire Prot. Dir. listed or FM APP Guide approved for use in wet pipe sprinkler systems.
- B. In general, systems shall be NFPA 13R except for the Community Room and Leasing office (ground floor) level and where otherwise indicated or required shall be designed to NFPA 13.

1.3.1 Location of Sprinkler Heads

- A. Location of heads in relation to the ceiling and the spacing of sprinkler heads shall comply with that permitted by NFPA 13R & 13.

1.3.2 Design Discharge

- A. Discharge shall be at least 18 gpm from any single sprinkler and not less than 13 gpm per sprinkler for the number of sprinklers required. Design discharge area shall be in accordance with the listed sprinkler criteria.

1.3.3 Number of Design Sprinklers

- A. The number of design sprinklers shall include sprinklers within a compartment to a maximum of four for an NFPA 13R system.

1.3.4 Friction Losses

- A. Calculate losses in piping in accordance with the Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 150 for plastic piping, except that friction loss may be based upon available manufacturer's data for specially listed piping products.

1.3.5 Water Supply

- A. Base hydraulic calculations on flow data per plans. Contractor shall confirm all flow data in-situ prior to design.

1.3.6 Detail Working Plan Drawings

- A. Prepare 24 by 36-inch detailed working plan drawings of sprinkler heads and piping system layout in accordance with NFPA 13R. Show data essential for proper installation of each system. Show details, plan view, elevations, and sections of the systems supply and piping. Show piping schematic of systems supply, devices, valves, pipe, and fittings. Show point to point electrical wiring diagrams. Submit working plan drawings signed by a Registered Fire Protection Engineer.

1.3.7 As-Built Drawings

- A. After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes. Submit 24 by 36-inch drawings on reproducible mylar film with title block similar to full size contract drawings.

1.4 SUBMITTALS

1.4.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4.2 INFORMATIONAL SUBMITTALS

- A. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13 & 13R, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- B. Fire-hydrant flow test report.
- C. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13&13R.

1.4.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications of Installer

- A. Prior to installation, submit data showing that the Contractor has successfully installed systems of the same type and design as specified herein, or that Contractor has a firm contractual agreement with a subcontractor having such required experience. Data shall include names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.
- B. Qualifications of System Technician: Installation drawings, shop drawings, and as-built drawings shall be prepared, by or under the supervision of, an individual who is experienced with the types of work specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum Level-III certification in the automatic sprinkler system program. The Contractor shall submit data for approval showing the name and certification of involved individuals with such qualifications at or prior to submittal of drawings.

PART 2 PRODUCTS

2.1 ABOVE GROUND PIPING SYSTEMS

- A. Provide fittings for changes in direction of piping and for connections. Make changes in piping sizes through tapered reducing pipe fittings; bushings shall not be permitted. Piping shall be concealed above ceiling.

2.1.1 Sprinkler Piping

- A. NFPA 13R, except as modified herein. Fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied shall not be permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 1.5 inches and larger. Fittings shall be UL Fire Prot Dir listed or FM APP GUIDE approved for use in wet pipe sprinkler systems. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer. Steel piping with wall thickness less than Schedule 40 shall not be threaded. CPVC and copper shall be permitted in strict accordance with all applicable NFPA requirements.

2.1.2 Sprinkler Heads

- A. Release element of each head shall be of the ordinary temperature rating or higher as suitable for the specific application. Provide polished stainless-steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings. Provide UL listed residential or quick response sprinkler heads in accordance with NFPA 13R. No O-rings will be permitted in sprinkler heads.

2.1.3 Cabinet

- A. Provide metal cabinet with extra sprinkler heads and sprinkler head wrench adjacent to the system riser. The number and types of extra sprinkler heads shall be as specified in NFPA 13R.

2.1.4 Alarm Valves

- A. Provide variable pressure type alarm valve complete with retarding chamber, alarm test valve, alarm shutoff valve, drain valve, pressure gages, accessories, and appurtenances for proper operation of the system.

2.1.5 Water Motor Alarms

- A. Provide alarms of the approved weatherproof and guarded type, to sound locally on the flow of water in each corresponding sprinkler system. Mount alarms on the outside of the outer walls of each building at a location as directed. Provide separate drain piping directly to exterior of building.

2.1.6 Pressure Switch

- A. Provide switch with circuit opener or closer for automatic transmittal of an alarm over the facility fire alarm system. Connect into the building fire alarm system. Where building fire alarm system is unavailable, provide local alarm and visual notification.

2.1.7 Valve Tamper Switch

- A. Provide valve tamper switch(es) to monitor the open position of valve(s) controlling water supply to the sprinkler system. Switch contacts shall transfer from the normal position to the off-normal position during the first two revolutions of the hand wheel or when the stem of the valve has moved not more than one-fifth of the distance from its normal position. Switch shall be tamper-resistant. Removal of the cover shall cause switch to operate into the off-normal position.

2.1.8 Pipe Hangers and Supports

- A. Provide in accordance with NFPA 13R.

2.1.9 Valves

- A. NFPA 13R. Provide indicating valves with tamper switches of types listed for fire service. Gate valves shall open by counterclockwise rotation. Check valves shall be flanged clear opening swing-check type with flanged inspection and access cover plate for sizes 2.5 inches and larger.

2.1.10 Identification Signs

- A. NFPA 13R. Attach properly lettered and approved metal signs to each valve and alarm device.

2.1.11 Backflow Prevention Assemblies

- A. Provide double check type backflow prevention assemblies which are approved by FCCCHR. Listing of the particular make, model and design, and size in the FCCCHR List shall be acceptable as the required proof.

2.1.12 Inspector's Test Connection

- A. Provide test connections approximately 6 feet above the floor for each sprinkler system or portion of each sprinkler system equipped with an alarm device; locate at the hydraulically most remote part of each system. Provide test connection piping to a location where the discharge shall be readily visible and where water may be discharged without property damage. Provide discharge orifice of same size as corresponding sprinkler orifice.

2.1.13 Main Drains

- A. Provide separate drain piping to discharge at safe points outside each building or to sight glasses attached to drains of adequate size to readily receive the full flow from each drain under maximum pressure. The discharge shall be readily visible and shall flow to a location that will not cause property damage. Provide auxiliary drains as required by NFPA 13R.

2.1.14 Fire Department Connections

- A. Provide connections approximately 3 feet above finish grade, of the approved two-way type with 2.5-inch national standard female hose threads with plug, chain, plastic breakaway caps, and identifying fire department connection escutcheon plate.

2.2 BURIED WATER PIPING SYSTEMS

2.2.1 Pipe and Fittings

- A. NFPA 13R. Provide polyvinyl chloride (PVC) piping, chlorinated polyvinyl chloride (CPVC) piping, or Type K copper tubing. Provide a dielectric union between copper piping and any metal piping.

2.2.2 Valves

- A. Provide as required by NFPA 24. Control valves shall conform to UL 262 and shall open by counterclockwise rotation.

2.2.3 Post Indicator Valves

- A. Provide with operating nut located about one meter 3 feet above finish grade. Gate valves for use with indicator post shall conform to UL 262. Indicator posts shall conform to UL 789. Provide each indicator post with one coat of primer and two coats of red enamel paint.

2.2.4 Valve Boxes

- A. Except where indicator posts are provided, for each buried valve, provide cast-iron, ductile-iron, or plastic valve box of a suitable size. Plastic boxes shall be constructed of acrylonitrile-butadiene-styrene (ABS) or inorganic fiber-reinforced black polyolefin. Provide cast-iron, ductile-iron, or plastic cover for valve box with the word "WATER" cast on the cover. The minimum box shaft diameter shall be 5.25 inches. Coat cast-iron and ductile-iron boxes with bituminous paint applied to a minimum dry film thickness of 10 mils.

2.2.5 Buried Utility Warning and Identification Tape

- A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall read "CAUTION BURIED WATER PIPING BELOW" or similar wording. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.3 PIPE SLEEVES

- A. Provide where piping passes entirely through walls, ceilings, roofs, and floors. Secure sleeves in position and location during construction. Provide sleeves of

sufficient length to pass through entire thickness of walls, ceilings, roofs, and floors. Provide one inch minimum clearance between exterior of piping and interior of sleeve or core-drilled hole. Firmly pack space with mineral wool insulation. Seal space at both ends of the sleeve or core-drilled hole with plastic waterproof cement which will dry to a firm but pliable mass, or provide a mechanically adjustable segmented elastomeric seal. In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with UL listed fill, void, or cavity material.

2.3.1 Sleeves in Masonry and Concrete

- A. Provide steel pipe sleeves or Schedule 40 PVC plastic pipe sleeves. Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in the core-drilled hole are completely grouted smooth. Provide an annular clearance around the sprinkler riser where it passes through the concrete slab in accordance with NFPA 13.

2.3.2 Sleeves Not in Masonry and Concrete

- A. Provide 26 gage galvanized steel sheet or PVC plastic pipe sleeves.

2.4 ESCUTCHEON PLATES

- A. Provide one piece or split hinge metal plates for piping entering floors, walls, and ceilings in exposed spaces. Provide polished stainless steel plates or chromium-plated finish on copper alloy plates in finished spaces. Provide paint finish on metal plates in unfinished spaces.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13R except as modified herein. Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings. Keep the interior and ends of new piping and existing piping affected by Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter. Inspect piping before placing into position. Provide Teflon based pipe thread sealant or Teflon tape on male pipe threads only.

3.1.1 Electrical Work

- A. Provide electrical work associated with this section under Division 26. Provide wiring in rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

3.1.2 Disinfection

- A. Disinfect the new water piping and existing water piping on the supply side of the backflow preventer affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 parts per million, or the residual chlorine content of domestic water supply.

3.1.3 Wet Tap Connections to Existing Underground Water Supply Systems

- A. Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around the main piping; bolt valve to the branch connection. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, without interruption of service. Notify the Owner in writing at least 15 working days prior to connection date; receive approval before any service is interrupted. Furnish materials required to make connections into existing water supply systems, and perform excavating, backfilling, and other incidental labor as required. Underground mains and lead-in connections to system risers shall be flushed before a connection is made to the sprinkler piping.

3.1.4 Buried Piping System

- A. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

3.2 FIELD PAINTING

- A. Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, steel piping, conduit, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

3.2.1 Piping in Unfinished Areas

- A. Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

3.2.2 Piping in Finished Areas

- A. Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel

applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

3.3 FIELD QUALITY CONTROL

3.3.1 Tests

- A. Hydrostatically test each system at 200 psig for a 2-hour period with no leakage or reduction in pressure. Flush piping with potable water in accordance with NFPA 13R. Piping above suspended ceilings shall be tested, inspected, and approved before installation of ceilings. Test the alarms and other devices. Test the water flow alarms by flowing water through the inspector's test connection. When tests have been completed and corrections made, submit a signed and dated certificate, similar to that specified in NFPA 13R.

-- END OF SECTION --

PLUMBING

1.1 SUMMARY & GENERAL PROVISIONS (REFER TO PLUMBING SPECS ON THE DRAWINGS)

- A. All work shall comply with federal, state (including Virginia Uniform Building Code) and local regulations. Contractor shall follow industry standards with regards to safety according to authority having jurisdiction. In addition, all work shall meet the mandatory requirements of the Virginia Housing Development Authority 2023 Minimum Design & Construction Requirements, 2022 Universal Design guidelines and Energy Star Prescriptive Path requirements.
- B. Provide plumbing products, materials and systems as scheduled and as described on the Drawings.
- C. Installation shall be in strict accordance with the most current version of local building code including referenced codes and standards and in accordance with mandates of the local building officials.
- D. The general arrangement and locations of piping, fixtures, etc. Are indicated by the drawings and shall be installed in accordance therewith; with the exception of such changes as may be required on account of other trades. Contractor shall coordinate work with installation of other subcontractors.
- E. Plumbing work shall be coordinated with the contractor as to scheduling, dimensioning and location of equipment. Major items are shown on the project plans. Contractor shall be responsible for all incidental items required to provide a complete and functional system.
- F. Trade names and catalog numbers shall be interpreted as establishing a general design and standard of quality and shall not be construed as limiting competition. Unless stated otherwise, the contractor may use any article which, in his judgement, and with written comment from the architect/ engineer indicating no objection, is equal or superior to that specified. Drawings showing changes or revisions required by the substitution for specified items shall be submitted with the shop drawing data, and the costs of all such changes shall be borne by the contractor.
- G. Similar items shall be provided by a single manufacturer.
- H. All required wall or floor openings shall be coordinated with the contractor.
- I. All piping shall be above ceiling unless indicated otherwise.
- J. All equipment shall be wiped clean, removing all traces of oil, dirt, or paint spots.
- K. Provide supports to rigidly attach all equipment, appurtenances and pipe as required for support. Prior to installation of hangers and inserts, the contractor shall coordinate locations and requirements to minimize conflicts with other building systems.
- L. Contractor shall make final connections to all equipment indicated to be furnished by others.
- M. Pressure reducing valves shall be installed on all water services where the water pressure exceeds 80 psi.
- N. All floor drains and indirect waste receptors to receive trap primer or code approved drain trap seal device.
- O. Seal around all plumbing penetrations in floors, walls and ceilings.

1.2 SUBMITTALS

- A. Submit for approval product data and warranties (where applicable).
- B. Shop drawings shall be submitted for equipment scheduled on the drawings and the following items:
 - a. All items as requested by owner.
 - b. All plumbing fixtures.
 - c. Domestic water heater(s).
- C. Identify all submittals with the name of the project.
- D. Clearly mark the specific items intended for use. Submit all related items at one time.
- E. Operating and maintenance manuals & as-builts:
 - a. Provide operating manual for: domestic water heater(s).
 - b. Prior to substantial completion, provide detailed as-builts for all underslab piping showing exact routing.

1.3 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide plumbing products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced plumbers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Guarantee: all materials and workmanship shall be guaranteed to be free from defects for a period of one (1) year from date of acceptance and contractor shall make good, without additional cost to the owner, any defects which may appear within that period. Manufacturer's warranties extending beyond one year shall be processed and turned over to the owner.

1.4 ACCESS DOORS

- A. Access doors shall be provided for all concealed valves, controls, and any other equipment or materials requiring inspection or maintenance. Access doors shall be furnished for floors, walls and ceilings, of adequate size so that concealed items will be readily accessible for servicing or for removal and replacement if necessary.

1.5 IDENTIFICATION

- A. Equipment tags: none required.
- B. Pipe markers
 - a. Color: conform to ASME A13.1.
 - b. Plastic pipe markers: factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. PIPING SPECIALTIES

- a. Pipe escutcheons: install pipe escutcheons on each pipe penetration thru floors, wall partitions, and ceilings where penetration is exposed to view and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface. Provide sheet steel escutcheons, solid or split hinged. All domestic supply runouts to fixtures shall be entirely chrome plated. No exposed copper is allowed.
- b. Pipe sleeves: install pipe sleeves here piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by architect/engineer.
- c. Fire barrier penetration seals: provide seals for any opening through fire-rated walls, floors, or ceilings used as passage for plumbing components such as piping.

B. INSULATION

- a. Flame/smoke ratings: provide composite plumbing insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame—spread rating of 25 or less and smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84 (NEPA 255) method. Insulation shall be labeled by the manufacturer. The label shall indicate the insulating value, flame spread and smoke-developed rating.
- b. Installation: insulation shall be applied in accordance with manufacturer's recommendations using only adhesives, mastics and plumbing fasteners approved by the insulation manufacturer. Insulation shall not be applied until after the equipment has been tested with results acceptable to the architect/engineer. Insulation with a vapor barrier jacket shall be applied with a continuous, unbroken vapor seal and all joints shall be sealed with a vapor barrier adhesive unless otherwise indicated. Staples, stick cups and hangers shall be vapor sealed where they puncture vapor barrier jackets. All insulation below-slab shall be close-cell foam and shall be explicitly rated by manufacturer for underground installation.
- c. Materials:
 - i. Cellular foam PPE insulation: tubular, flexible, fire resistant insulation with operating temperature range of -40 degrees f to 220 degrees F, thermal conductivity "k" 0.27 btu-in /hour--SF-deg f at 75 degrees f. No jacket required. Equal to Armstrong Armaflex AP.
 - ii. Polyethylene pipe insulation: Insulation Materials Corporation of America (IMCOA), flexible, service temperature -110F to 110F. No jacket required.
- d. Pipe insulation
 - i. Insulation omitted: omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainers, flexible connections, and expansion joints.
 - ii. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run.
 - iii. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

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- iv. Install protective metal shields and insulated inserts wherever needed to prevent compression of insulation.
- e. Pipe hanger insulation inserts: butt pipe insulation against pipe insulation inserts. For hot pipes, apply 3 inches wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inches wide vapor barrier tape or band.
- f. Domestic cold-water piping, above ground: piping shall be insulated with 1-inch-thick glass fiber, cellular foam, or polyethylene pipe insulation, with a minimum insulative value of R-3.
- g. Domestic hot water piping: piping shall be insulated with 1-inch-thick glass fiber, cellular foam, or polyethylene pipe insulation, with a minimum insulative value of R-3.

C. PLUMBING PIPING

- a. Domestic water piping above ground pipe: see drawings
- b. Domestic water piping below grade pipe: see drawings
 - i. All below-grade piping shall be minimum 3/4" dia. and shall be continuous without fittings.
- c. Fittings: see drawings
- d. Soil, waste and vent, & storm piping above grade size: see drawings
- e. Slope:
 - i. All drain lines 1/4 inch per foot minimum for sizes less than 4 inches; slope 1/8 inch per foot for sizes 4 inches and larger.
- f. Soil, waste and vent piping located below grade shall be 2 inches size minimum.
- g. Vents shall extend 12 inches above the roof. Roof flashing shall be coordinated by the contractor.
- h. Domestic hot and cold-water piping to fixtures shall be 1/2 inches size unless indicated otherwise.
- i. Air admittance valves may be used where allowed by the building department.
- j. All plumbing piping shall be solid wall construction (no cellular core piping permitted).

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D. PLUMBING VALVES

- a. Provide shut-off valve and union or equivalent at each hot and cold-water equipment connection, provide shut-off valve on each branch or riser that serves two or more plumbing fixtures.
- b. Gate valves 2-1/2 inches and smaller: all bronze, rising stem, solid wedge disc. Stockham B-100 or B-108.
- c. Ball valves may be used in lieu of gate valves 1 inches and smaller. Ball valves shall have bronze body, bronze ball and TFE seats and seals. Stockham S-216BRRT or S-216BRRS.

E. PLUMBING FIXTURES

- a. General
 - i. Codes and standards: comply with applicable portions of national standard plumbing code pertaining to materials and installation of plumbing fixtures.
 - ii. All exposed fixture supplies and waste lines shall be chrome plated.
 - iii. Plumbing fixtures shall be positively vented and trapped in accordance with the local plumbing code, latest edition. Wet venting is allowed if waste piping is oversized and in accordance with code provisions. Location of vent shall not exceed maximum distances to the trap as established within the local plumbing code.
 - iv. Mount lavatories at required elevation for handicap usage where required. Insulate all exposed piping per code requirements.
 - v. Coordinate final fixture selection with owner/architect to ensure that all ADA requirements are met. Coordinate trench drain locations with roll-in showers. All units indicated on the architectural plans as "HC", "ADA", or "handicap", as well as specific "UD" units where indicated, shall have a trench drain with roll-in shower.
 - vi. All fixtures shall be suitable for Universal Design.

F. FAUCETS/SHOWER HEADS:

- a. Install new WaterSense labeled low flow (less than 2.0 gpm) Bath Sink Faucets, equal in all apartments. All faucets shall have a lifetime warranty.
- b. Install new WaterSense labeled low flow (less than 2.0 gpm) Bath Shower Heads, in all apartments. All faucets shall have a lifetime warranty.
- c. All tubs/showers and shower diverters are to have internal shut-off-valves or external shut-off-valves with access panels.
- d. When installing wall-hung sinks, provide concealed arm type carriers.

G. WATER CLOSETS

- a. Install new WaterSense labeled 1.3 gpf ADA compliant (17" high seats) water closets in all UD/HC and UD Bathrooms and other Public H/C Toilets, complying with UFAS and ANSI A117.1 – 2003 standards.
- b. In UD/HC and UD and in other Public H/C Toilets the flush controls for the water closets shall be located on the transfer side of the fixture.

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- c. Installation shall include wax seals.
- d. Water closets shall be installed level and shall be securely anchored to the floor. Where necessary, shim the toilet, if needed, to make level and to assure secure anchorage. Caulk gap between toilet base and floor along entire perimeter of toilet base. Installation shall include bolt caps attached to bolts.
- e. Where water supply line penetrates wall, caulk gap and provide escutcheon plate.

H. LAVATORY

- a. Install new vanity tops with side supports in all apartment Bathrooms and other Public H/C Toilets.
 - i. Sinks shall be mounted at 34" from floor to the top leading rim of the sink.
 - ii. Include accessible concealment panel below counter.
 - iii. Insulate exposed drain lines below the lavatory.
- b. Non-H/C lavatories shall have cabinet and removable fronts.

I. KITCHEN SINK see drawings

- a. Install double-bowl, stainless steel, 4-hole sink in all apartment Kitchens. Both bowls of the sink shall have drains in rear of bowl.
- b. Exposed drain lines below UD/HC and UD kitchen sinks shall be insulated.
- c. Drain lines shall be located as close to the rear wall as possible.
- d. H/C and public sinks shall be 6" depth, rear drain, and ADA compliant.

J. WATER HEATER

- a. Install Electric Water Heaters. See drawings.
- b. Install pipe insulation on the first two feet of water piping extending from the water heater.
- c. Each new electric water heater shall have plastic pan 2" deep with drain to outside, and a water shut-off valve operated with a moisture sensor or similar mechanism, with piping draining to the outside.
- d. Water heater installation shall comply with the latest edition of the International Plumbing Code for New Construction.
- e. UL and NEMA compliance: provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards. Water heaters shall be furnished with ASME rated temperature and pressure relief valve with test lever.

K. ROLL-IN SHOWERS

- a. In apartments indicated as UD/HC on the Drawings, install new acrylic roll-in shower assemblies to include floor and wall surround components with UFAS- compliant grab bars and roll-over shower dam.
- b. Rough in for new shower controls to include shower control/diverter unit and shower head.

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- c. Install new Energy Star rated WaterSense low flow shower control/diverter, located off center in compliance with UFAS and ANSI A117.1 standards. Installation shall include rough in for shower drain and remotely-located floor drain.
- d. Second fixed shower head shall be located on rear wall (max) 27" from end wall per VHDA (Universal Design) Guidelines.
- e. A trench drain shall be run the full length of the shower.

L. BATH TUBS

- a. Install new one-piece acrylic bath tubs. Installations to include controls.
- b. The bottoms of bath tubs are to have slip resistant/textured finish.

M. DEHUMIDIFIER INSTALLATIONS: see drawings

- a. Install new Dehumidifier units in all apartments where indicated on the Drawings. Installations to include line to floor drain, electrical receptacle. (Equipment to be provided under Div. 23; drain installation to be provided under Div. 22 work).

N. LAUNDRY ROOMS & DWELLING UNIT LAUNDRY CLOSETS

- a. In each Laundry Room and dwelling unit laundry closet, provide hot and cold-water supply for each washer location and dryer vent hook up for each dryer location, each in a recessed panel.
- b. Clothes washing machines or connections for clothes washing machine shall have a pan, with a drain, connected to building sewer per applicable codes.

O. ELECTRIC WATER COOLER:

- a. Install new electric water cooler as indicated.
- b. Provide ADA compliant design installed to meet adult and child standards.
- c. Provide bi-level design for standard high-left/low-right or alternate low-left/high-right installation.
- d. Electronic bubbler push bars for easy activation.
- e. Fastener-less integrated drain.
- f. Flexible antimicrobial mouth guard.
- g. Vinyl clad finish.
- h. Rated for indoor use.

P. CLEANING AND TESTING

- a. All water piping, valves, etc. shall be thoroughly flushed of foreign matter and tested for leaks in accordance with the local building code. Any leakage shall be repaired. Disinfect domestic water piping including water service piping in accordance with AWWA C601.
- b. All drain, waste and vent piping shall be tested for leaks in accordance with the local building code. No visible drop in water level will be acceptable.

END OF SECTION

27 10 00 - STRUCTURED CABLING

PART 1 - GENERAL

1. SCOPE

This section describes the products and execution requirements relating to furnishing and installation of Communications Cabling and Termination Components and related sub-systems as part of a Structured Cabling System for the project. The specified cabling may support “voice” and “data”.

2. DESIGN INTENT

General

The Structured Cabling System is based on a hierarchy of cables and termination locations.

All components shall be VOIP compatible.

All cables and related termination, support and grounding hardware, bonding, shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following sections.

Provide all labor and materials necessary to construct the system as described herein. This includes - but is not limited to - furnishing and installing cable, cable supports, innerduct, racking and termination components, termination, testing, labeling, and documentation.

Horizontal Cabling

Horizontal Cabling System links the termination in the work area (Equipment Outlet (EO) to the Horizontal Cross-connect serving the location. This cabling and the related connectors (both ends) is referred to as the “Permanent Link” in this section.

3. QUALITY ASSURANCE

Manufactured Items

The manufacturer(s) of cabling and connectivity components shall be a company specializing in and having a minimum of five years documented experience in producing products similar to those specified in this and related sections.

PART 2 - PRODUCTS

1. HORIZONTAL PERMANENT LINK

General

The Horizontal Cable System is based on the installation of 4-pair, copper twisted-pair cables from the Equipment Outlet to the Horizontal Cross-connect (wiring hub). The combined cable and termination hardware is referred to as the “Permanent Link”.

Unshielded Twisted-Pair (UTP) is the default choice for the horizontal cable unless noted otherwise.

Where a shielded cable is called for, the cable shall incorporate an overall foil shield under the cable jacket and no shielding around individual pairs.

This cable is referred to herein as “F/UTP - Foiled Unshielded Twisted Pair”. “ScTP - Screened Twisted-pair” is also sometimes used in industry publications to describe the cable type.

Cable and Termination Components (Jack, Patch Panel / Wiring Blocks) are specified to function as a System. The compatibility of the Cable to be installed with the proposed termination components shall be recognized and documented by the Termination Component Manufacturer.

All Horizontal Link Cable shall be of the same manufacturer throughout the project.

All Horizontal Link connectivity components shall be of the same manufacturer throughout the project.

Application

Separate Horizontal Cables designated for "DATA" and "VOICE" (Telephone and/or other analog applications) shall support each application.

Performance

Where Cable, Component and Permanent Link performance is specified to "Exceed Category 6", performance shall be defined as follows:

- Manufacturer's published literature shall document performance margins over worst-case ANSI/TIA-568-C.2 Category 6 Channel requirements for Power Sum Attenuation-to-Crosstalk Ratio (PSACR). Channel – as tested – shall include 4-connections (minimum). Data shall be verified by an independent source (e.g. ETL, Intertek).

Performance Margins shall be greater than zero (0) at all frequencies up to and including 250-MHz. PSACR shall remain positive at all frequencies up to and including 250-MHz.

Cable and connecting components that comprise the "Permanent Link" shall meet or exceed the requirements for "DTE Power via the MDI" to provide at least 25 W at the Powered Device as defined by the IEEE 802.3at-2009 "Power over Ethernet Plus (PoE+)" standard.

Project Requirements

Cable shall be listed as being suitable for use in environments found within this project.

2. HORIZONTAL TWISTED-PAIR CABLE

All Cables and Termination hardware shall be technically compliant with and installed in accordance with the referenced ANSI/TIA documents and perform as required to provide the margins stated herein.

All cables shall be suitable for installation in the environment.

Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.

Construction:

Horizontal Cables shall be constructed of individually twisted pairs with 23-AWG (Category 6) - insulated solid copper conductors.

Pairs shall be identified by a banded color code in which conductor insulation is marked with a dominant color and banded with a contrasting color as follows:

- Pair 1: White-Blue / Blue (or Blue/White)
- Pair 2: White-Orange / Orange (or Orange/White)
- Pair 3: White-Green / Green (or Green/White)
- Pair 4: White-Brown / Brown (or Brown/White)

Cable Rating shall be as identified in the above article "HORIZONTAL PERMANENT LINK".

Cable Jacket color(s) shall be as identified in the above article "HORIZONTAL PERMANENT LINK".

Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages that incorporate a rotating reel.

Cable performance shall be as required to meet the specified Permanent Link and Channel performance as specified in the above Article "HORIZONTAL PERMANENT LINK".

Horizontal Cable Termination

Refer to Part 2 articles "EQUIPMENT OUTLET", "MODULAR PATCH PANEL" and "TERMINATION BLOCKS".

Termination hardware performance shall be as required to meet the criteria defined in "HORIZONTAL CABLING / Performance" above.

3. EQUIPMENT OUTLET

General

Station cables shall each be terminated at their designated workstation location in the connector types described in the sub-sections below. Included are Modular Jacks. These connector assemblies shall snap into a mounting frame. The combined assembly is referred to as the Equipment Outlet (EO).

EO mounting configurations shall be as follows:

- Flush in wall boxes.
- Mounted in a Floor Box or Poke-Through Assembly.

The Equipment Outlet Frame-wall- and furniture-mount assemblies shall accommodate:

- Number of jacks as indicated on the plans.
- The outlet frame shall incorporate a mechanism for adjusting the surface plate to a plumb position.

Connector mounting in the faceplate/frame shall be flush.

The same orientation and positioning of Jacks and Connectors shall be utilized throughout the installation. Prior to installation, submit the proposed configuration for each EO type for review by the owner.

Wall Mount Outlet Faceplates shall incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.

Unused jack positions shall be fitted with a removable blank inserted into the opening.

Faceplate of the EO shall be as selected by the architect.

Copper Connector (Modular Jack)

Connector shall be Legrand Ortronics series, Leviton eXtreme 6+ or owner approved equal.

4. MODULAR PATCH PANEL

Patch panel shall be 48-Port Legrand Ortronics series, Leviton eXtreme 6+, or owner approved equal.

Patch panels to be provided in quantity to accommodate all outlets shown on plans.

Patch Panels shall incorporate Modular Jacks meeting the specifications for the Equipment Outlet detailed in the above article "EQUIPMENT OUTLET".

Jack colors shall be in accordance with owner's standards.

Modular Patch Panel shall be mounted as directed by owner.

Where wall-mounted:

- Cable interface shall be on the front of the panel (same size as modular jacks) and be protected by a cover plate when in use.
- Shall incorporate a standoff bracket to allow for cabling to be routed behind the panel.

Modular Patch Panel cable termination shall:

- Have the ability to seat and cut 8 conductors (4 pairs) at a time and shall have the ability of terminating 22- through 26-gauge plastic insulated, solid and stranded copper conductors.
- Be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
- Include color coded designation strips or other markings to identify conductor position.

Modular Patch Panels shall incorporate cable support and/or strain relief mechanisms to secure cables at the termination block and to ensure that all manufacturers minimum bend radius specifications are adhered to.

Modular Patch Panel performance shall be as required to meet the specified Permanent Link and Channel performance.

5. MISCELLANEOUS MATERIALS

Fiber Optic Cable

Berk-Tek 12 x OS2 Adventum Riser Cable or owner approved equal.

Conduit for Fiber Optic Cable

Premier Conduit brand Riser Duct or owner approved equal. Conduit shall be white in color.

J-Hooks

ICC ICCMSJH922 or owner approved equal.

Connectors

CAT-6: Legrand Ortronics series, Leviton eXtreme 6+ or owner approved equal.

Fiber: Legrand Ortronics series, Leviton Fast-Cure Connector or owner approved equal.

PART 3 - EXECUTION

1. GENERAL

Refer to Project Drawings which indicate Equipment Outlet locations

Furnish and install all cables, connectors, hardware and equipment as required.

Should it be found by the Engineer or owner that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings with the respect or regard to the quality, value of materials, appliances or labor used in the work, it shall be rejected and replaced by the Contractor and all work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

All cables, termination components and support hardware shall be furnished, installed, tested and documented by the Contractor unless noted otherwise.

Schedule work with Owner/Agency and other contractors.

2. CABLE INSTALLATION

General

Install all cables in continuous lengths from endpoint to endpoint. No splices shall be allowed unless noted otherwise.

Cable shall be suitable for the installation environment through which it passes.

Furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may move or wear in a manner to pose a hazard to the cable, shall not be used.

Pull all cable by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a "break-away" or other approved method.

Use a swivel between the pull-line and pulling grip to prevent the pull-line from imparting a twist to the cable.

Complete all work using qualified personnel utilizing state-of-the-art equipment and techniques. During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit, as well as to feed cable and operate pulling machinery.

Pull cable in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed. If any installed cable is kinked to a radius less than recommended dimension it shall be replaced by the contractor with no additional cost to the project.

All wiring shall be run "free-air", in conduit, supported by J-hooks, or in a secured metal raceway as designated on the plan drawings. All cable shall be free of tension at both ends.

All new fiber cables shall be run in conduit.

Avoid abrasion and other damage to cables during installation.

Pulling Lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellerm grips may be used to spread the strain over a longer length of cable.

Manufacturer's minimum bend radius specifications shall be observed in all instances.

Leave a minimum of 12" slack at all boxes.

Leave a minimum of 10 feet service loop at MDF & IDF rooms.

Protection of cable from foreign materials:

Provide adequate physical protection during construction to prevent foreign material application or contact with any cable type.

Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited, to overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.

Overspray of paint on any cable, cable jacket or cable termination component will not be accepted.

Use of any cleaning agents to remove overspray shall be per the cable manufacturer's written consent.

It shall be the Contractor's responsibility to replace any component in its entirety affected by a foreign material. This shall be at no additional cost to the project.

Should the manufacturer and/or warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced.

In the case of plenum cabling, in addition to the statement from the manufacturer, submit a letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.

3. EQUIPMENT OUTLET

General

Outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on Surface Raceway and in modular furniture.

Mount level.

Assemble shielded connector per manufacturer's recommendations to ensure continuity between connector shield and cable shield.

4. CABLE TERMINATION

General

At the Server Room, position all Data and Voice Cables on termination hardware in sequence of the Outlet I.D. starting with the lowest number.

Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by the owner prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

At each Equipment Outlet terminate cabling per manufacturer's recommendations.

Terminate Plus using pin/pair assignments as identified in the above article "HORIZONTAL PERMANENT LINK".

Cable Termination - Modular Patch Panels

Install Modular Patch Panel(s) in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.

Provide Modular Patch Panels to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.

At Equipment Outlet and Modular Patch Panel, ensure that the twists in each cable pair are preserved to within 0.5-inch of the termination for Data cables. The cable jacket shall be removed only to the extent required to make the termination.

Provide horizontal cable management hardware adjacent to (above or below) each row of jacks in a Modular Patch Panel.

5. IDENTIFICATION AND LABELING

Refer to Section "Identification for Communications Systems" below for Identification and Labeling guidelines for this Project.

Label all Horizontal Cable, Outlet Faceplates, and Termination components.

Prior to installation, provide samples of all label types planned for the project to the owner. These samples shall include examples of the lettering to be used.

6. TESTING AND ACCEPTANCE

General

Contractor shall provide all test equipment necessary to perform testing.

All jacks, patch panels, and cabling shall be fully tested for proper operation in accordance with facility standards. Testing shall include standard CAT-6 and Fiber "throughput" testing, ringing out end to end of each cable, and as described herein.

Prior to testing, provide a summary of the proposed test plan for each cable type including equipment to be used, set-up, test frequencies or wavelengths, results format, etc. Failure to provide the above information shall be grounds for the Owner/Engineer to reject any and all Documentation of Results on related testing and to require a repeat of the affected test.

Visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. Provide to the Architect, Owner, and Engineer a written certification that this inspection has been made.

Conduct acceptance testing according to a schedule coordinated with the owner.

Representatives of the Owner shall be in attendance to witness the test procedures. Provide a minimum of one (1) week advance notice to allow for such participation.

Provide Test Plan as part of this notice or sooner.

Supply all equipment and personnel necessary to conduct the acceptance tests.

All equipment used in testing shall be maintained and calibrated per manufacturer's guidelines. Provide documentation of equipment calibration.

Document all tests. Refer to the Article "DOCUMENTATION" below which details requirements.

Perform tests related to connected equipment of others only with the permission and presence of the Owner's representative and Contractor involved.

All cabling shall be 100% fault free unless noted otherwise. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the expense of the contractor. The applicable tests shall then be repeated.

Should it be found by the Engineer or owner that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings, with the respect or regard to the quality, amount of value of materials, appliances or labor used in the work, it shall be rejected and replaced by the Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

Contractor shall furnish Owner an installation inspection report certifying that all equipment and cabling has been installed correctly and is operating properly. The report shall be signed by authorized representatives of the Contractor.

Horizontal 4-pair Copper Cabling

General

Testing shall be from the Equipment Outlet to the Modular Patch Panel (or Wiring Block) at the TR on which the cables are terminated.

The cabling must pass all the specified requirements. Conditional passing test results that are within the measurements accuracy of the test equipment (e.g. “*PASS”) are not acceptable.

When the EO is located on/in the wall behind modular furniture, a patch cord may be inserted into the EO to allow the furniture to be returned to its normal location. Cable testing, in this case, will be done with the patch cord. If the cable test fails only due to the length of the patch cord, the DFD will accept the cable as passing. Provide list of such locations in Test Results documentation.

Horizontal “Station” cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and Wire Map (Conductor Position on the Modular Jack).

Correct any defective, split or mis-positioned pairs.

Additional testing of Cabling Systems rated at TIA Category 5e and higher shall be performed to confirm proper functioning and performance.

Performance Testing

Unless otherwise specified by the Owner or the Owner’s Representative, each cabling link shall be tested for:

Wire Map

Length

Propagation Delay

Delay Skew

DC Loop Resistance – recorded for information only

DC Resistance Unbalance – recorded for information only

Insertion Loss

NEXT (Near-End Crosstalk)

PS NEXT (Power Sum Near-End Crosstalk)

ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only

PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only

ACR-F (Attenuation to Crosstalk Ratio Far-End)

Return Loss

TCL (Transverse Conversion Loss) – recorded for information only

ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only

Cables shall be tested to the maximum frequency defined by the standards covering that performance category. Transmission Performance Testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify “PASS” on each cable and display the specified parameters – comparing test values with standards based “templates” integral to the unit. Test method shall document all parameters specified by the standard.

All testing procedures and field-test instruments shall comply with applicable requirements of:

ANSI/TIA-1152, Requirements for Field Test Instruments and measurements for Balanced Twisted-Pair Cabling

ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.

ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard

ANSI/TIA 568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.

ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

Where margin(s) over compliance with the identified standard(s) is specified, field verify that the necessary margins are met and take corrective actions necessary to remedy out-of-spec links.

The maximum length of station cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.

In order to establish testing baselines, cable samples of known length and of the cable type and lot installed shall be tested. The cable may be terminated with an 8-position Modular plug (8-pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be calculated

based on this test and be utilized during the testing of the installed cable. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.

Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

Manufacturer of the Connectors or Cable.

Manufacturer of the test equipment used for the field certification.

Training organization (e.g., BICSI, A Telecommunications Association headquarters in Tampa, FL; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

The Owner or the Owner's Representative shall be invited to witness and/or review field-testing. The Contractor shall test each cable, end to end, to ensure it is fully functional and operational. Contractor shall also label each cable end. The Owner or the Owner's Representative shall be notified of the start date of the testing phase one (1) week before testing commences.

In the event results of the tests are not satisfactory, make changes as necessary, and shall then repeat the test or tests which disclosed faulty or defective material, equipment or installation method, and shall make additional tests as the owner or Engineer deems necessary at no additional expense to the project or user agency.

All test results and corrective procedures are to be documented and submitted in digital format to the Architect, owner, and Engineer within five (5) working days of test completion.

Voice Channel Test (where applicable)

Where cross-connection of cabling sub-systems by the Contractor is specified, test each subsystem separately as defined. Test Voice Channel after the cross-connect wiring/patching is complete.

Voice Channel Test confirms the end-to-end voice transmission between the Main Cross-connect and the Equipment Outlet (Voice) and include patch cords/jumper cables.

All pairs shall be tested and are to be free of shorts, verified for continuity, pair validity, polarity, and conductor position.

Correct any mis-positioned pairs or cross-connect wiring. Replace any patch cords/jumper cables which cause the Voice Channel test to fail and retest Channel.

Fiber Optic Cabling

General

Testing shall be from end to end of fiber optic run.

The cabling must pass all the specified requirements. Conditional passing test results that are within the measurements accuracy of the test equipment (e.g. "**PASS") are not acceptable.

Visually inspect all cables, cable reels, and shipping cartons to detect cable damage incurred during shipping and transport. Return visibly damaged items to the manufacturer.

Where post-manufacturer test data has been provided by the manufacturer on the reel or shipping carton: submit copies to the campus representative prior to installing cables.

Test fully completed systems only. Piecemeal testing is not acceptable.

Testing shall not be performed until after all hardware is installed and attached, and all labeling and identification has been completed.

Any cable that does not pass all required testing shall be removed, replaced, and retested.

Remove and replace any defective cables from pathways system. Do not abandon cables in place.

The owner and owner's representatives reserves the right to observe all portions of the testing process.

The owner and owner's representatives further reserves the right to conduct "Proof of performance testing", using Contractor equipment and labor, a random re-test of up to ten percent (10%) of the cable plant to confirm documented test results.

Perform all tests as required by the manufacturer in support of the structured cabling system warranty.

Performance Testing

All test results are to be defined as acceptable / unacceptable by the requirements of ANSI/TIA/EIA-526, inclusive of all subsections.

Index matching fluids or gels shall not be used.

Strands whose measured attenuation fall outside the acceptable range shall be subject to further inspection and testing to determine the nature of the fault. Faults related to splicing shall be corrected, and the fiber re-tested as described above, until acceptable attenuation measurements are recorded. If acceptable attenuation cannot be achieved, then the fiber shall be replaced in its entirety.

Optical Time Domain Reflectometer Testing:

All OTDR testing procedures and field test instruments shall comply with applicable requirements of: EIA/TIA 455-78 and EIA/TIA 455-133.

OTDR test jumpers must meet the criteria for reference jumpers specified in EIA/TIA-455-171.

A launch cable shall be installed between the OTDR and the first link connection.

A receive cable shall be installed after the last link connection.

All cables shall be OTDR tested at 1310 nm and 1550 nm (for Single-mode) operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.

All cables shall be OTDR tested at 850 nm and 1300 nm (for Multi-mode) operating wavelengths for anomalies and to ensure uniformity of cable attenuation and connector insertion loss.

All fiber links shall be tested in both directions.

Optical Return Loss (ORL) for each link shall be measured.

Fiber Length shall be measured and documented.

Perform a high resolution OTDR test with tracing printouts noting each optical fiber and buffer tube color designation.

Optical Power Loss Testing:

All fiber optic cables are to be tested via the One-Jumper Reference Method, formerly Method B.

Perform end-to-end, bi-directional attenuation (loss) test for each fiber strand at 850nm and 1300nm (multi-mode) or at 1310 and 1550 (single mode) wavelengths.

Visual Endface Inspection:

Must pass double ended Pass/Fail certification of fiber optic connector.

Must not have any graphical indication of problem areas on fiber endfaces due to contamination, pits, chips and scratches

Test result shall be recorded per cable.

Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

Manufacturer of the Connectors or Cable.

Manufacturer of the test equipment used for the field certification.

Training organization (e.g., BICSI, A Telecommunications Association headquarters in Tampa, FL; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

The Owner or the Owner's Representative shall be invited to witness and/or review field-testing. Contractor shall also label each cable end. The Owner or the Owner's Representative shall be notified of the start date of the testing phase one (1) week before testing commences.

In the event results of the tests are not satisfactory, make changes as necessary, and shall then repeat the test or tests which disclosed faulty or defective material, equipment or installation method, and shall make additional tests as the owner or Engineer deems necessary at no additional expense to the project or user agency.

7. DOCUMENTATION

General

Upon completion of the installation, provide project documentation to the architect, owner, and engineer for review. Documentation shall be in accordance with facility testing standards. Provide approved test results and documentation in Operating and Maintenance Manuals.

Submit Documentation within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.).

Interim documentation on a shorter schedule may be required to accommodate occupancy or other requirements. Confirm requirements during construction.

When such interim documentation is submitted, submit a composite results package containing all records at closeout.

This is inclusive of all test result and *draft* as-built drawings. Draft drawings may include annotations done by hand.

Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

The owner may request that a 10% random field re-test be conducted on the cable system at no additional cost to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the owner, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

8. AS-BUILT CONSTRUCTION DOCUMENTS

Provide Record Drawings which denote as-built information.

Include cable routes and outlet locations.

Identify Telecommunications and other low-voltage Outlet locations by their sequential number as defined elsewhere in these documents. Numbering, icons and drawing conventions used shall be consistent throughout all documentation provided.

Identify each drawing submitted by the Contractor as part of the Project Documentation as an "As-built" drawing and include a) the contractor name and/or logo, and b) the date of the drawing.

All documentation, including hard copy and electronic forms shall become the property of the owner.

9. WARRANTY

In accordance with owner's standards.

IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1. SCOPE

- a. This Section describes the general, product and execution requirements relating labeling of all communications cabling, terminations and related sub-systems for the Project.
- b. Labeling requirements in above sections are in addition to those listed below.
- c. Provide all labeling as detailed in this and related Sections.

PART 2 - PRODUCTS

1 GENERAL

- a. All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED unless specifically exempted by the language of this Section.
- b. Labels and markings shall be physically and chemically resistant to damage that would affect readability.
- c. Embossed tape will not be permitted for any application.
- d. Labels shall match hardware layout and design and shall be as large as possible while fitting properly.
- e. Refer to Part 3 for labeling formats and content.
- f. Use of installing company logo on any labeling is not permitted.
 - i. *Exception: Where included for warranty and/or maintenance purposes, such labeling is acceptable.*
- g. *Rhino Labels or owner approved equal.*

2. EQUIPMENT ROOM AND FITTINGS

- a. **Backboard**
 - i. Adhesive Label or Stencil.
 - ii. Character height shall be 2-inch (minimum).
- b. **Equipment Racks and Cabinets**
 - i. Adhesive Label.

- ii. Character height shall be 1-inch (minimum).

c. Equipment Enclosures

- i. Adhesive Label.

- ii. Character height shall be 1-inch (minimum).

3. CABLE AND TERMINATION HARDWARE

a. Cable Labels

- i. Labels shall be White Vinyl or other appropriate substrate and incorporate a clear lamination that, when label is wrapped around cable, covers printed part of label. Flag type labels are not allowed.

- ii. Labels shall be of adequate size to accommodate circumference of cable(s) being marked and properly self-laminate over full extent of printed area of label.

b. Equipment Outlet

- i. Equipment Outlet labels that are placed in recessed label holders shall be white paper on which outlet information is added.

c. Modular Patch Panel

- i. Paper Inserts integral to patch panel, Adhesive labels or factory-screened numbering.

d. Termination Blocks

- i. Labels for 110-type Termination Blocks shall be paper inserts and be color-coded to indicate the block's place in the cabling hierarchy (backbone, horizontal, etc.). Refer to Part 3 for insert colors.

PART 3 - EXECUTION

1. GENERAL

- a. Clean surfaces before attaching labels with the label manufacturer's recommended cleaning agent.

- b. Install labels firmly as recommended by the label manufacturer.

- c. Install labels square and neatly on all equipment.

- d. Position labels as to be visible and not obscured by termination hardware or other cabling.

- e. Lettering shall be 10-point or larger unless noted otherwise.

2. EQUIPMENT ROOM AND FITTINGS

a. General

- i. Designators for communications equipment rooms shall be as directed by owner's IT representative.

c. Modular Patch Panels

- i. Label each Patch Panel and port at horizontal cross-connect with unique identifying code. Code shall identify Outlet ID that corresponds with each jack/connector position.
- ii. The format of the Modular Patch Panels shall be as directed by owner's IT representative.

4. TERMINATION BLOCKS

a. General

- i. Provide color-coded Designation Strips with Termination Blocks.
- ii. Label termination positions on Designation Strips with identifier.
- iii. Label each Designation Strip with (2) rows of identifiers. Identifiers on "upper" row on each strip refer to cable positions ABOVE the label; identifiers on the "lower" row refer to cable positions BELOW the label.

b. Horizontal Cabling

- i. Designation Strips for Blocks on which Horizontal Cabling is terminated shall be BLUE.
- ii. Code used to label Designation Strips shall be same as identified for Equipment Outlet above. Label each position.
- iii. Horizontal Cross-connect (location) identifier is not required on Termination Blocks.

c. Backbone Cabling - Intra-Building

- i. Designation Strips for Blocks on which Intra-Building (within building) Backbone Cabling is terminated shall be WHITE.

1. Label Designation Strips with:

- a. Cable Origin & Destination. Repeat on every designation strip.
- b. Pair Number. Label 1st and 25th Positions on each row (e.g. 001 & 025, 026 & 050, etc.).

d. Voice Multiplier (where applicable)

- i. The following assumes creation of a Voice "Multiplier" Block using 100-pair blocks which have been wired to make each pair position in a row common with the comparable position in each other row.
- ii. Designation Strips for Voice Multiplier Blocks shall be YELLOW.
- iii. Label Designation Strips with:
- iv. Designation as "MULTIPLIER". Repeat on every designation strip.
- v. Row designator - Label 25-pair rows in 100-pair multiplier block as "A" (1st 25-pair), "B" (2nd 25-pair), "C" and "D".
- vi. Pair Number. Label 1st and 25th Positions on each row (e.g. 001 and 025).

- e. **Telephone System Equipment Cabling (where applicable)**
 - i. Designation Strips for Blocks on which cabling from Telephone System Equipment is terminated shall be PURPLE.

 - ii. Label Designation Strips with:
 - iii. Equipment Designation (e.g. System or Equipment Type)
 - iv. Pair Number.
