

CHMP, INC.
5198 TERRITORIAL ROAD
GRAND BLANC, MICHIGAN 48439
(810) 695-5910

PROJECT: Fort Gratiot Charter Township
New Municipal Center

ADDENDUM NO: Two

PROJECT NO.: 13003300

LOCATION: 3720 Keewahdin Rd.
Fort Gratiot, Michigan 48059

DATE: March 7, 2014

I. INSTRUCTIONS

- A. The proposed Contract Documents dated February 18, 2014 for the project noted above are modified as noted in this Addendum No. Two.
- B. Receipt of this Addendum shall be acknowledged by inserting its number and date in the space provided on the Proposal Form.
- C. All work performed under this Addendum shall be subject to the General Conditions of the Contract and Specifications for similar work in connection with this project. Include all incidental work required to properly complete the work.
- D. This addendum to the Construction Documents is issued prior to receipt of bids. All work covered in this Addendum shall be included in the original quotation and the Addendum will be considered one of the Contract Documents.

II. BID DUE DATE Invitation to Bid

- A. The bid due date has been extended. Bids will be received by the Charter Township of Fort Gratiot located at 3720 Keewahdin Road, Fort Gratiot, Michigan 48059 until 2:00 p.m., Tuesday, March 18, 2014.
- B. The last day for questions is Tuesday, March 11, 2014, 5:00 p.m. All inquiries should be directed to the office of the Architect: CHMP, INC., 5198 Territorial Road, Grand Blanc, Michigan 48439, Attention: Gregory N. Mason, A.I.A., email: gmason@chmpinc.com; telephone (810) 695-5910; fax (810) 695-0680.

III. MODIFICATIONS TO THE CONTRACT DOCUMENTS

A. Refer to the Project Manual

1. Refer to the Index

Item A: Section 071313 – Composite Sheet Waterproofing has been added.

Item B: 096719 is correct section; 096137 is not used; delete from index.

2. Section 002113 – Instructions to Bidders

Item A: The Local Participation Plan and Unit Pricing shall be permitted to be submitted 24 hours following submission of bid on March 18th. However, General Contractor is to provide statement included in bid package stating the percentage of local subcontractors and material suppliers utilized.

3. Section 003100 – Bid Tender Form

Item A: Bid Tender Form has been revised to include Alternate #8. Form attached here.

4. Section 012113 – Cash Allowances

Item A: Delete exterior signage allowance \$10,000. This shall be Owner's responsibility.

5. Section 012300 - Alternates

Item A: 3.1 – Schedule of Alternates: DEDUCT Alternate No. 4: General Contractor to include replacement of fibercement trim with exterior grade Western Red Cedar with a solid color stain finish. Replacement with soffits with premium grade vented vinyl soffit as manufactured by Certainteed or approved equal. Color as selected by Architect.

Item B: Add Item H ADD Alternate #8: Increase concrete slab depth from 6" to 8" in Apparatus Bay. Refer to Sheet S-1.

6. Section 046000 – Cast Stone Veneer

Item A: 2.1 Manufacturers: Add Coronado to the list of approved manufacturers.

- Item B: Provide fieldstone: Kentucky by Centurion Stone or Architect approved equal.
7. Section 071313 – Composite Sheet Waterproofing
- Item A: The section has been added to the project manual attached herein.
8. Section 073116 – Roof Shingles
- Item A: Refer to Part 2 – Products; Basis of Design = Provide Landmark TL Triple Laminate or approved equal.
- Item B: 2.2 B – Basis of Design is Landmark TL Triple Laminate or approved equal.
9. Section 074113 – Metal Roofing Panels (Alternate No. 6)
- Item A: 2.2 Materials A.9 Color – Delete Colonial Red. Color as selected by Architect from manufacturer’s full range.
- Item B: 2.2, B. – Delete metal soffit/wall systems (not used)
- Item C: 2.7, A.1 – Revise to snow and ice bar equal to Ultra Seam model S-5. Provide over all entry/exit doors. Refer to sheet A-13 Exterior Building Elevations.
10. Section 081119 – Steel Doors and Frames
- Item A: 2. PRODUCTS 2.1.A. Manufacturers: Daybar is an approved manufacturer for steel doors and frames subject to compliance with the requirements of Section 081119.
11. Section 083500 – Four-Fold Door Systems
- Item A: Change exterior swinging to interior swinging.
- Item B: Part 2 – PRODUCTS 2.1, A.1 – Series FF300 Glazed Four-Fold Doors with interior mounted operators.
- Item C: Part 2 – PRODUCTS 2.3, B. Angle Frame: Supply pre-hung tube frame system constructed of minimum HSS6x4x0.25, in lieu of L6x4x0.25.

12. Section 105113 – Metal Lockers and Gear Racks
- Item A: Part 2 – PRODUCTS 2.1, B – Locker Manufacturer: Add Geargrid to the list of approved manufacturers.
13. Section 107500 – Flagpoles
- Item A: 2.3 Fittings – Delete internal halyard. Provide external rope with cleat covers with cylinder locks.
1. Provide one halyard and one cleat at each flagpole.
 2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
14. Section 211316 – Dry-Pipe Sprinkler Systems (Attached)
- Item A: Provide a full coverage dry pipe fire protection system for the areas subject to freezing including the attic and entry canopy per NFPA 13 standards and approved by the AHJ. The dry pipe system shall also protect Lobby #152 and Lobby #121 (no exposed sprinkler piping shall be allowed in the lobbies).
- Item B: The fire protection in the Apparatus Bay shall be wet pipe exposed below the drywall ceiling and dry pipe above in the unheated attic.
- Item C: The dry pipe system to include submittals, 120V-1Ø air compressor, valving, fire department hose connection, backflow prevention, power, fire alarms, sprinkler heads, black steel pipe and all other components required for a fully operational system.
15. Section 238127 – Variable Refrigerant Flow HVAC System
- Item A: 2.1 Trane is an approved equipment manufacturer for the VRF heat pump system.
16. Section 263213 – Engine Generator
- Item A: 2.7, C.2 - Use fixed-engine type louver, delete reference to “automatic damper”.
17. Section 263600 – Transfer Switch
- Item A: 2.2, F.1 – Delete reference to transfer switch being “rated as a service entrance main disconnecting device”.

- Item B: 2.2, F., 1 – Transfer switch shall be 4-pole instead of 3-pole.
- Item C: 2.3, H and J – Delete reference to transfer switch being “closed” transition type and replace with “open” transition type.
- Item D: 2.4 – Delete remote annunciator for automatic transfer switch. Remote annunciator will be provided as part of emergency generator package.

18. Section 275117 – Audio Visual System

- Item A: 1.3, F – Delete reference to phone number 1-800-284-2391 and replace it with 1-248-960-3700.

19. Section 275118 – Sound System – Fire/Police

- Item A: 1.1, B - Delete reference to phone number 1-800-284-2391 and replace it with 1-248-960-3700.

20. Section 275119 – Sound System – General Building

- Item A: 1.1, B - Delete reference to phone number 1-800-284-2391 and replace it with 1-248-960-3700.

21. Section 283111 – Fire Alarm System

- Item A: 2.6, C – Provide horn-strobes instead of speaker-strobes.

B. Refer to the Civil Site Construction Plans

1. Revision: MDOT has required for their permit, the attached Special Provisions for Maintaining Traffic and Horizontal Auger Boring.
2. Clarification: Some line items in the Civil Site Construction Plans reference Michigan Department of Transportation (MDOT) Pay Items. Any Civil Site line items not provided with specifications shall be covered under the MDOT 2012 Standard Specifications for Construction, which shall be considered integral and supplementary to this Contract.
3. Clarification: The Contractor may haul all excavated material to an offsite location, other than the Fort Gratiot Township property designated for soil disposal (Parker Road site as shown on SD-1 & C-4), if this option results in lower Contract costs. If the Contractor opts to dispose of the spoils on the Township property as indicated in the plans, the Contractor must follow the plan description requirements. All Engineer’s Estimate quantities are to be considered approximate. It is the Contractor’s responsibility to study the Geotechnical Report and all materials provided

to estimate and bid accordingly. Pavement excavated from the existing fill areas shall be separated from the soils, and lawfully disposed of offsite. The northeast retention basin may be used for a borrow pit for suitable backfill material under pavements, but not for engineered backfill for the building, and the borrow pit may be backfilled with unsuitable materials excavated elsewhere onsite.

4. Sheet C-1 - Site Plan

Item A: Clarification: Sheet C-1, Site Plan, illustrates the locations of Concrete Curb and Gutter Type F-4, including drop curb for gutter pan to accommodate snow plowing, and Type F-4, Modified, and Type B-2 in the Road Commission right-of-way.

5. Sheet C-2 - Grading Plan

Item A: Clarification: The dimension along the east property line indicates the location of 296 feet of Concrete Valley Gutter. The 2-foot wide Concrete Maintenance Strip is illustrated as the unshaded double line bordering the Hot Mix Asphalt Pavement wherever Concrete, Concrete Curb and Gutter, or Valley Gutter are not proposed.

Item B: Revision: The siren tower foundation design has been updated.

Item C: Revision: The eastern approach and east property line elevations have been updated.

Item D: Revision: The proposed DTE utility locations, and the sanitary and storm sewers in the right-of-way being designed, and to be installed by others, have been updated.

Item E: Revision: The western retention basin has been revised.

Item F: Revision: The quantities have been updated per the latest Engineer's Estimate.

6. Sheet C-3 - Utility Plan

Item A: Revision: MDOT has required project compliance with the attached Special Conditions for Maintaining Traffic and Horizontal Auger Boring for their permit.

Item B: Revision: The eastern approach has been updated.

- Item C: Revision: The proposed DTE utility locations, and the sanitary and storm sewers in the right-of-way being design, and to be installed by others, have been updated.
- Item D: Revision: The western retention basin has been revised. The western and northeastern retention basin calculations have been updated.
- Item E: Revision: The western retention basin sand filter outlet and plain riprap shall be installed during Phase 1 to accommodate storm water discharge. The Contractor shall maintain the noted plain riprap and sediment sump throughout construction operations until the removal of the bypass pipe during Phase 3.
- Item F: Revision: Add 150 feet of 6-inch diameter HDPE perforated corrugated under drain with geotextile sock to convey parking lot runoff to the northeastern retention basin.
- Item G: Revision: The quantities have been updated per the latest Engineer's Estimate.

7. Sheet L-1 – Landscape Plan

- Item A: All plants and landscaping shown for monument sign located in the right-of-way shall be deleted except GTII (4).

C. Refer to the Architectural Drawings

1. Refer to Sheet A-1 - Floor Plan

- Item A: The interior windows without a window type label are to be W8 for Rooms 100, 101, 102, 103, and 106.

2. Refer to Sheet A-6 – Interior Elevations (SK 1 & 2 attached)

- Item A: Changes have been made to custom millwork at reception counter. Refer to SK-1 and SK-2 attached; Details 5 & 6 on Sheet A-6.

3. Refer to Sheet A-10 – Room Finish Schedule (Sheet has been re-issued)

- Item A: Floor material finish for Public Lobby is porcelain tile as shown on drawing in lieu of carpet.

Item B: Extend portion of porcelain tile at Entrance Door 116 to extend in front of DPW Supervisor 108 (terminate at north wall Common Work Room 107).

Item C: Delete PT-1 at top of Stair 126. Delete VCT at landing. Delete VCT at Basement Stair 126. Stair and stair landings to receive rubber floor finish. Refer to section 096519. Provide rubber treads, risers, nosings, and stringers.

4. Refer to Sheet A-11 – Door Schedule (Sheet has been re-issued)

Item A: Door 132A Door Type “A”
Door 132B Door Type “A”
Door 138C Door Type “A”, Frame Material HM FF
Door 149A Door Material HM, Frame Material HM
Door 149B Door Material HM, Frame Material HM

See attached revised door schedule included in this addendum.

D. Refer to the Mechanical Drawings

1. Refer to Sheet M-6 and detail on M-10

Item A: Revise the gas-fired radiant heater flue and vent piping from 4” to 6” stainless steel. (RH-1, 2, 3, & 4).

Item B: Provide indirect gas fired indoor makeup air unit for the kitchen hood located in Kitchen 151.

1. Greenheck model IGX-108-H12, 100 mbh in/80 mbh out, ¼ HP, 120v-1PH, 800 cfm @ .45” esp., 92.6 F TR, power venting, spark ignition, SS heat exchanger, standalone unit mounted 4 to 1 electronic controls, insulated casing, motorized inlet damper, air sensors, KSCP remote control panel, Merv 8 filters, freeze protection, 1 NO/1 NC on starter, access panels, control panel with starters, disconnect, relays, transformers, modulating gas valve, combustion blower, DWDI FC fan, isolators, ETL certified, shop drawings, check test and start up. Unit weight 800 lbs, Unit size 100” x 39” x 37” high.
2. Unit to be ceiling hung in the Apparatus Bay Mezzanine 200. Provide supports as required, install all accessories shipped loose for field installation. Provide 1-1/4” gas piping to connect to 2-1/2” NG main, duct 200 cfm into the Apparatus Bay thru a 12” x 6” duct with volume damper and duct 600 cfm thru a 10” x 12’ insulated supply air duct work to a new SOFTAIRE ceiling diffuser

located near the hood in Room 151, install fire damper at rated wall, provide 12" x 12" insulated intake ductwork and 24" x 18" intake louver and 6" x 6" combustion air intake duct with roof cap.

2. Refer to Sheets M-9 and M-11

Item A: VFR-2/CU-2 shall be the same size as VRF-1/CU-1: 192,000 BTUH cooling; 216,000 BTUH heating. Mitsubishi model PUHY192TSJMU-A.

Item B: The stands for VRF/CU-1, 2 & 3 shall be 18" tall in lieu of 12" as presently specified on the drawings.

3. GMP-1: Refer to Detail on Sheet M-10

Item A: Furnish and install one complete carbon monoxide and diesel exhaust ventilation control system, including all relays, shielded cables, conduits, wiring, shop drawings, installation drawings, wiring diagrams, etc. for the Apparatus Bay.

Item B: The UL and CSA approved enclosure and control panel shall include dual trip points, dual DPDT alarm relays for alarm and control of ventilation system, alarms, activation delay, programmable keys, 85 DB alarm with silence switch, include relays, LED's for power on, high and low alarms and fair and silence button, test push button.

Item C: Fans to be interlocked with the automatic dampers on the intake louvers. Dampers to open upon fan start-up and close on fan shutdown.

Item D: Design based on Armstrong AMC-1AD1 monitor with AMC-1222 carbon monoxide and nitrogen dioxide sensors.

Item E: AMC-1222 sensor modules for CO and NO2 detection, EZ cal sensor exchange program, and sensor end of life warning CO range of 0-100 PPM CO, 0-3 PPM NO2 range 3-wire hook up mounted 4-5 feet above the floor. Standard alarm trip points are 25-35 PPM CO, 1 PPM NO2, adjustable for nuisance tripping.

4. Refer to Sheet M-12 – Energy Recovery Unit Schedule.

Item A: VFR system manufacturer to provide ERV's based on the outside air specified in the schedule. Alternate

manufacturers (RenewAire) are acceptable, but the VFR system controls will required field mounting.

1. ERV-1: RenewAire Model HE2X1NH, 990 CFM
2. ERV-2: RenewAire Model HE1X1NH, 790 CFM
3. ERV-3: RenewAire Model HE1X1NH, 625 CFM

5. Mechanical contractor to provide reinforced 6" thick concrete pads with 36" deep footings for condensing units. Verify size with equipment manufacturer.

D. Refer to Electrical Drawings

1. Refer to Sheet E-3.

Item A: The monument sign shown in the right-of-way is being deleted from the project. The conduit shall be stubbed-off and capped at the right-of-way line for future use.

Item B: Underground primary electrical service entrance cables and conduits shall be installed from the Detroit Edison Company pad mounted transformer to a new utility company pole to be added along the east property line by DTE Co., instead of running to utility pole along the west property line. Verify exact location of pole with DTE Co. in field.

2. Refer to Sheets E-3 and C-1

Item A: Refer to civil drawings sheet C-1 for exact location of relocated tornado alarm siren tower.

3. Refer to Sheet E-4

Item A: The panic buttons shown in rooms 116, 118, 120 and 134 shall be wired into the combination fire alarm and security systems control panel located in Computer Server Room #122 with wiring as recommended by the manufacturer, by the electrical contractor.

Item B: Provide a single phase manual starter in Storage Room #152 for a dry pipe fire protection system air compressor and wire it to a spare 20A-1P breaker in RP-"G", circuit #G-39.

Item C: Wire dry pipe fire protection system water flow and supervisory switches in Storage Room #152 to circuit #F-7.

- Item D: A new make-up air unit #1 is being provided in Apparatus Bay #158 by mechanical trades for range hood in Kitchen #151 along with a remote control panel on wall near range hood. Electrical contractor shall wire from remote panel to the new MUAU#1. Wire both to a spare 20A-1P breaker in panel "RP-E". Interlock new MUAU#1 to range hood.
4. Refer to Sheets E-4 and E-9 and Specification Section 283111
- Item A: Delete fire alarm system except for audible signal/visual flasher on exterior of building and water flow/supervisory switches in Storage Room #152.
5. Refer to Sheets E-5 and E-11
- Item A: Disconnect switches for CU-2 shall be 100A instead of 60A. Amp load for CU-2 is 55.9 instead of 39 amps. Fuse size in "MSB" for CU-2 shall be 80 amps instead of 60A. Switch size in "MSB" for CU-2 shall be 100 amps instead of 60A.
6. Refer to Sheet E-7
- Item A: 15A-2P breaker for circuits #B-22 & 24 shall be changed to a 25A-2P breaker.

END OF ADDENDUM

DOCUMENT 003100 - BID/TENDER FORM

FOR: Charter Township of Fort Gratiot
New Municipal Center
3720 Keewahdin Road
Fort Gratiot, Michigan 48059

DATE: _____

NAME OF BIDDER: _____

ADDRESS _____

TELEPHONE: () _____

TO: Charter Township of Fort Gratiot (hereinafter called "Owner")

Gentlemen:

The Bidder, in compliance with your invitation for bids for work on Charter Township of Fort Gratiot New Municipal Center (CHMP Project No. 13003300) having examined the Contract Documents prepared by CHMP, Inc., dated February 18, 2014, respectively, and other related documents and being familiar with site of proposed work, and with all conditions surrounding construction of proposed project including availability of materials and labor, hereby propose to furnish all labor, materials, tools, equipment, machinery, equipment rental, transportation, superintendence, perform all work, provide all services, and to construct all work in accordance with Contract Documents, within time set forth herein, at prices stated below. These prices are to cover all expenses incurred in performing work required under Contract Documents, of which this Bid/Tender is a part.

Successful bidder agrees to provide performance and payment bonds written by surety acceptable to Owner. Made in favor of Owner as oblige.

BASE BID – CHARTER TOWNSHIP OF FORT GRATIOT-NEW MUNICIPAL CENTER:

Bidder agrees to perform all work as described in the Contract Documents, for Lump Sum of

(\$ _____).

ALTERNATES:

The following Alternates shall be expressed in words and figures as an ADDITION or DEDUCTION to Base Bid as indicted. Refer to Section 012300.

Alternate No. 1, Delete the basement construction in its entirety and relocate/construct the electrical room to the first floor. DEDUCT the sum of _____
(\$ _____)

Alternate No. 2, Provide and install Type "G" Overhead Sectional Doors in lieu of Type "F" Four-Fold Doors on south side of Apparatus Room. DEDUCT the sum of _____
(\$ _____)

Alternate No. 3, Replace all LED lights inside building with similar fluorescent fixtures and all LED exterior lights with similar metal halide fixtures. Reference drawings include: E-3, E-6 and E-8. DEDUCT the sum of _____

_____ (\$ _____)

Alternate No. 4, Replace fiber cement horizontal siding with premium grade vinyl siding equal to Monogram 46 series as manufactured by CertainTeed double 5 clapboard. Color as selected by Architect. Reference is made to drawings A-13 and specification section 074646. DEDUCT the sum of _____

_____ (\$ _____)

Alternate No. 5, Delete General Building and Fire/Police Departments sound systems with the exception of Apparatus Bay speakers which shall remain. Reference drawings include: E-4, E-6 and E-10. Reference specifications sections include 275118 – Sound System-Fire/Police and section 275119 – Sound System-General Building. DEDUCT the sum of _____

_____ (\$ _____)

Alternate No. 6, Replace roofing shingles with metal roofing as specified under Section 074113 of the specifications. Provide surface applied ice guards over all doors, provide integral gutter and matching downspouts, and provide metal ridge vents where indicated on drawings. ADD the sum of _____

_____ (\$ _____)

Alternate No. 7, Delete the emergency generator including remote annunciator panel, automatic transfer switch, concrete pad and grounding. This would also include the removal of the main disconnect switch and the provision of a “main service rated” bolt-loc switch in the main switchboard. Reference drawings include: E-3, E-4 and E-11. Reference specifications sections include 262413 – Switchboards, section 262816 – Enclosed Switches, section 263213 – Engine Generator and section 263600 – Transfer Switch. DEDUCT the sum of _____

_____ (\$ _____)

Alternate No. 8, Increase concrete slab depth from 6” to 8” in Apparatus Bay. Refer to Sheet S-1. ADD the sum of _____

_____ (\$ _____)

Bidder, if awarded a Contract, hereby agrees to commence and complete work under this contract in compliance with the project schedule provided within Section 011113 - “Summary of Work”. Bidder also acknowledges that non-compliance with the project schedule is subject to liquidated damages.

UNIT PRICES:

If the following items of work are added or deducted from quantities required by the construction documents, unit prices will apply as stated. (Refer to section 012200 for detailed definitions of unit prices).

(Show amounts in both words and figures. In case of discrepancy, amount shown in words will govern)

	<u>ADD</u>	<u>DEDUCT</u>
Price No. 1: Hidden Rock and Concrete Excavation and Removal	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 2: Engineered Fill, C.I.P.	\$ _____ /C.Y.	\$ _____ /C.Y.

Price No. 3:	Contaminated Earth Excavation and Removal (Class II Landfill)	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 4:	Unsuitable Soil Excavation and Removal	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 5:	Strip & Stockpile Topsoil	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 6:	Earthwork, Embankment (Cut to Fill)	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 7:	Earthwork, Excavation (Cut & Haul)	\$ _____ /C.Y.	\$ _____ /C.Y.
Price No. 8:	Erosion Control, Silt Fence	\$ _____ /L.F.	\$ _____ /L.F.
Price No. 9:	Geotextile Separator	\$ _____ /S.Y.	\$ _____ /S.Y.

FEES FOR CHANGE IN WORK

The undersigned agrees that if awarded the contract for this work, it will, upon request by the Owner, perform additional work or omit specified work, or cause same to be performed or omitted by subcontractors, for the following percentage fees which have been computed in accordance with the requirements of Section 01:

	<u>Additions</u>	<u>Omissions</u>
Work By Contractor's Own Forces	_____ %	_____ %
Work By Subcontractor's Forces	_____ %	_____ %

It is agreed that in this context a subcontractor shall be as specified in Article 5 of the General Conditions.

PROPOSED SUBSTITUTIONS

The undersigned submits for consideration by the Owner and/or the Architect-Engineer the Proposed Substitutions as listed hereinafter, each item being offered as a substitute for the referenced specified item which was used in compiling the Lump Sum Price of this Proposal and each price having been computed in accordance with the requirements of Section 012500.

<u>Proposal Item</u>	<u>Proposed Substitution</u>	<u>Add</u>	<u>Deduct</u>
1. _____	_____	\$ _____	\$ _____
2. _____	_____	\$ _____	\$ _____
3. _____	_____	\$ _____	\$ _____

The bidder agrees that the Owner may accept or reject any or all of the above Proposed Substitutions, and that the work applicable to any items which are accepted will be performed in accordance with the requirements of the drawings and specifications.

Bidder understands that the Owner reserves right to reject any or all Bid/Tenders and to waive any informalities or irregularities herein.

Upon notice of acceptance of this Bid/Tender, bidder will execute Contract Agreement and deliver properly executed Performance and Payment Bonds to Owner within 15 days.

Bidder acknowledges receipt of following addenda:

If awarded a contract, bidder's surety will be (name of Surety Company).

CERTIFICATION OF SITE VISIT

The undersigned hereby affirms that is has complied with the requirements for visiting the site as detailed in the Instructions To Bidders.

ADDRESS, LEGAL STATUS, AND SIGNATURE OF BIDDER

The undersigned does hereby designate the address, given below, as the legal address to which all notices, directions, or other communications may be served or mailed.

P.O. Box (if applicable) _____

Street _____

City _____ State _____ Zip Code _____

The undersigned does hereby declare that it has the legal status checked below.

_____ Individual

_____ Co-Partnership

_____ Corporation Incorporated under the laws and State of _____

The names and address of all persons indicated as partners in this Bid Proposal are as follows:

<u>NAME</u>	<u>ADDRESS</u>
_____	_____
_____	_____
_____	_____

This Bid Proposal is submitted in the name of:

(Name of Contractor)

By _____

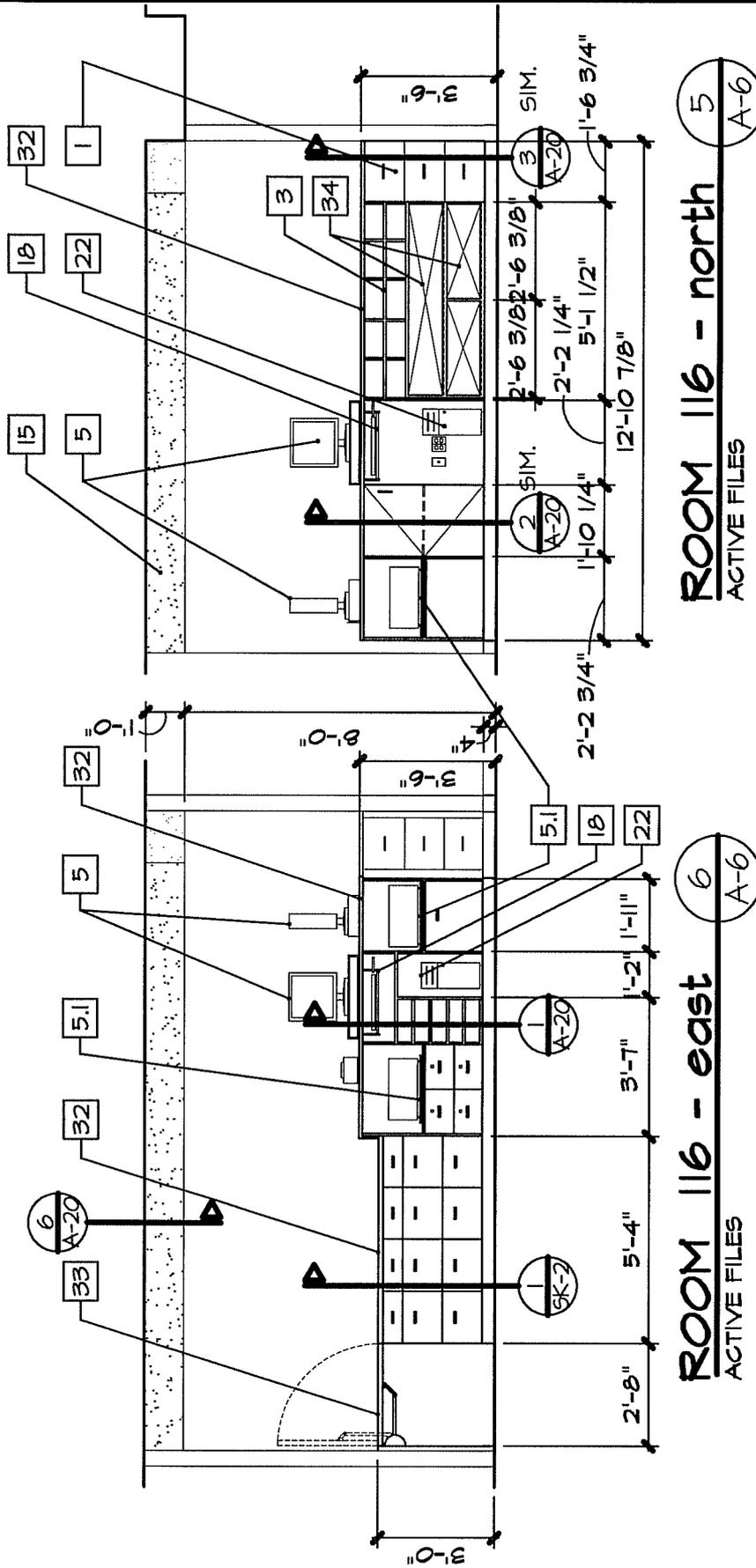
Title _____

Signed and sealed this _____ Day of _____, 20 ____.

INSTRUCTIONS: Submit two (2) copies to Owner and retain one (1) copy.

SK-1

PROJECT NAME: FORT GRATIOT MUNICIPAL CENTER
PROJECT NO.: 13003300
DATE: MARCH 7, 2014
REFERENCE DRAWINGS: A-6
• **ISSUE FOR REVISION**



ROOM 116 - north

ACTIVE FILES

5
A-6

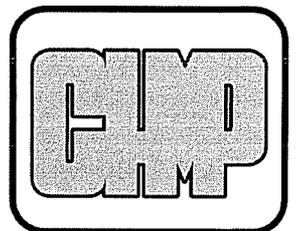
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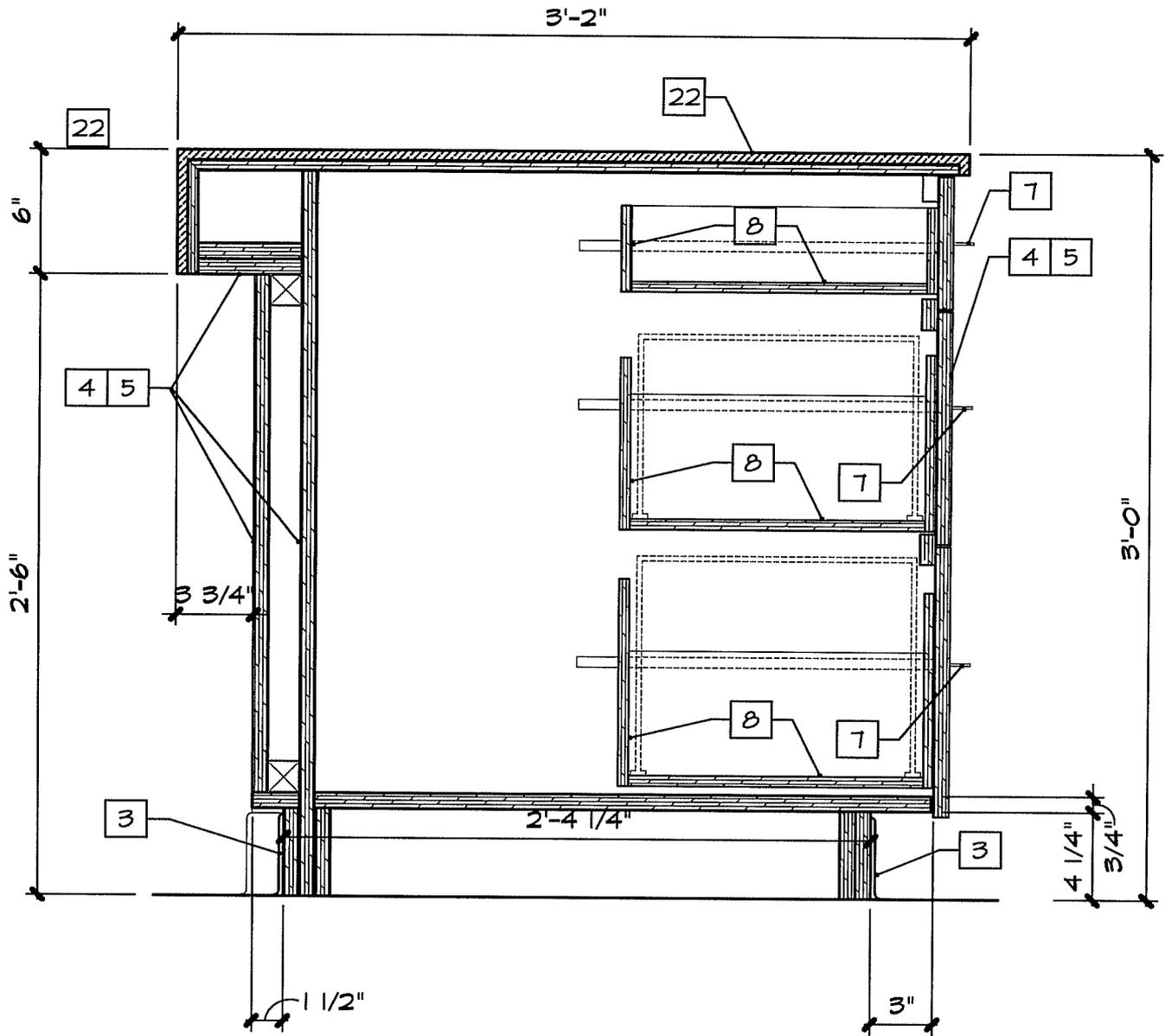
ROOM 116 - east

ACTIVE FILES

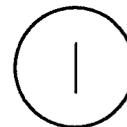
6
A-6

CLERK & ASSESSING



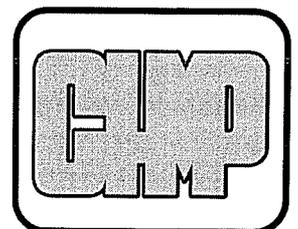


NOTE: REFER TO SHEET A-20 MILLWORK DETAILS FOR PLAN REFERENCE NOTES.



SK-2

PROJECT NAME: FORT GRATIOT MUNICIPAL CENTER
PROJECT NO.: 13003300
DATE: MARCH 7, 2014
REFERENCE DRAWINGS: SK-1
 • ISSUE FOR REVISION



810 / 695-5910

SECTION 071313 - COMPOSITE SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Below-grade wall waterproofing.
 - 2. Waterproofing under basement slabs.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 3 Section "Cast-in-Place Concrete" for concrete placement, curing, and finishing.
 - 2. Division 7 Section "Sheet Metal Flashing and Trim" for sheet metal flashings.
 - 3. Division 7 Section "Joint Sealants" for joint sealant materials and installation.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide waterproofing that prevents the passage of liquid water under hydrostatic pressure and complies with requirements as demonstrated by testing performed by an independent testing agency of manufacturer's current sheet membrane.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of waterproofing specified, including manufacturer's printed instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties.
- C. Shop Drawings showing locations and extent of waterproofing, including details for substrate joints and cracks, sheet flashings, penetrations, tie-ins with adjoining construction, and other termination conditions.
- D. Samples, 3-by-6-inch (75-by-150-mm) minimum size, of each waterproofing material required for Project.
- E. Installer certificates signed by manufacturer certifying that Installers comply with requirements under the "Quality Assurance" Article.
- F. Product test reports from a qualified independent testing agency evidencing compliance of waterproofing with requirements and other physical properties reported by manufacturer based on comprehensive testing of products according to current standard test methods within previous 5 years.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an Installer who has completed waterproofing similar to that indicated for this Project and who is acceptable to waterproofing manufacturer.
- B. Single-Source Responsibility: Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing waterproofing.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
 - 1. Before installing waterproofing, meet with Owner, Architect, consultants, independent testing agency, waterproofing manufacturer, and other concerned entities.
 - 2. Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, inspection and testing procedures, and protection and repairs.
 - 3. Notify participants at least 7 days before conference.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Apply waterproofing within range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty signed by waterproofing manufacturer and Installer agreeing to repair or replace waterproofing that does not meet requirements or that does not remain watertight during the specified warranty period. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
 - 1. Warranty Period: 5 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The following materials establish a minimum standard using products manufactured by the “W.R. Grace & Co.” Alternative manufacturers must submit to the Architect product data which meets or exceeds these minimum standards for approval.

1. Under Slab Waterproof Membrane (below basement slab):

- a. Bituthene Preprufe 300

2. Membrane Terminations:

- a. Bituthene Mastic

2.2 SHEET MEMBRANE WATERPROOFING

A. Reference Standards:

1. The following standards and publications are applicable to the extent referenced in the text.
2. American Society for Testing Materials (ASTM)

- a. C 836-89 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
b. D 412-87 Standard Test Methods for Rubber Properties in Tension.
c. D 570-88 Standard Test Method for Water Absorption of Plastics.
d. D 882-91 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting.
e. D 903-83 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
f. D 1876-83 Standard Test Method for Peel Release of Adhesives (T-Peel).
g. D 1970-94 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
h. D 3767-83 Standard Practice for Rubber - Measurements of Dimensions.
i. D 5385-93 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
j. E 96-80 Standard Test Methods for Water Vapor Transmission of Materials.
k. E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

3. General Services Administration, Public Building Service

- a. GSA-PBS-07115: Guide Specification for Elastomeric Waterproofing.

2.3 UNDER SLAB WATERPROOF MEMBRANE

A. Materials

1. Preapplied Sheet Waterproofing Membrane: Bituthene® Preprufe™ 300 Waterproofing Membrane by Grace Construction Products, a four layer composite sheet membrane consisting of 0.8 mm (0.030 in) of high density polyethylene film, 0.6 mm (0.025 in) of specially formulated

- synthetic adhesive, 0.03 mm (0.001 mil) of protective coating and surface treatment.
2. Preapplied Sheet Waterproofing Membrane; Physical Properties for Bituthene Preprufe 300 Waterproofing Membrane:

Property	Test Method	Typical Value
Color		Black with white protective coating and white surface treatment
Thickness	ASTM D 3767 Method A	1.42 mm (0.056 in) nominal
Low Temperature Flexibility	ASTM D 1970	Unaffected at -23 °C (-10 °F)
Elongation	ASTM D 412	300% minimum
Crack Cycling at -23 °C (-10 °F), 100 Cycles	ASTM C 836	Unaffected
Tensile Strength, Film	ASTM D 412	27 600 kPa (4,000 lb/in ²) minimum
Puncture Resistance	ASTM D 903 Modified (1)	800 N (180 lb) minimum
Peel Adhesion to Concrete	ASTM D 1876 Modified (2)	800 N/m (5.0 lb/in) minimum
Lap Adhesion	ASTM D 5385 Modified (3)	440 N/m (2.5 lb/in) minimum
Resistance to Hydrostatic Head	ASTM E 96 Method B	70 m (231 ft) minimum
Permeance	ASTM D 570	0.6 ng/m ² sPa (0.01 perms) maximum
Water Absorption		0.5% maximum

Footnotes:

- (1) Concrete is cast against the white treated surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of the membrane to concrete is measured at a rate of 50 mm (2 in) per minute at room temperature.
- (2) The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in) per minute at -4 °C (25 °F).
- (3) Hydrostatic head tests are performed by casting concrete against the membrane with a lap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 70 m (231 ft) of water.

B. Execution:

1. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected.

C. Substrates:

1. Earth and stone substrates shall be well compacted to produce an even, solid substrate. Remove loose aggregate or sharp protrusions. Concrete substrates shall be smooth and monolithic. Fill gaps or voids greater than 13 mm (0.5 in) . Remove standing water prior to membrane applications.

D. Installation:

1. Refer to manufacturer's literature for complete installation instructions, but not limited to, the following:
 - a. Apply membrane with the HDPE film facing the prepared substrate. Remove the release liner during application.
 - b. Apply succeeding sheets by overlapping the previous sheet 75 mm (3 in) along the uncoated edge of the membrane. Roll firmly to assure a tight seal.
 - c. Overlap the ends of the membrane a minimum of 75 mm (3 in) and apply Bituthene® Preprufe™ Tape centered over the lap. Roll firmly to assure a tight seal.

E. Concrete Placement:

1. Place concrete slab within 30 days of membrane application.

END OF SECTION 071313

SECTION 096519 - RESILIENT FLOOR TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Rubber floor tile.
- 2. Vinyl composition floor tile.
- 3. Resilient sports floor coverings.

B. Related Sections:

- 1. Division 9 Section "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

B. LEED Submittals:

- 1. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.

- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 1. Show details of special patterns.

- D. Samples for Initial Selection: For each type of floor tile indicated.

- E. Product Schedule: For floor tile. Use same designations indicated on Drawings.

- F. Qualification Data: For qualified Installer.

- G. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

- 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

- 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:

- 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

- C. Close spaces to traffic during floor tile installation.

- D. Close spaces to traffic for 48 hours after floor tile installation.

- E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 RUBBER FLOOR - RF

- A. Products: Subject to compliance with requirements, provide the following:

- a. Estrie Products International, American Biltrite (Canada) Ltd.; Duramed.

- B. Sheet Standard: ASTM F 1344, Class I-B, homogeneous rubber tile, through mottled.

- C. Hardness: Manufacturer's standard hardness.

- D. Wearing Surface: Textured.
- E. Thickness: .080" (2 mm).
- F. Size: 60" x 50'.
- G. Seaming Method: Standard.
- H. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 VINYL COMPOSITION FLOOR TILE - VCT

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Imperial Texture.
 - b. Mannington; Essentials.
 - c. Tarkett, Inc.; Expressions.
- B. Tile Standard: ASTM F 1066, Class 1, solid-color tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 RUBBER MULTI-FUNCTION & SPORTS FLOOR TILE (SF)

- A. Multi-Functional and Sports Floor Tile: Two-ply vulcanized construction, which incorporates a highly-resilient rubber wear layer and an elastic cushioned performance layer, with manufacturer's standard factory-applied, protective coating.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Johnsonite; Triumph.
- B. Thickness: 3/8 inch (9.5 mm).
- C. Size: 24 by 24 inches (61 by 61 cm).
- D. Performance Characteristics:
 - a. Abrasion Resistance: ASTM D 3389.
 - b. Slip Resistance: ASTM D 2047 - Meet or exceed a static coefficient of friction of 0.8.
 - c. Fire Resistance: ASTM E648/NFPA 253 - Class 1.
 - d. Chemical Resistance: ASTM F 925.
- E. Color and Texture: As selected by Architect from full range of manufacturer's standard colors and with hammered surface.

- F. Rubber Stair Treads and Accessories RSTA: All stairways where indicated to receive rubber floor finish; provide rubber treads, risers, nosings, and stringers.
1. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for rubber stair treads and accessories complying with requirements indicated.
 2. Rubber Stair Treads: Type 2 design (designed) products complying with the following requirements:
 - a. Type 2 Design: Raised-disc pattern.
 - b. Abrasive Strips: Provide abrasive strips as specified by product designation indicated above in color selected by Architect from manufacturer's full range of colors.
 - c. Nosing Style: Square
 - d. Nosing Height: 1-1/2 inches (38.1 mm) or 2-3/16 inches (55.6 mm)
 - e. Thickness: 3/16-inch (4.8-mm) tapering to 1/8 inch (3.2 mm) at back edge.
 - f. Size: Lengths and depths to fit each stair tread in one piece.
 3. Rubber Risers: Smooth, flat, toeless risers, 1/8 inch (3.2 m) thick by height and length to cover risers.
 4. Rubber Stringers: Material matching risers, of height and length after cutting to fit risers and treads and to cover stair stringers.
 5. Color: As selected by Architect from manufacturer's full range of colors produced for vinyl accessory molding complying with requirements indicated.
 6. Product Description: Carpet edge for glue-down applications.
 7. Profile and Dimensions: As specified by product designation indicated above.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
- a. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - 2) Rubber Floor Adhesives: Not more than 60 g/L. The adhesives shall be of type recommended by rubber flooring manufacturer.
- C. Floor Polish for VCT: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate acceptable to flooring manufacturer.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

**SPECIAL CONDITIONS FOR HORIZONTAL AUGER
BORING (HAB)
October, 2006**

1 Materials

- 1.1 Pipe** - Pipe used in this method includes an external steel casing pipe and may include a variety of interior carrier pipe materials.

Casing pipe shall be used within the entire roadbed influence area. The roadbed influence area is defined as the subsurface area located under the road and shoulder surface, between each shoulder point or back of curb; and continues transversely outward and downward from each shoulder point or back of curb on a 1 on 1 slope. Pipe shall be specifically designed and certified for HAB by the pipe manufacturer.

1.2 Allowable forces

The allowable jacking strength capacity of the casing pipe shall be capable of withstanding the maximum jacking forces imposed by the operation. Steel casing pipe shall have minimum yield strength of 35,000 psi.

1.3 Casing Pipe Characteristics

- (a) Casing pipe materials shall be steel. Alternate materials will require prior approval.
- (b) Only new casing pipe shall be used, unless otherwise approved by the MDOT Engineer/Inspector.
- (c) Casing pipe shall have a minimum wall thickness of $\frac{1}{4}$ inch or as specified in the current MDOT Standard Specifications for Construction, Table 909-18, whichever is larger.
- (d) Casing pipe shall be round. Casing pipe shall have a roundness tolerance, so that the difference between the major and minor outside diameters shall not exceed 1% of the specified nominal outside diameter, or 0.25 inch, whichever is less.
- (e) Casing pipe shall have square and machine beveled ends. The pipe end maximum out-of-square tolerance shall be 0.04 inch, (measured across the diameter).
- (f) Casing pipe shall be straight. The maximum allowable straightness deviation over any 10 foot length of steel casing pipe is $\frac{1}{8}$ inch.
- (g) Pipe shall be without any significant dimensional or surface deformities. All pipes shall be free of visible cracks, holes, foreign material, foreign inclusions, blisters, or other deleterious or injurious faults or defects. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used.
- (h) Casing pipe shall normally be constructed without any longitudinal seams. However, longitudinally welded casing pipe is allowed for 48 inch or larger diameter pipes when a certified welder performs all the welding.
- (i) Casing pipe shall have smooth interior and exterior walls to reduce jacking force and prevent casing rotation
- (j) The inside diameter (ID) of the casing pipe shall be at least 6 inches larger than the largest outside diameter (OD) of the carrier pipe to allow the carrier pipe to be inserted or removed subsequently without disturbing the casing or the roadbed.

- 1.4 Casing Spacers** - Casing spacers are required for all carrier pipes. Casing spacers shall be plastic, fiberglass, stainless steel, or carbon steel. Normally, one spacer is adequate to support a carrier pipe length that does not exceed ten feet; otherwise, two spacers are required for longer carrier pipe lengths.

2 Construction

2.1 Minimum Allowable Depths

The minimum allowable depth of a HAB installed casing pipe under the road and shoulder surface is listed in table 1. Any deviation from table 1 shall require prior approval from the MDOT Engineer/Inspector.

Table 1 – HAB minimum installation depth under different soil conditions

Soil Condition	Minimum Depth (feet)
Clayey	4
Silty	4
Sandy	6
Gravely	6

In locations where the road surface is super elevated, the minimum depth of the bore shall be measured from the lowest side of the pavement surface. In addition, a minimum 3 foot depth shall be maintained in all other features including ditch bottoms.

2.2 Access Pits

- (a) Location - A minimum distance, from the edge of the paved shoulder or curb, to the face of any access pit, equipment, and supplies, shall be 35 feet along freeways and limited access roadways and 25 feet along free access roadways. Any deviation from these distances shall require prior approval from the MDOT Engineer/Inspector.
- (b) Sheeting and Bracing -Sheeting and bracing shall be required whenever any part of the access pit excavation is located within the roadbed influence area. Steel sheet piling shall be furnished and installed as indicated in the current MDOT Standard Specifications for Construction, section 704. An additional earth retention structure shall be required above and below the bore hole on the drilling face of all access pits to prevent loss of material during construction.
- (c) Protection - Fencing barriers shall be installed adjacent to access pits, open excavations, equipment and supplies with suitable fencing and plastic drums to prohibit pedestrian access to the work site. Equipment shall not be used as fencing to protect access pits.

2.3 Lead Auger / Overcut Allowance

A full-size auger section shall be used as the lead section of the casing. The auger shall not protrude from the leading edge of the casing. However, if soil conditions halt the movement of the casing, the auger shall be allowed to protrude not more than 3 inches in front of the casing during the boring operation.

Overcut is the annular space between the excavated hole and the outside diameter of the casing pipe. The allowable overcut diameter is one inch greater than the casing pipe radius.

2.4 Watertight Joints

Water tight pipe joints are required to ensure the integrity of the roadbed. Casing pipe shall be constructed to prevent water leakage or earth infiltration throughout its entire length.

2.5 Lubrication Fluids

- (a) Lubrication fluids are specifically required for this method regardless of the soil conditions. Any deviation from the use of lubrication shall require prior approval from the MDOT Engineer/Inspector.
- (b) Lubrication fluids, consisting of a mixture of water and bentonite or bentonite/polymer, shall be used in the annular space between the casing being installed and the native soil. Lubrication may also be used inside the casing pipe to facilitate spoil removal.
- (c) Grease is not allowed for use as lubrication for this purpose.

2.6 Pipe locating and tracking - One of the following tracking, locating, and guidance systems shall be used, unless an alternate is approved by the MDOT Engineer/Inspector.

- (a) Waterline system.
- (b) Mechanical control head.
- (c) Electronic (inertial) control head.
- (d) Walkover system.
- (e) Laser guided tunnel attachment.
- (f) Laser guided pilot rod.

2.7 Settlement/Heaving Monitoring

- (a) This method shall be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the HAB operation; and will minimize subsidence of the surface above and in the vicinity of the boring. The ground shall be supported in a manner to prevent loss of ground and keep the perimeter and face of the boring stable at all times, including during shutdown periods.
- (b) Potential heave or settlement shall be monitored at each shoulder point, edge of pavement, the edge of each lane (or centerline for two lane roads), and otherwise at 50 foot intervals along the pipe centerline.
- (c) A survey shall be performed one day prior to initiating this operation at each required monitoring location. A similar survey shall then be performed at each location, on a daily basis, until the permitted activity has been completed. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a foot. Digital photographs of the pavement conditions shall also be taken prior and after the pipe installation.
- (d) All operations shall stop immediately whenever monitored points indicate a vertical change in elevation of 1/2 inch or more, or any surface disruption is observed. The Contractor shall then immediately report the amount of settlement to the MDOT Engineer/ Inspector.

2.8 Ground Water Control

- (a) Dewatering shall be conducted whenever there is a high ground water table level to prevent flooding and facilitate the operation. The water table elevation shall be maintained at least 2 feet below the bottom of the casing at all times. When needed, dewatering *may* be initiated prior to any excavation.

- (b) Minor water seepage or pockets of saturated soil may be effectively controlled through bailing or pumping. This control shall be accomplished without removing any adjacent soil that could weaken or undermine any access pit, its supports, or other nearby structure.
- (c) Larger volumes of ground water shall be controlled with one or more well points or with staged deep wells. Well points and staged deep well pumping systems shall be installed and operated without damage to property or structures, and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Any pumping methods used for de-watering and control of ground water and seepage shall have properly designated filters to ensure that the adjacent soil is not pumped along with the water. Well diameter, well spacing and the pump's pumping rate, shall provide adequate draw down of the water level. Wells shall be located to intercept ground water that otherwise would enter the access pit excavation and interfere with the work. Upon removal of a well, the hole shall be filled and grouted according to the specifications identified in MDOT's flowable fill special provision, and MDOT's Plugging Drill Holes special provision.
- (d) Existing storm sewers shall only be used to discharge water from the dewatering operation in accordance with a permit obtained from the appropriate storm sewer owner. Filters or sediment control devices shall be required to ensure that the existing system is not adversely affected by construction debris or sediment.
- (e) If grouting is used to prevent ground water from entering the area of the access pit, the grouting shall be installed without damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. The material properties of the grout shall conform to the specifications identified in MDOT's flowable fill special provision.

2.9 Failure

- (a) Should anything prevent completion of this operation, the remainder of the pipe shall be constructed and/or abandoned by methods approved by the MDOT Engineer/Inspector.
- (b) Abandonment of any component of the installation shall only be allowed as approved by the MDOT Engineer/Inspector.

2.10 Contamination

When an area of contaminated ground is encountered, all operations shall stop immediately, and shall not proceed until approved by the MDOT Engineer/Inspector. Any slurry shall be tested for contamination and disposed of in a manner, which meets Local, State and/or Federal requirements.

2.11 Bulkhead

Casing ends shall be enclosed or bulkheaded with a commercial grade concrete, or approved alternate to seal the ends to prevent water leakage or earth infiltration. The concrete shall extend longitudinally into the pipe end opening to create a minimum one foot thick bulkhead barrier, or as required by permit. MDOT Engineer/Inspector may allow rubber bulkheads in special situations.

2.12 Work Site Restoration

- (a) Access pits and excavations shall be backfilled with suitable material, and in a method approved by the MDOT Engineer/Inspector. Any embedded supports shall be removed

to 10 feet below the original ground surface. The disturbed work site area shall be restored to existing grades and original material condition.

- (b) The disturbed grass-surface area shall be topsoiled, seeded, fertilized, mulched, and anchored according the current MDOT Standard Specifications for construction, sections 816 and 917.
- (c) Upon completion of the work, the contractor shall remove and properly dispose of all excess materials and equipment from the work site.

SECTION 211316 - DRY-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Fire-department connections.
4. Sprinkler specialty pipe fittings.
5. Sprinklers.
6. Alarm devices.
7. Manual control stations.
8. Control panels.
9. Pressure gages.

B. Related Sections:

1. Division 21 Section "Wet-Pipe Sprinkler Systems" for wet-pipe sprinkler piping.

1.3 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure 175 psig maximum.

1.4 SYSTEM DESCRIPTIONS

- A. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.

1.5 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
 1. Sprinkler Occupancy Hazard Classifications shall be as required by NFPA 13:

2. Minimum Density for Automatic-Sprinkler Piping Design as required by NFPA 13
3. Maximum Protection Area per Sprinkler: Per UL listing.>.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For dry-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Delegated-Design Submittal: For 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.

1.7 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Domestic water piping.
 2. Compressed air piping.
 3. HVAC hydronic piping.
 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
- B. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- C. Fire-hydrant flow test report.
- D. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
- E. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.10 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

1. NFPA 13, "Installation of Sprinkler Systems."
2. NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

1.11 COORDINATION

A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

A. Standard Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Pipe ends may be factory or field formed to match joining method.

B. Schedule 30, Galvanized-Steel Pipe: ASTM A 135; ASTM A 795/A 795M or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.

C. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

- D. Galvanized, Steel Couplings: ASTM A 865, threaded.
- E. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- F. Malleable- or Ductile-Iron Unions: UL 860.
- G. Cast-Iron Flanges: ASME B16.1, Class 125.
- H. Plain-End-Pipe Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn or screwed retainer pin to secure pipe in fitting.
- I. Grooved-Joint, Steel-Pipe Appurtenances:
 - 1. Pressure Rating: 175 psig minimum.
 - 2. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
 - 4. .

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.
 - 1. Class 125, Cast-Iron and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 - 2. Class 250, Cast-Iron and Class 300, Raised-Face Flanges: Ring-type gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
 - 1. Valves shall be UL listed or FM approved.
 - 2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig
- B. Ball Valves:
 - 1. Standard: UL 1091 except with ball instead of disc.
 - 2. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 - 3. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - 4. Valves NPS 3 Ductile-iron body with grooved ends.
- C. Bronze Butterfly Valves:

1. Standard: UL 1091.
2. Pressure Rating: 175 psig .
3. Body Material: Bronze.
4. End Connections: Threaded.

D. Iron Butterfly Valves:

1. Standard: UL 1091.
2. Pressure Rating: 175 psig
3. Body Material: Cast or ductile iron.
4. Style: Lug or wafer.
5. End Connections: Grooved.

E. Check Valves:

1. Standard: UL 312
2. Pressure Rating: 250 psig
3. Type: Swing check.
4. Body Material: Cast iron.
5. End Connections: Flanged or grooved.

F. Bronze OS&Y Gate Valves:

1. Standard: UL 262.
2. Pressure Rating: 175 psig .
3. Body Material: Bronze.
4. End Connections: Threaded.

G. Iron OS&Y Gate Valves:

1. Standard: UL 262.
2. Pressure Rating: 250 psig
3. Body Material: Cast or ductile iron.
4. End Connections: Flanged or grooved.

H. Indicating-Type Butterfly Valves:

1. Standard: UL 1091.
2. Pressure Rating: 175 psig minimum.
3. Valves NPS 2 and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.
4. Valves NPS 2-1/2 and Larger:
 - a. Valve Type: Butterfly.
 - b. Body Material: Cast or ductile iron.
 - c. End Connections: Flanged, grooved, or wafer.
5. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch visual indicating device.

I. NRS Gate Valves:

1. Standard: UL 262.
2. Pressure Rating: 250 psig
3. Body Material: Cast iron with indicator post flange.
4. Stem: Nonrising.
5. End Connections: Flanged or grooved.

2.5 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Dry-Pipe Valves:

1. Standard: UL 260
2. Design: Differential-pressure type.
3. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
4. Air-Pressure Maintenance Device:
 - a. Standard: UL 260.
 - b. Type: Automatic device to maintain minimum air pressure in piping.
 - c. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig outlet pressure.
5. Air Compressor:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Motor Horsepower: Fractional.
 - c. Power: 120-V ac, 60 Hz, single phase.

C. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175 psig minimum.

3. Type: Automatic draining, ball check.
4. Size: NPS 3/4
5. End Connections: Threaded.

2.7 FIRE-DEPARTMENT CONNECTIONS

A. Exposed-Type, Fire-Department Connection:

1. Standard: UL 405.
2. Type: Exposed, projecting, for wall mounting.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
6. Caps: Brass, lugged type, with gasket and chain.
7. Escutcheon Plate: Round, brass, wall type.
8. Outlet: Back, with pipe threads.
9. Escutcheon Plate Marking:
10. Finish: Polished chrome plated.

2.8 SPRINKLER SPECIALTY PIPE FITTINGS

A. General Requirements for Dry-Pipe-System Fittings: UL listed for dry-pipe service.

1. Standard: UL 213.
2. Pressure Rating: 175 psig minimum
3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
4. Type: Mechanical-T and -cross fittings.
5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
7. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum.
3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

C. Sprinkler Inspector's Test Fittings:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig minimum
3. Body Material: Cast- or ductile-iron housing with sight glass.
4. Size: Same as connected piping.
5. Inlet and Outlet: Threaded.

D. Adjustable Drop Nipples:

1. Standard: UL 1474.
2. Pressure Rating: 250 psig minimum
3. Body Material: Steel pipe with EPDM O-ring seals.
4. Size: Same as connected piping.
5. Length: Adjustable.
6. Inlet and Outlet: Threaded.

2.9 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFAC Inc.
2. Globe Fire Sprinkler Corporation.
3. Reliable Automatic Sprinkler Co., Inc.
4. Tyco Fire & Building Products LP.
5. Venus Fire Protection Ltd.
6. Victaulic Company.
7. Viking Corporation.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.

C. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: **UL 199**.
2. Characteristics: Nominal 1/2-inch orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.

D. Sprinkler Finishes:

1. Chrome plated.
2. Bronze.
3. Painted.

E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated steel
2. Sidewall Mounting: Chrome-plated steel

F. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
2. Type: Wire cage with fastening device for attaching to sprinkler.

2.10 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.
- B. Water-Motor-Operated Alarm:
 - 1. Standard: UL 753.
 - 2. Type: Mechanically operated, with Pelton wheel.
 - 3. Alarm Gong: Cast aluminum with red-enamel factory finish.
 - 4. Size: 10-inch diameter.
 - 5. Components: Shaft length, bearings, and sleeve to suit wall construction.
 - 6. Inlet: NPS 3/4
 - 7. Outlet: NPS 1 drain connection.
- C. Electrically Operated Alarm Bell:
 - 1. Type: Vibrating, metal alarm bell.
 - 2. Size: 6-inch minimum diameter.
 - 3. Finish: Red-enamel factory finish, suitable for outdoor use.
- D. Pressure Switches:
 - 1. Standard: UL 346.
 - 2. Type: Electrically supervised water-flow switch with retard feature.
 - 3. Components: Single-pole, double-throw switch with normally closed contacts.
 - 4. Design Operation: Rising pressure signals water flow.
- E. Valve Supervisory Switches:
 - 1. Standard: UL 346.
 - 2. Type: Electrically supervised.
 - 3. Components: Single-pole, double-throw switch with normally closed contacts.
 - 4. Design: Signals that controlled valve is in other than fully open position.
 - 5. .

2.11 PRESSURE GAGES

- A. Standard: UL 393.
- B. Dial Size: 3-1/2- to 4-1/2-inch diameter.
- C. Pressure Gage Range: 0 to 250 psig .
- D. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
- E. Air System Piping Gage: Include retard feature and "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

- B. Report test results promptly and in writing.

3.2 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements in Division 21 Section "Facility Fire-Suppression Water-Service Piping" for exterior piping.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.3 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
- B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
- C. Install seismic restraints on piping. Comply with requirements in NFPA 13 for seismic-restraint device materials and installation.
- D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- H. Install sprinkler piping with drains for complete system drainage.
- I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- J. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or to outside building.
- K. Connect compressed-air supply to dry-pipe sprinkler piping.
- L. Connect air compressor to the following piping and wiring:
 - 1. Pressure gages and controls.
 - 2. Electrical power system.
 - 3. Fire-alarm devices, including low-pressure alarm.
- M. Install alarm devices in piping systems.

- N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
- O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- P. Drain dry-pipe sprinkler piping.
- Q. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices air compressors.
- R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section "Escutcheons for Fire-Suppression Piping."

3.4 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
- I. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

- J. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- K. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- L. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
- M. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2154. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
- N. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.5 VALVE AND SPECIALTIES INSTALLATION

- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Specialty Valves:
 - 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - 2. Dry-Pipe Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - a. Install air compressor and compressed-air supply piping.
 - b. Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings adjustable range; and 175-psig maximum inlet pressure.
 - c. Install compressed-air supply piping from building's compressed-air piping system.

3.6 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
- C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.7 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Install wall-type, fire-department connections.
- B. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-Place Concrete".
- C. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

3.8 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Energize circuits to electrical equipment and devices.
 - 5. Start and run air compressors.
 - 6. Coordinate with fire-alarm tests. Operate as required.
 - 7. Coordinate with fire-pump tests. Operate as required.
 - 8. Verify that equipment hose threads are same as local fire-department equipment.
- C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.10 CLEANING

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain specialty valves.

3.12 PIPING SCHEDULE

- A. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.
- B. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
- C. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.
- D. Standard-pressure, dry-pipe sprinkler system, shall be one of the following:
 - 1. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - 2. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.13 SPRINKLER SCHEDULE

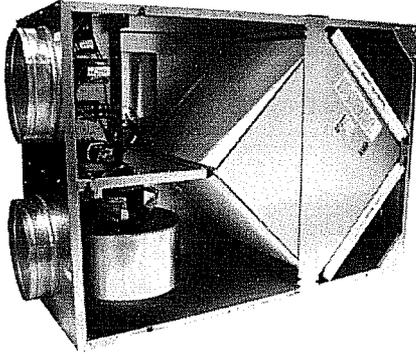
- A. Use sprinkler types in below for the following applications:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Dry pendent sprinklers
 - 3. Wall Mounting: Dry sidewall sprinklers.
 - 4. Spaces Subject to Freezing: Upright sprinklers, Dry pendent sprinklers, Dry sidewall sprinklers Upright, dry pendent sprinklers and dry sidewall sprinklers
 - 5. Special Applications: Extended-coverage and quick-response sprinklers
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - 2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - 3. Upright Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view

END OF SECTION 211316

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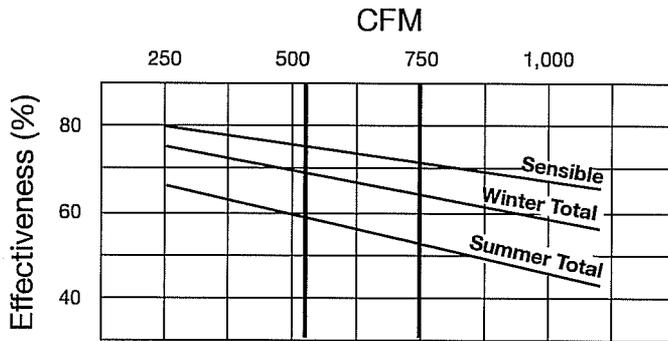
Indoor Unit



Specifications

Ventilation Type: Static Plate, Heat and Humidity Transfer					
Typical Airflow Range: 250-925 CFM					
AHRI 1060 Certified Core: One L125-00					
Airflow Rating Points (for AHRI): 750 CFM and 563 CFM					
Number Motors: Two direct drive blower/motor packages					
V	HZ	Phase	FLA (per motor)	Min. Cir. Amps	Max. Overcurrent Protection Device
115	60	Single	9.0	20.3	25
208-230	60	Single	4.5	10.1	15
277	60	Single	3.9	8.8	15
208-230	60	Three	1.7-2.3	5.2	15
460	60	Three	1.15	2.6	15
Standard Features: Non-fused Disconnect 24 VAC Transformer/Relay Package					
Filters: Two total, MERV 8, 2" pleated, 20" x 20" nominal size					
Weight: 211 lbs (unit), 300 lbs (shipping weight, on pallet)					
Shipping Dimensions: 62" L x 48" W x 40" H					
Options: ECM Motor – Two, 115V or 208-230V 0.75 hp (Single Phase) Fused Disconnect Double Wall Construction Motorized Isolation Dampers, OA, EA or both airstreams Factory Mounted Filter Alarms (2) Independent Blower Control					
Accessories: Wall Caps Back Draft Dampers					

G5 Performance



*At AHRI 1060 standard conditions
(See certified data on page 73 for core components.)

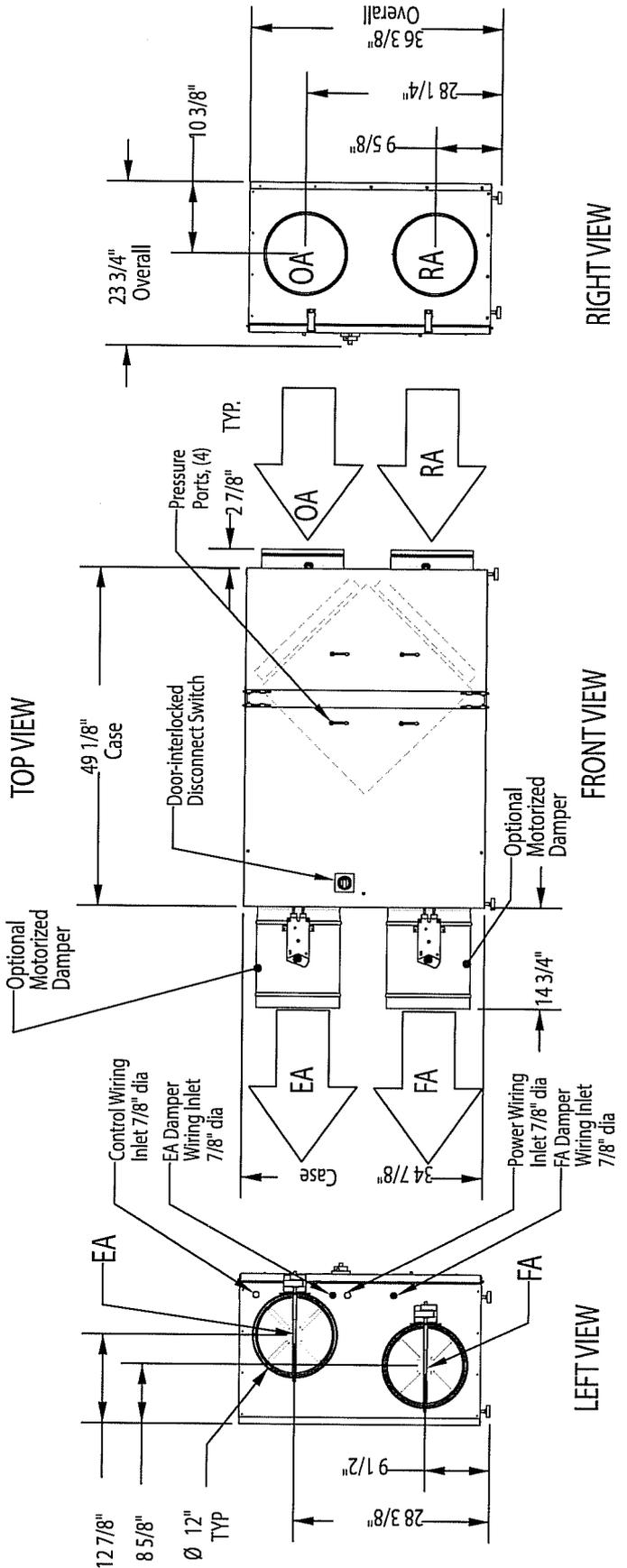
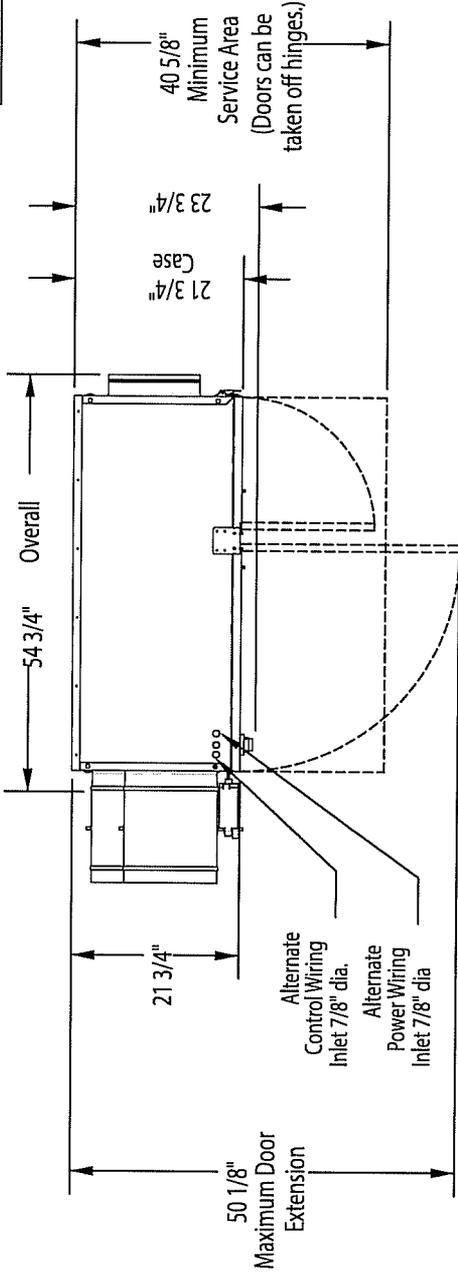
Airflow Performance

Motor HP Phase	External Static Pressure (Inches Water Column)						
	0.0	0.25	0.5	0.75	0.9	1.25	1.5
0.75 Single Phase	970 CFM	925 CFM	860 CFM	795 CFM	750 CFM	635 CFM	480 CFM
	1,490 Watts	1,375 Watts	1,270 Watts	1,160 Watts	1,090 Watts	950 Watts	825 Watts
0.75 Three Phase	970 CFM	925 CFM	860 CFM	795 CFM	750 CFM	635 CFM	480 CFM
	1,246 Watts	1,158 Watts	1,039 Watts	928 Watts	856 Watts	691 Watts	509 Watts

Note: Watts is for the entire unit (two motors).

HE1XINH Unit Dimensions

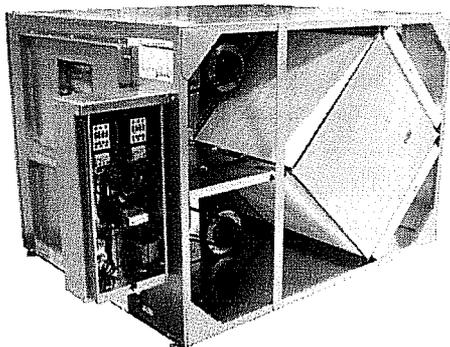
EA: Exhaust Air to outdoors
 OA: Outdoor Air intake
 RA: Room Air to be exhausted
 FA: Fresh Air to inside



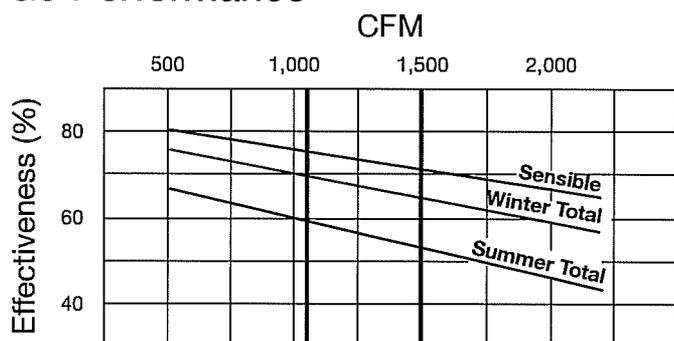
HE2XINH



Indoor Unit



G5 Performance



*At AHRI 1060 standard conditions
(See certified data on page 73 for core components.)

Specifications

Ventilation Type: Static Plate, Heat and Humidity Transfer							
Typical Airflow Range: 500-2,200 CFM							
AHRI 1060 Certified Core: Two L125-00							
Airflow Rating Points (for AHRI): 1,500 CFM and 1,126 CFM							
Number Motors: Two belt drive blower/motor packages with adjustable sheaves							
Drive HP	Volts	HZ	Phase	FLA (per motor)	Min. Cir. Amps	Max. Overcurrent Protection Device	
1.5	115	60	Single	15.2	34.2	45	
	208-230	60	Single	8.2-7.6	18.5	25	
	208-230	60	Three	4.6-4.8	10.8	15	
	460	60	Three	2.4	5.4	15	
2.0	575	60	Three	1.8	4.1	15	
	115	60	Single	20.0	45.0	60	
	208-230	60	Single	10.8-10.0	24.3	35	
	208-230	60	Three	6.1-5.8	13.6	15	
2.0	460	60	Three	2.9	6.5	15	
	575	60	Three	2.4	5.4	15	
	Optional Factory Installed VFD Electrical Specifications						
	1.5	208-230	60	Single	4.6-4.8	20.6	25
208-230		60	Three	4.6-4.8	11.9	15	
460		60	Three	2.4	5.9	15	
575		60	Three	1.8	4.5	15	
2.0	208-230	60	Single	6.1-5.8	26.0	30	
	208-230	60	Three	6.1-5.8	15	15	
	460	60	Three	2.9	7.2	15	
	575	60	Three	2.4	5.9	15	
Standard Features: Totally Enclosed Premium Efficiency Motors Motor Starters, Non-fused Disconnect 24 VAC Transformer/Relay Package							
Filters: Four total, MERV 8, 2" pleated, 20" x 20" nominal size							
Weight: 442 lbs (unit), 525 lbs (shipping weight, on pallet)							
Shipping Dimensions: 72" L x 48" W x 40" H							
Options: Fused disconnect Double wall construction Factory supplied and mounted Variable Frequency Drives (VFDs) – one or both airstreams Motorized isolation dampers, OA, EA or both airstreams Factory mounted Filter Alarms (2)							

Airflow Performance

Motor HP	Blower RPM	Turns Open	External Static Pressure (in. w.g.)													
			0.00		0.25		0.50		0.75		1.00		1.25		1.50	
			SCFM	BHP	SCFM	BHP	SCFM	BHP	SCFM	BHP	SCFM	BHP	SCFM	BHP	SCFM	BHP
1.5	1148	4	1592	0.7	1480	0.7	1320	0.6	1120	0.5	800	0.4	975	0.6	630	0.4
	1304	2	1809	1.0	1720	1.0	1600	0.9	1410	0.8	1250	0.7	1400	1.0	1165	0.8
	1460	0	2025	1.5	1950	1.4	1845	1.3	1715	1.2	1540	1.1	1400	1.0	1165	0.8
2	1506	2	2130	1.6	2050	1.5	1955	1.4	1840	1.3	1735	1.2	1585	1.0	1360	0.9
	1584	1	2170	1.8	2080	1.7	1970	1.5	1870	1.4	1765	1.3	1565	1.1	1360	0.9
	1661	0	2200	1.9	2100	1.8	2000	1.7	1900	1.5	1765	1.3	1565	1.1	1360	0.9

Note: Brake Horse Power (BHP) is for one blower motor package only.

Operation in this zone will likely exceed FLA limits. Operation in this zone outside of core airflow limits.



Simplicity - Reliability - Performance

Name:

General ERV-1
Description:

Model Number: (Info)

Core Designation:

Engineer:

Firm/Company:

Prepared By:

Phone Number:

Fax Number:

Email Address:

Ventilation Inputs

	Winter		Summer	
Fresh Air Flow Rate:	<input type="text" value="990"/> CFM	Room Exhaust Air DB: <input type="text" value="75.0"/> F	DB: <input type="text" value="75.0"/> F	
Fresh Air Ext. Static Pressure:	<input type="text" value="0.50"/> in W.C.	Room Exhaust Air RH: <input type="text" value="35"/> %	RH: <input type="text" value="50"/> %	
Exhaust Air Flow Rate:	<input type="text" value="990"/> CFM	Outside Air DB: <input type="text" value="21.0"/> F	DB: <input type="text" value="87.0"/> F	
Exhaust Air Ext. Static Pressure:	<input type="text" value="0.50"/> in W.C.	Outside Air WB: <input type="text" value="17.0"/> F	WB: <input type="text" value="71.0"/> F	

Performance Data

	Sensible		Total	
	Winter	Summer	Winter	Summer
Recovery Effectiveness	76 %	76 %	72 %	63 %

	Room Exhaust		Outside Air		Supply Air	
	Winter	Summer	Winter	Summer	Winter	Summer
Dry Bulb (F)	75.0	75.0	21.0	87.0	62.2	77.8
Wet Bulb (F)	58.1	62.6	17.0	71.0	49.0	65.8
Relative Humidity (%)	35	50	43	46	37	54
Absolute Humidity (lbH2O/dryair)	0.0064	0.0092	0.0010	0.0126	0.0043	0.0108
Enthalpy (BTU/lb)	25.0	28.1	6.1	34.7	19.6	30.6

	Sensible		Latent		Total	
	Winter	Summer	Winter	Summer	Winter	Summer
Original Load (BTU/h)	57737	12830	26213	16095	83950	28925
Original Load (Tons)		1.1		1.3		2.4
Load with RenewAire (BTU/h)	13710	3047	10132	7664	23842	10711
Load with RenewAire (Tons)		0.3		0.6		0.9
Savings (BTU/h)	44027	9784	16081	8431	60108	18214
Savings (Tons)		0.8		0.7		1.5



Simplicity - Reliability - Performance

Name: Engineer:

General Description: ERV-3 Firm/Company:

Prepared By:

Phone Number:

Fax Number:

Email Address:

Model Number: (Info)

Core Designation:

Ventilation Inputs

Winter

Summer

Fresh Air Flow Rate: CFM Room Exhaust Air DB: F DB: F

Fresh Air Ext. Static Pressure: in W.C. Room Exhaust Air RH: % RH: %

Exhaust Air Flow Rate: CFM Outside Air DB: F DB: F

Exhaust Air Ext. Static Pressure: in W.C. Outside Air WB: F WB: F

Performance Data

	Sensible		Latent		Total	
	Winter	Summer	Winter	Summer	Winter	Summer
Recovery Effectiveness	73 %	73 %	68 %	59 %		
	Room Exhaust		Outside Air		Supply Air	
	Winter	Summer	Winter	Summer	Winter	Summer
Dry Bulb (F)	75.0	75.0	21.0	87.0	60.7	78.2
Wet Bulb (F)	58.1	62.6	17.0	71.0	47.8	66.2
Relative Humidity (%)	35	50	43	46	37	54
Absolute Humidity (lbH2O/dryair)	0.0064	0.0092	0.0010	0.0126	0.0041	0.0110
Enthalpy (BTU/lb)	25.0	28.1	6.1	34.7	19.0	30.8
Original Load (BTU/h)	36450	8100	16549	10161	52999	18261
Original Load (Tons)		0.7		0.8		1.5
Load with RenewAire (BTU/h)	9669	2149	7202	5340	16871	7489
Load with RenewAire (Tons)		0.2		0.4		0.6
Savings (BTU/h)	26781	5951	9347	4821	36128	10772
Savings (Tons)		0.5		0.4		0.9

IGX-108-H12

CONSTRUCTION FEATURES AND ACCESSORIES

Unit Overview

Model	Airflow (CFM)	Heating	Cooling	Electrical V/C/R
IGX-108-H12	800	Indirect Gas	No Cooling	115/60/1

Features

- Exterior housing constructed of galvanized steel
- Removable access panels
- Painted or galvanized steel blower and bearing supports
- Forward curved steel blower and motor
- Fan assembly is mounted on vibration isolators
- Motor pulleys are adjustable through 15 hp and fixed for 20 hp and greater
- Fan shaft is mounted in permanently lubricated ball bearings (up through size 118) or ball bearing pillow blocks (size 120 and greater)
- Static free belts
- Corrosion resistant fasteners are standard

Options and Accessories

- Air Flow Arrangement: Outdoor Air Only
- Filter Section: MERV13., 4-15x20x2
- Damper: Inlet
- Outdoor Air Intake Position: End
- Discharge Position: Horizontal
- Coating: Galvanized
- Insulation: Duct Liner - Heat Source On
- Access Side: Right-Hand
- Control Center
- Freeze Protection
- Heat Inlet Air Sensor
- 1 NO/1 NC on Supply Starter
- Remote Panel: Kitchen (ships loose)
- Mounting: By Others
- Unit Warranty: 1 Yr (Standard)



IGX-108-H12

PERFORMANCE AND SPECIFICATIONS

Description/Arrangement

Model	Qty	Unit Weight (lb)	Discharge Position	Air Flow Arrangement	Unit Arrangement
IGX-108-H12	1	789	Horizontal	Outdoor Air Only	Horizontal

Design Conditions

Elevation (ft)	Summer DB (F)	Summer WB (F)	Winter DB (F)
768	89	77	-1

Air Performance

Type	Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor Size (hp)
Supply	800	0.25	0.289	870	0.17	1/4

Electrical/Motor Specifications

V/C/P	Unit MCA (amps)	Unit MOP (amps)	Enclosure	Supply Motor RPM	Supply Efficiency
115/60/1	12	15	ODP	1725	Standard

Heating/Cooling Specifications

Heating Type	Gas Type	Input (MBH)	Output (MBH)	LAT (F)	Temp. Rise (F)	Furnace Size	Furnace Control
Indirect Gas	Natural	100.0	80.0	91.6	92.6	100	4 to 1 Electronic

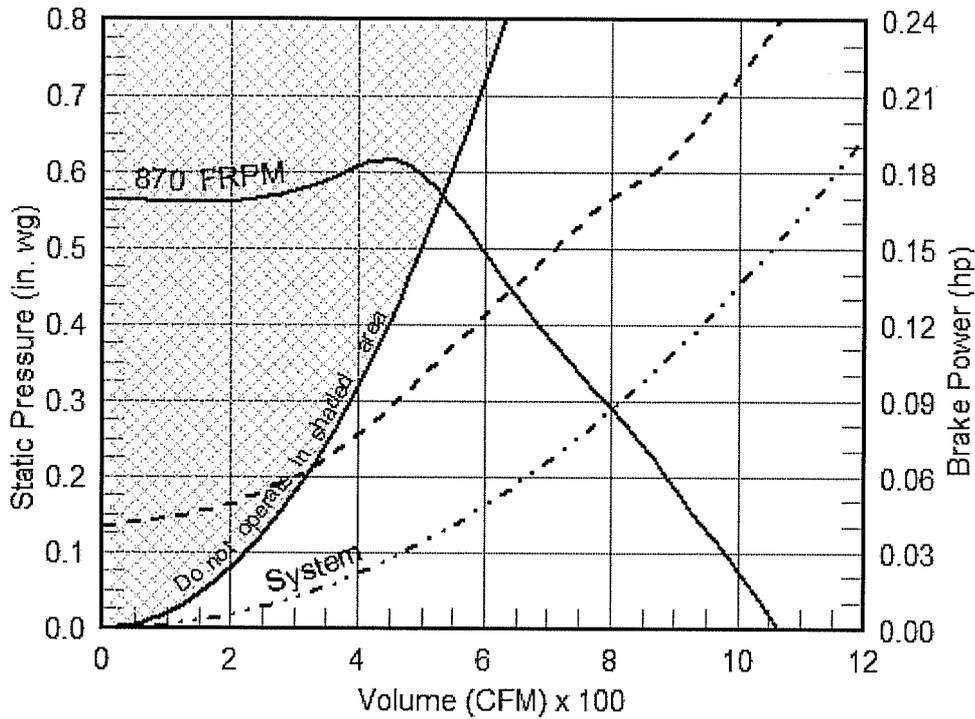
Sound Performance in Accordance with AMCA

Fan	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Supply	77	74	69	64	62	60	57	50	68	57	7.6

IGX-108-H12 FAN CURVES

Supply Fan Performance

Volume (CFM)	Supply SP (in wg)	Total SP (in wg)	RPM	Operating Power (hp)	Motor Size (hp)	Fan Quantity
800	0.25	0.289	870	0.17	1/4	1



- Fan curve
- - - System curve
- . - Brake horsepower curve

IGX-108-H12

HEATING PERFORMANCE

Indirect Gas Heating

Heating Type	Gas Type	Input (MBH)	Output (MBH)	LAT (F)	Temp. Rise (F)	Furnace Control
Indirect Gas	Natural	100.0	80.0	91.6	92.6	4 to 1 Electronic

Indirect Gas Unit Details

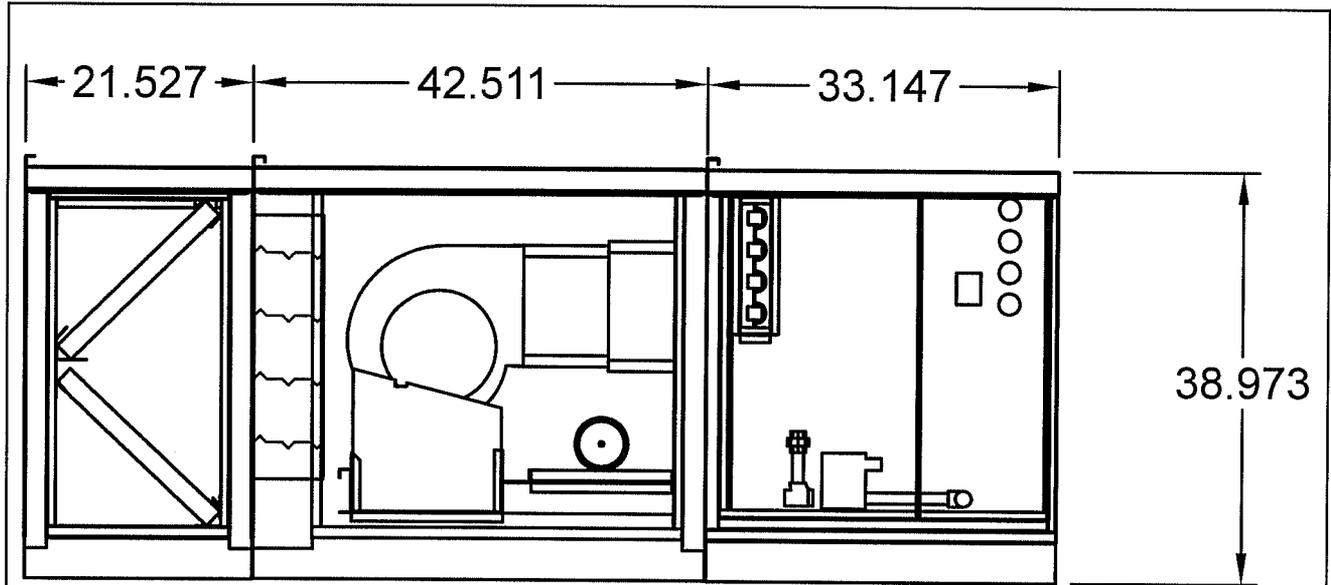
This unit will come equipped with the following:

- ETL Listed to ANSI Standard Z83.8 and CGA 2.6
- High Thermal Efficiency
- Direct Spark Ignition
- Power Venting
- 24 Volt Control Power

Heating Details

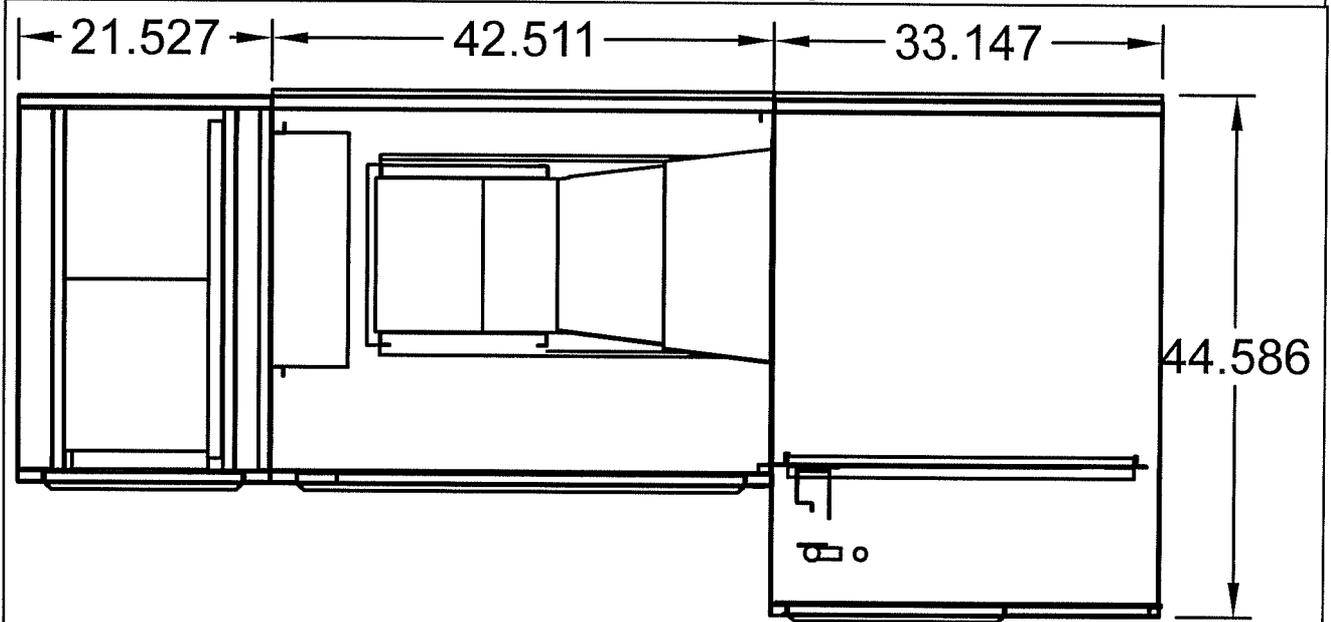
Heat Exch. Material	Stainless Steel
Unit Installation	Indoor
Indoor Venting	Vertical Concentric
Furnace Control	4 to 1 Electronic
Room Override	Yes
Heat Ex. Warranty 5yr	Yes

IGX-108-H12



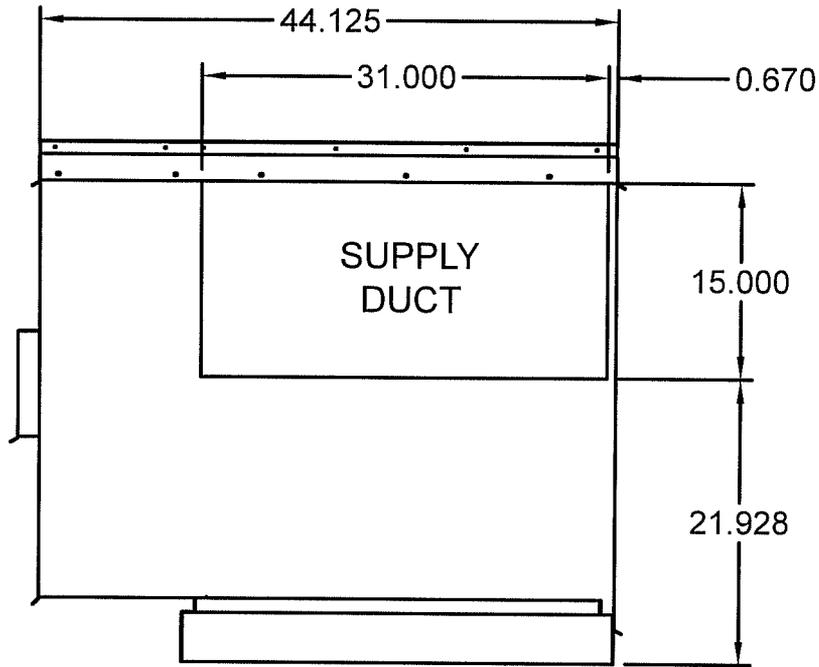
ELEVATION VIEW

* Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.

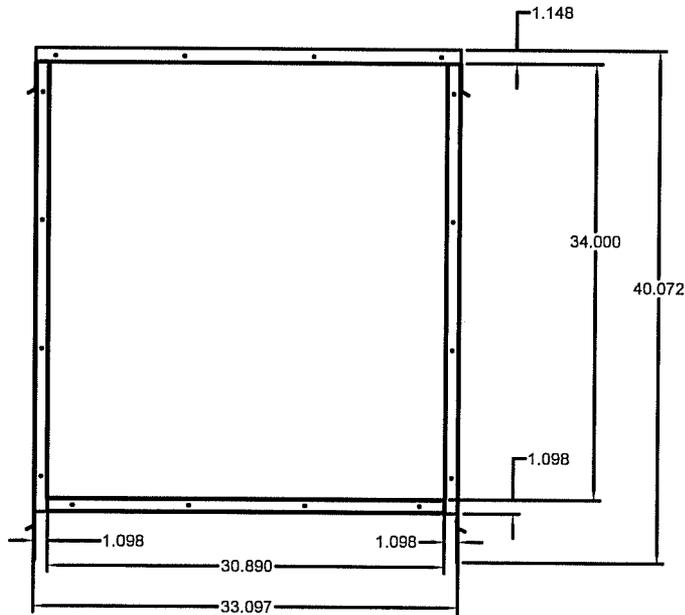


PLAN VIEW

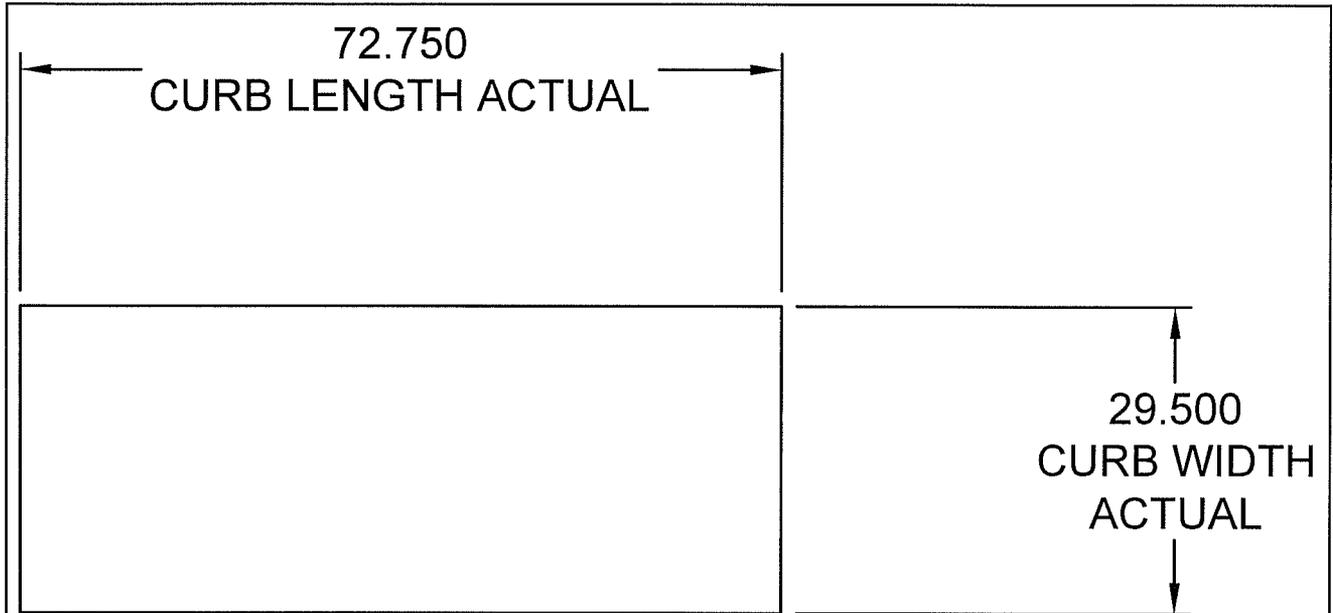
* Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.



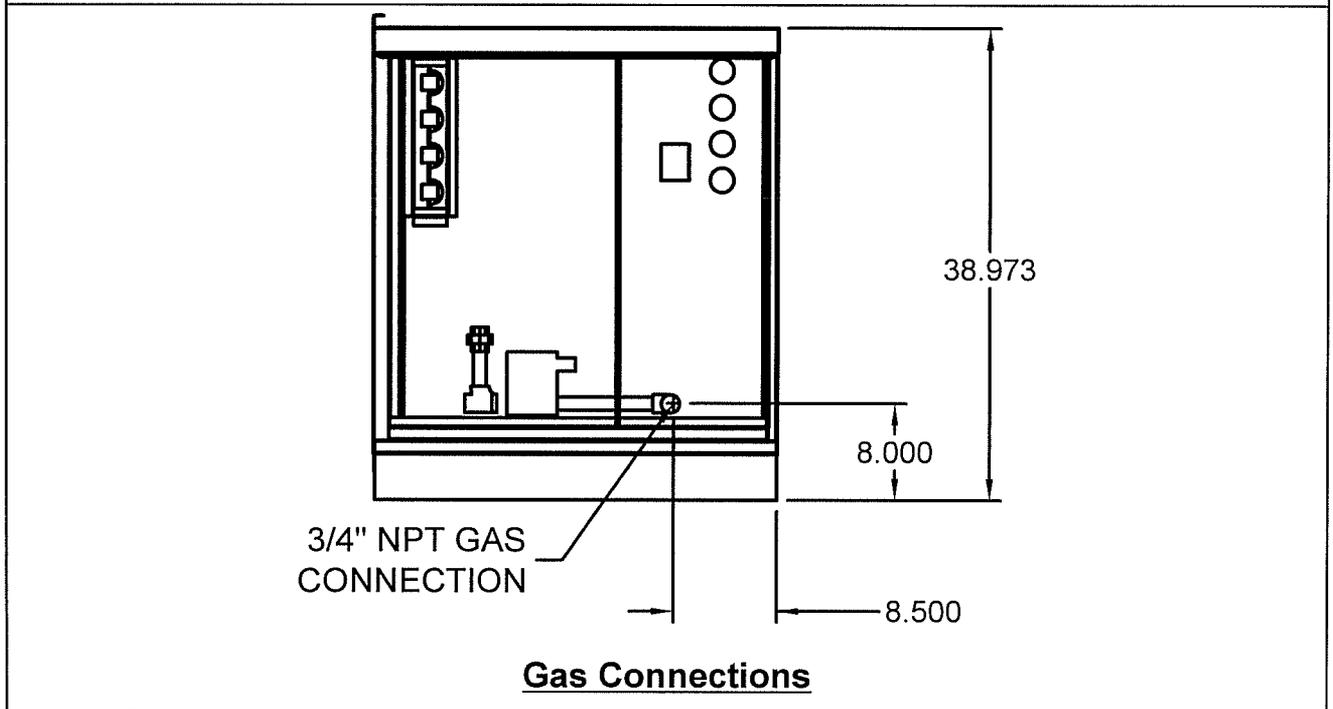
END VIEW

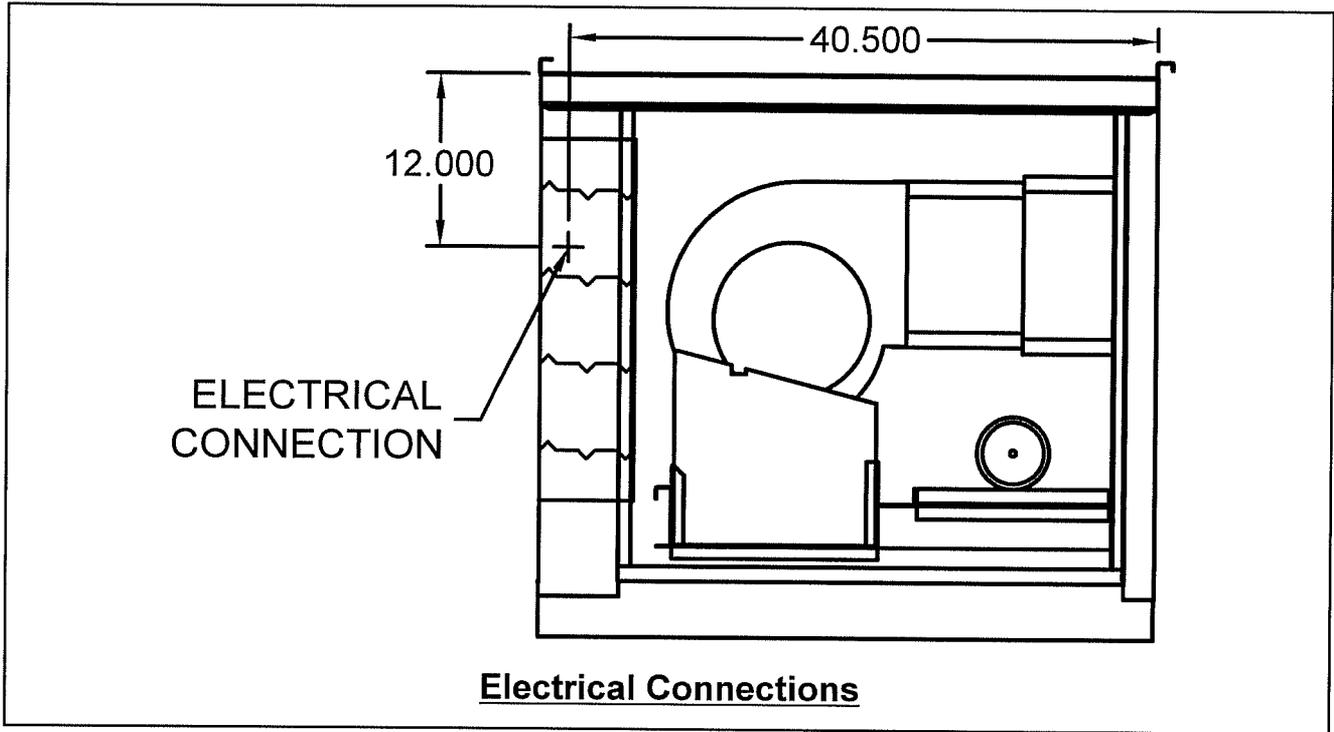


INTAKE VIEW

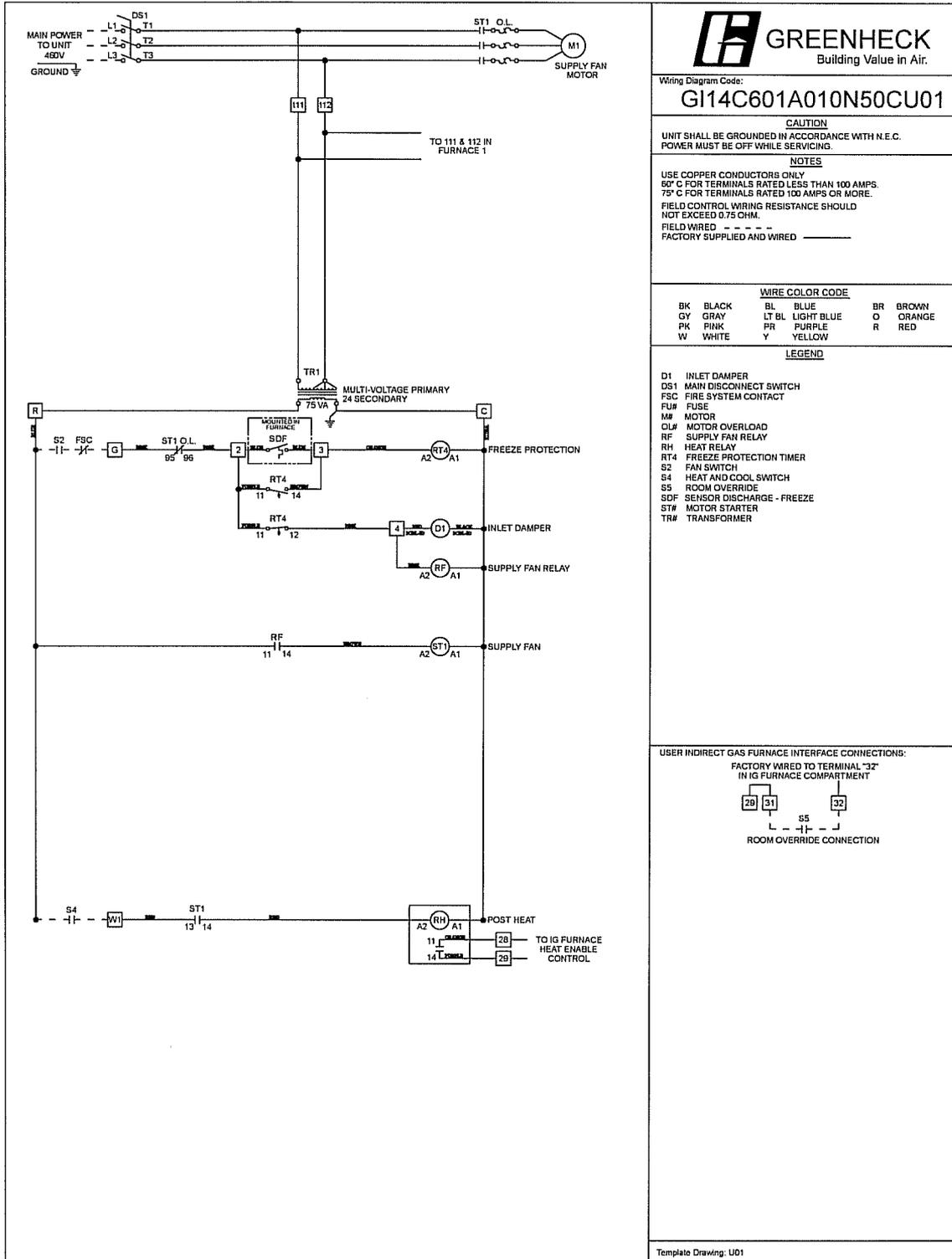


FOOTPRINT VIEW

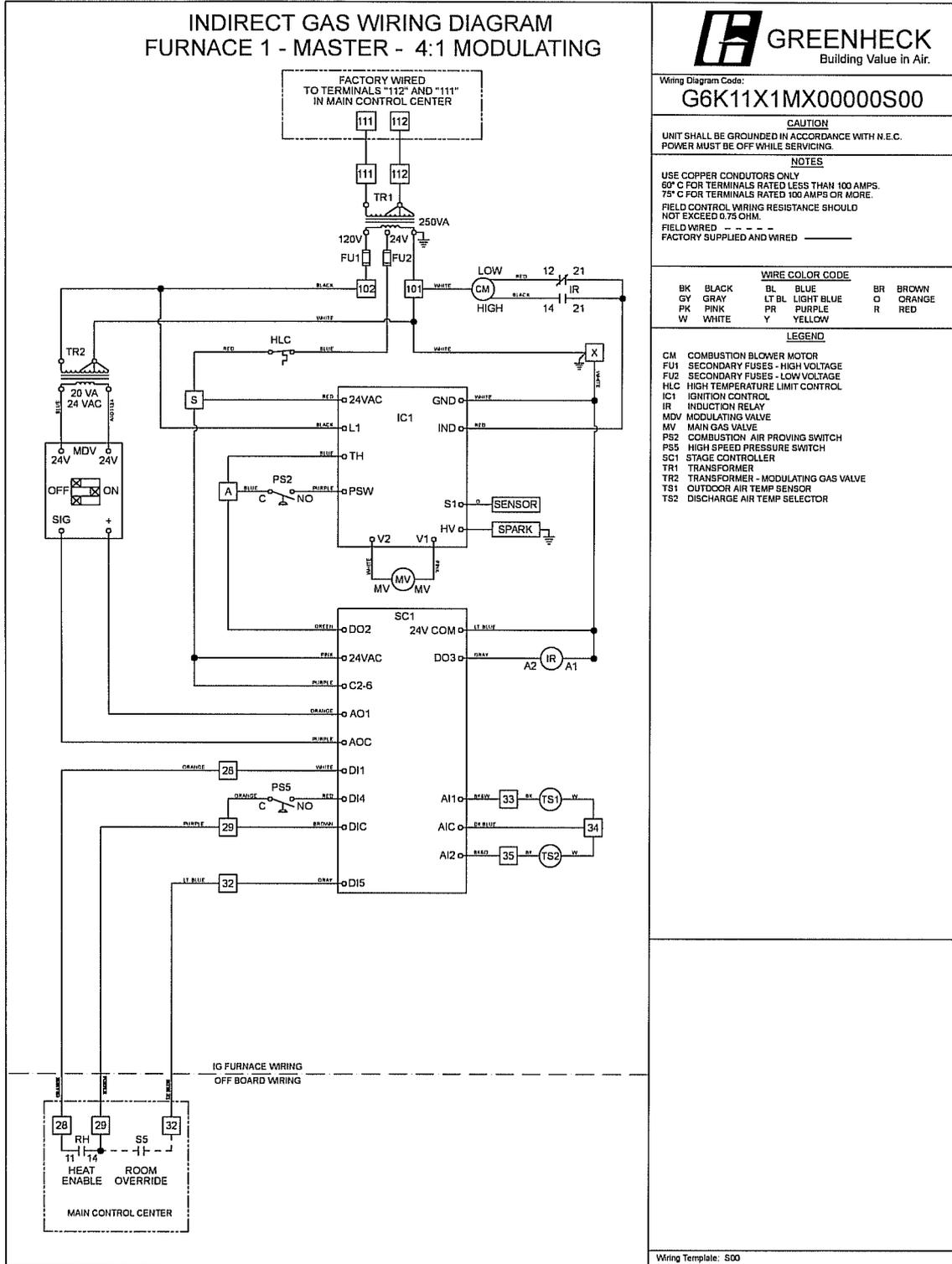




EQUIPMENT SCHEDULE													
Tempered Make-Up Air Unit										Mark: MAU-Kitchen			
Qty	Greenheck Model	Volume	External SP		FRPM	Operating Power	Weight	Motor Information					MCA
			Total SP					Size	V/C/P	Encl:	Motor RPM	Windings	
1	IGX-108-H12	800 CFM	0.25 in. wg	0.289 in. wg	870 RPM	0.17 hp	789 lb	1/4 hp	460/60/3	ODP	1725	1	2.1
Heating													
Type	Gas Type	Temperature			Energy			Connection Gas	Building Gas Pressure	Control Access			
		Winter DB	Max Δ	Max LAT	Input	Output	Efficiency						
Indirect Gas	Natural	0 F	92.6 F	91.6 F	100.0 MBH	80.0 MBH	80%	3/4"	1/2 to 1 PSI				
Outlet Sound Power By Octave Band								LwA	dBA	Sones			
62.5	125	250	500	1000	2000	4000	8000						
77.4	74	68.5	63.7	62.3	59.6	57.1	49.8	68.2	57.2	7.6			
<ul style="list-style-type: none"> • LwA - A weighted sound power level based on ANSI S1.4 • dBA - A weighted sound pressure level base on 11.1 dB attenuation per octave band at 5.0 ft. • Noise Criteria (NC) based on an average attenuation of 11.5 dB per octave band at 5.0 ft. 													
OPTIONS AND ACCESSORIES													
Unit Insulation - DuctLiner - Heat Source On Air Flow Arrangement - Outdoor Air Only - 100% OSA Horizontal Unit - No Weatherhood Provided 03a Indoor Unit Installation - Vertical Concentric Venting Discharge Position - Horizontal - No Diffuser Inlet Damper Inlet Air Sensor - Heating Control Center Factory Finish - Galvanized Blower Isolation - Neoprene Furnace Control - 4to1Electronic - w/ room override													



Manufacturer reserves right to change, alter, or improve this product at any time.

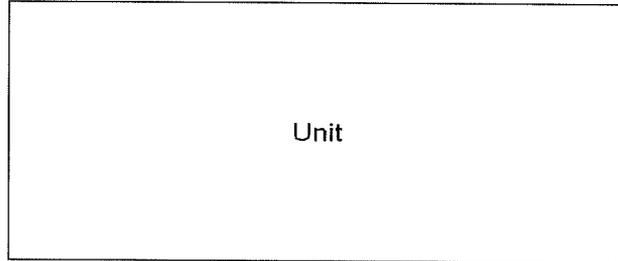


Manufacturer reserves right to change, alter, or improve this product at any time.

IGX-108-H12 Corner Weights

133 lb

172 lb



211 lb

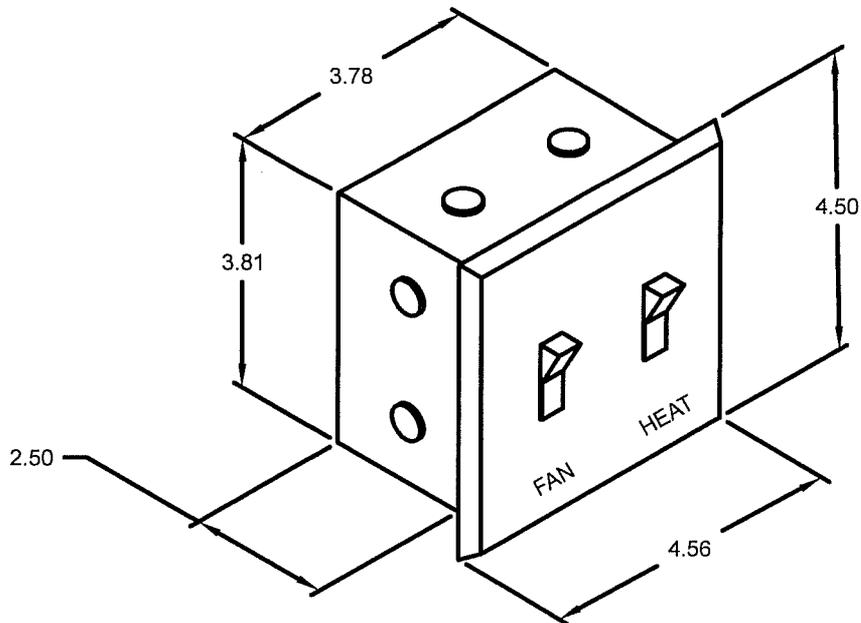
273 lb

Note: Estimated corner weights are shown looking down on unit and airflow from left to right. Weights are applied at the base of the unit. Images not drawn to scale.

KSCP REMOTE CONTROL PANEL

STANDARD CONSTRUCTION FEATURES

- Toggle switches and stainless face plate for wall mounting.
- Junction box included.



* Location of switches, lights and controls may vary.

NOTES: All dimensions shown are in units of inches

Warranty Information

Limited Warranty - Unit

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of 1 year(s) from the purchase date. Any component which proves defective during the warranty period will be repaired, or replaced, at Greenheck's sole option when returned to our factory, transportation prepaid.

The warranty does not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product.

This warranty is exclusive, and is in lieu of all other warranties, whether written, oral or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose.

Limited Warranty - Heat Exchanger

Greenheck warrants the stainless steel heat exchanger to be free from defects in material and workmanship for a period of 5 years from the purchase date. Any stainless steel heat exchanger which proves defective during the warranty period will be repaired, or replaced, at Greenheck's sole option when returned to our factory, transportation prepaid.

The warranty does not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product.

This warranty is exclusive, and is in lieu of all other warranties, whether written, oral or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose.