



Design Advisory Board

Tuesday, March 12, 2024, 3:00 PM

Remote and In Person (at 645 Pine Street) Meeting

Please click the link below to join the webinar:

Zoom: <https://us02web.zoom.us/j/87155655137?pwd=ZEdGaGhxeFpRNDJQcFJrNWkvb1Vudz09>

Webinar ID: 871 5565 5137

Passcode: 796731

Telephone: US: +1 312 626 6799 or +1 929 205 6099 or +1 301 715 8592 or +1 346 248 7799 or +1 669 900 6833 or +1 253 215 8782

1. Agenda

1.1.

Session I – 3:00 PM – 3:30 PM

ZP-24-59; 44 Wright Avenue (RL-W, Ward 5) 44 Wright, LLC / Arthur Chukhman
Rehabilitation of existing triplex, adding a unit within, and constructing detached triplex in the rear for a total of 7 units. (Project Manager, Mary O’Neil)

1.2.

Session II – 3:30 PM – 4:00 PM

ZP-24-23; 23 Catherine Street (RL, Ward 5) David Barron / Erica Houskeeper / Dixie O’Connor
Conditional use to demolish existing garage to construct a new habitable building in the same footprint. (Project Manager, Mary O’Neil)

2. Informational and Non-Discrimination Statements

2.1.

The programs and services of the City of Burlington are accessible to people with disabilities. Individuals who require special arrangements to participate are encouraged to contact the Department of Permitting & Inspections at least 72 hours in advance so that proper accommodations can be arranged. For information call 865-7188.

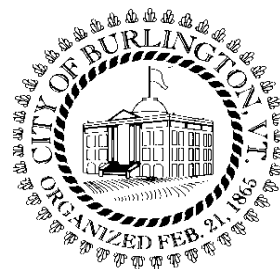
Non-Discrimination

The City of Burlington will not tolerate unlawful harassment or discrimination on the basis of political or religious affiliation, race, color, national origin, place of birth, ancestry, age, sex, sexual orientation, gender identity, marital status, veteran status, disability, HIV positive status, crime victim status or genetic information. The City is also committed to providing proper access to services, facilities, and employment opportunities. For accessibility information or alternative formats, please contact Human Resources Department at (802) 540-2505.

Department of Permitting and Inspections

Zoning Division
645 Pine Street
Burlington, VT 05401
www.burlingtonvt.gov/pz
Phone: (802) 865-7188
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*William Ward, Director
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Garret King, Associate Planner
Joseph Cava, Planning Technician
Ted Boylan, Permit Administrator
Theodore Miles, Zoning Specialist*



MEMORANDUM

To: The Design Advisory Board
From: Mary O'Neil, AICP, Principal Planner
RE: ZP-24-59
Location: 44 Wright Avenue
Date: March 12, 2024

File: ZP-24-59
Location: 44 Wright Avenue
Zone: RM **Ward:** 5
Parking District: Neighborhood
Date application accepted: February 21, 2024; revised planset February 29, 2024.
Applicant/ Owner: Arthur Chukhman, Duncan Wisniewski Architects / Andrew McNealus, 44 Wright LLC
Request: Proposed reconfiguration of existing 3-unit building into a 4-unit building. Proposal includes a secondary 3-unit structure and changing the driveway from gravel to pervious pavers. Review of this application is under the newly warned **ZA-24-02 Neighborhood Code**.



Background:

The programs and services of the City of Burlington are accessible to people with disabilities. For accessibility information call 865-7188 (for TTY users 865-7142).

- **Zoning Permit 23-207**; seeking determination classifying property as a three-unit dwelling. Affirmative determination May 2023.
- **Zoning Permit 03-453**; install vinyl siding over existing asphalt siding. Vinyl cornerboards. Aluminum window trim and soffits. [Conditioned that existing wood cornerboard, window trim, soffits, and gable ends be maintained as wood is defining features of the building.] Property identified as a **duplex**. April 2003.
- **Zoning Permit 85-162**; Construct open deck to the rear of #46. Property identified as a duplex. May 1985.
- **Zoning Permit (82-illegible)**; add an 8' x 14' open deck to the upstairs rear of the house. Changing present window to a door. No additional lot coverage. Property identified as 3 units. June 1982.

Overview: 44-46 Wright Avenue is an existing triplex within the Lakeside Historic District. The application seeks to utilize the warned Neighborhood Code zoning amendment 24-02 that permits up to 6 units in a principal building in the RM zoning district, and a secondary building with up to 4 units. As part of the Neighborhood Code, this neighborhood has been up-zoned to Residential-Medium from the previous Waterfront Low-Density zoning district. This application proposes four units in the Principal building (with a full structural gut of the existing home), and a new, detached building with three additional residential units for a total of 7 on-site. The existing gravel driveway and parking area will be replaced with pervious pavers.

Part 1: Land Division Design Standards

Not applicable.

Part 2: Site Plan Design Standards

Sec. 6.2.2 Review Standards

(a)Protection of Important Natural Features:



The site appears relatively flat, but falls away at the northwest corner. This is likely the basis for the lot being included within the Steep Slopes overlay district, which includes "adjacent lands within 50' of the top of the slopes." Should the applicant team feel this attribution is incorrect, they shall provide corrected slope data. The boundaries on the Steep Slopes Overlay Map may be supplemented or modified by examination of one of more of the following sources by the Development Review Board whenever an application is submitted for review.

- Contour Maps prepared from the most current orthophotography.
- On-site survey prepared by a registered professional engineer or surveyor.

The burden of proving the correct boundary shall be on the applicant, supported by engineering and/or surveying data or mapping. Absent correction, the Steep Slopes standards will apply.

(b) Topographical Alterations:

The plan includes providing a shallow basin around the new pervious paver parking area; to provide an area for runoff. The Stormwater Engineer must agree with this plan as part of a Stormwater Management plan.

(c) Protection of Important Public Views:

There are no protected public views from or through this property.

(d) Protection of Important Cultural Resources:

Burlington's architectural and cultural heritage shall be protected through sensitive and respectful redevelopment, rehabilitation, and infill. Archeological sites likely to yield information important to the city's or the region's pre-history or history shall be evaluated, documented, and avoided whenever feasible. Where the proposed development involves sites listed or eligible for listing on a state or national register of historic places, the applicant shall meet the applicable development and design standards pursuant to Sec. 5.4.8(b).

See Section 5.4.8, below.

(e) Supporting the Use of Renewable Energy Resources:

Any new construction after January 1, 2024 triggers compliance requirements with the City's new Thermal Energy Systems ordinance. The applicant is encouraged to connect with Chris Burns (cburns@burlingtonelectric.com) to begin a conversation about compliance.

(f) Brownfield Sites:

None identified.

(g) Provide for nature's events:

Special attention shall be accorded to stormwater runoff so that neighboring properties and/or the public stormwater drainage system are not adversely affected. All development and site disturbance shall follow applicable city and state erosion and stormwater management guidelines in accordance with the requirements of Art 5, Sec 5.5.3.

Design features which address the effects of rain, snow, and ice at building entrances, and to provisions for snow and ice removal or storage from circulation areas shall also be incorporated.

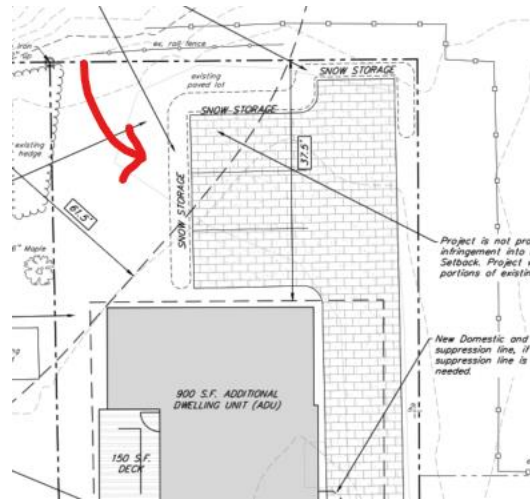
The site plan includes a proposal for a shallow basin to direct stormwater away from the parking area. The Stormwater engineer will review a Stormwater Plan to determine the efficacy and to prevent adverse impacts to mis-directed on-site water.

An EPSC and Stormwater Plan are required.

The existing multi-unit structure has a principal entry under a gabled porch; the new rear building is illustrated with a southerly entry under a modified canopy. Both will provide a modicum of protection from inclement weather.



Snow storage is identified at the north/west corner of the parking area.



(h) Building Location and Orientation:

The introduction of new buildings and additions shall be consistent with the intent of the district. New buildings and additions should be aligned with the front façade of neighboring buildings to reinforce the existing “street-edge,” or where necessary, located in such a way that complements existing natural features and landscapes. Buildings placed in mixed-use areas where high volume of pedestrian traffic are desired should seek to provide sufficient space (optimally 12-15 feet) between the curblane and the building face to facilitate the flow of pedestrian traffic. In such areas, architectural recesses and articulations at the street-level are particularly important, and can be used as an alternative to a complete building setback in order to maintain the existing street wall.

44 Wright will retain the same orientation as existing; gable front to the street. The proposed new triplex will be placed behind the existing building at the center of the lot.

(i) Vehicular Access:

Vehicular access will remain as existing, with a single access driveway off Wright Avenue.

(j) Pedestrian Access:

There is a sidewalk along the north side of Wright Avenue, and two entry walkways (south, and east) to the existing building at 44 Wright Ave. There is no dedicated pedestrian walkway to access the rear building. One is required to separate vehicles from pedestrians.

(k) Accessibility for the Handicapped:

Building Code typically requires the creation of one accessible unit when the new unit count $\geq$ 4. The building official will provide guidance on requirements for providing any accessible units.

A ramp has been included on the principal building. See plans A 1-1 and C-1.00.

(l) Parking and Circulation:

There is an existing extended driveway in place since 2000 leading to a parking area in the rear. This application proposes retention of existing conditions, with removal of the gravel and installation of 2,650 sf of pervious pavers. At the time of review, the Stormwater Administrator had concerns about the degree of pervious pavers as part of the “bonus” provisions of Section 4.4.5 (d) 2. C. (ix). The pavers alone exceed the allowance for bonus residential features. Three parking spaces are illustrated behind the new triplex. A portion of the hammerhead has been removed to meet the minimum setback of 5’ from the rear property line.

(m) Landscaping and Fences:

No landscaping plan has been provided, and is required. It is likely that the Conservation Board will recommend some native plantings on the northwesterly side of the parcel.

(n) Public Plazas and Open Space:

There are two small areas on the west side of the lot that can provide an area for recreation, gathering, gardening, or other common outdoor enjoyment.

(o) Outdoor Lighting:

Where exterior lighting is proposed the applicant shall meet the lighting performance standards as per Sec 5.5.2.

A lighting plan and photometric has been provided, and is acceptable to the standards of Section 5.5.2.

(p) Integrate infrastructure into the design:

Exterior storage areas, machinery and equipment installations, service and loading areas, utility meters and structures, mailboxes, and similar accessory structures shall utilize setbacks, plantings, enclosures and other mitigation or screening methods to minimize their auditory and visual impact on the public street and neighboring properties to the extent practicable.

Condensing units have been relocated to the north (rear) of the existing building and placed between the residential decks. Mailbox location will need to be identified for the Secondary building.

Telecom box and a gas meter is on the west elevation of the Principal building, with another gas meter on the east elevation. Additional equipment may be required for the Secondary building after compliance review by BED to meet the Thermal Energy Ordinance. If so, revised plans shall be provided with those changes.

Utility and service enclosures and screening shall be coordinated with the design of the principal building, and should be grouped in a service court away from public view. On-site utilities shall be placed underground whenever practicable. Trash and recycling bins and dumpsters shall be located, within preferably, or behind buildings, enclosed on all four (4) sides to prevent blowing trash, and screened from public view.

Plans note the likely insufficiency of water and sewer service (C-1.00). Plans for upgrades shall be coordinated with Water Resources Division. New electric must be undergrounded. The area for trash/recycling/compost has not been identified, and must be.

Any development involving the installation of machinery or equipment which emits heat, vapor, fumes, vibration, or noise shall minimize, insofar as practicable, any adverse impact on neighboring properties and the environment pursuant to the requirements of Article 5, Part 4 Performance Standards.

Condensing units have been relocated to the area between the rear porches, which should be effective in limiting auditory and visual impact to the street and neighboring structures.

Part 3: Architectural Design Standards Sec. 6.3.2 Review Standards

(a) Relate development to its environment:

*Proposed buildings and additions shall be appropriately scaled and proportioned for their function and with respect to the purpose of the zoning district. They **should** integrate harmoniously into the topography, and to the use, scale, and architectural details of existing buildings in the vicinity; however such consideration shall not require building height to be more limited than otherwise allowed within an applicable zoning district or overlay zone per Article 4. [Standard revised per ZA-24-02]*

Although taller than the existing structure, the new residential secondary structure meets the allowance of 35' / 3 stories in the Neighborhood Code.

1. Massing, Height and Scale:



While architectural styles or materials may vary within a streetscape, proposed development should maintain an overall scale similar to that of surrounding buildings, or provide a sensitive transition where appropriate to development of a dissimilar scale.

In low and medium residential districts, the height and massing of existing residential buildings should be carefully considered when evaluating the compatibility of additions and infill development; however no modifications by the DRB shall be made to projects which otherwise limit the allowable Principal Structure footprint, height and number of units per building otherwise permitted by Tables 4.4.5-1 and 4.4.5-2. [Standard revised by Neighborhood Code]

Per the newly warned amendment, the principal building is limited to a footprint of 1800 sf. Aside from replacement rear decks, that footprint will not increase.

The rear building is consistent with **Table 4.4.5-2, Principal & Secondary Structures Massing and Placement Standards in Residential Districts**. At a 900 sf footprint, it maximizes the allowance for a secondary structure in the RM zoning district. The Minimum Distance required between buildings is 15' and height limit is 35' / 3 stories; the submitted plan is compliant.

2. Roofs and Rooflines.

Plan A2-1 illustrates a 35' height on the dormer-roofed side of the building (measurement to the mid-point of the rise of the roof); the applicant has confirmed that the corresponding easterly roof concurs with height compliance of 35'.

3. Building Openings

Replacement windows are proposed for the existing structure, with some variation in window arrangement on the north (rear) and west 2nd story.

The new triplex in large part features casement windows and double hung sash are included. There is increased attention to the westerly elevation to maximize resident lake views. A main entry is provided on the south/1st floor elevation, with additional doors at unit decks. Doors are full light. See attached Pella Unit Elevations for window and door schedule.

(b) Protection of Important Architectural Resources:

Burlington's architectural and cultural heritage shall be protected through sensitive and respectful redevelopment, rehabilitation, and infill. Where the proposed development involves buildings listed or eligible for listing on a state or national register of historic places, the applicant shall meet the applicable development and design standards pursuant to Sec. 5.4.8. The introduction of new buildings to a historic district listed on a state or national register of historic places shall make every effort to be compatible with nearby historic buildings.

See Section 5.4.8.

(c) Protection of Important Public Views:

There are no protected public views from or through this site.

(d) Provide an active and inviting street edge:

Plans do not define any specific alterations to the exterior of the existing building; however a ramp is proposed adjacent to the front landing. Ramps are specifically excluded from lot coverage calculations.

The Secondary building will have limited visibility from the street; however the principal entrance will face Wright Avenue.

(e) Quality of materials:

All development shall maximize the use of highly durable building materials that extend the life cycle of the building, and reduce maintenance, waste, and environmental impacts. Such materials are particularly important in certain highly trafficked locations such as along major streets, sidewalks, loading areas, and driveways. Efforts to incorporate the use of recycled content materials and building materials and products that are extracted and/or manufactured within the region are highly encouraged.

Windows are proposed to be fiberglass; siding for the existing structure is an engineered wood product (“Smart Side”) with a proprietary combination of zinc borate, resins, and waxes. A similar shingle product is proposed for the gable dormers and principal gable of the original structure.



The new building will be clad in corrugated metal in 2 different colors.

Owners of historic structures are encouraged to consult with an architectural historian in order to determine the most appropriate repair, restoration or replacement of historic building materials as outlined by the requirements of Art 5, Sec. 5.4.8.

(f) Reduce energy utilization:

The new construction will be required to meet the new Thermal Energy Ordinance, in effect since January 1, 2024. A contact with BED has been provided to the applicant for early guidance.

(g) Make advertising features complementary to the site:

Not applicable.

(h) Integrate infrastructure into the building design:

See Section 6.2.2 (p), above.

(i) Make spaces secure and safe:

All building and life safety code as defined by the building official and the fire marshal will be applicable.

Sec. 5.4.8 Historic Buildings and Sites

The City seeks to preserve, maintain, and enhance those aspects of the city having historical, architectural, archaeological, and cultural merit. Specifically, these regulations seek to achieve the following goals:

To preserve, maintain and enhance Burlington's historic character, scale, architectural integrity, and cultural resources;

To foster the preservation of Burlington's historic and cultural resources as part of an attractive, vibrant, and livable community in which to live, work and visit;

To promote a sense of community based on understanding the city's historic growth and development, and maintaining the city's sense of place by protecting its historic and cultural resources; and,

To promote the adaptive re-use of historic buildings and sites.

(a) Applicability:

These regulations shall apply to all buildings and sites in the city that are listed, or eligible for listing, on the State or National Register of Historic Places.

44 Wright Avenue is a contributing resource to the Lakeside Historic District, listed on the National Register April 12, 1982. These standards apply ONLY to the existing structure at 44 Wright Avenue.

(13)
44-46 Wright Avenue. Dwelling Type D. Same as bldg. No. 5, 57-59 Lakeside Avenue. Variations: the entrance porch has a gable roof. Alterations: asphalt shingle siding (wood shingle siding in front gable and dormer peaks not covered.)

(b) Standards and Guidelines:

The following development standards, following the Secretary of the Interior's Standards for the Treatment of Historic Properties, shall be used in the review of all applications involving historic buildings and sites subject to the provisions of this section and the requirements for Design Review in Art 3, Part 4. The Secretary of the Interior's Standards are basic principles created to help preserve the distinctive character of a historic building and its site. They are a series of concepts about maintaining, repairing and replacing historic features, as well as designing new additions or making alterations. These Standards are intended to be applied in a reasonable manner, taking into consideration economic and technical feasibility.

1. *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.*

44 Wright Avenue was constructed as a residential duplex structure as company built housing to support the Queen City Cotton Mill. As a multi-unit building (with an additional residential structure), it will continue the residential use of the property.

2. *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.*

When 44 Wright Avenue was listed on the National Register, the narrative described asphalt shingle siding, although the gable and dormers were shingled. A zoning permit in 2003 required the retention of cornerboards and shingle siding due to the historic listing of the property. This application proposes engineered wood siding, with a similar shingle style material in the dormers and at the principal gable end of the historic structure.

The removal and replacement of rear porches does not alter historic building features.

Window replacement will revert to the fenestration pattern visible in the historic district photograph: 6/6 visible in historic photos and the Assessor's aerial image of 1985.. There are



no permits on file for window replacement, other than replacement of a rear window with a door in 1982.

3. *Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.*

No conjectural features are proposed; however there is physical evidence to inform the original conditions of the building prior to earlier alteration, with or without zoning permits. Windows were historically 6/6 (probably as the construction date overlaps with the last building phase of the district, when Colonial Revival treatment was included) and the gable ends were shingled.

4. *Changes to a property that have acquired historic significance in their own right will be retained and preserved.*

None identified.

5. *Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.*

44 Wright Avenue retains its relationship within the historic district due to its identical style and size to those other dwellings constructed by the Queen City Cotton Mill, however one of a handful that were oriented at right angles to the street rather than parallel. This massing and orientation, with dormer features follows the characteristic pattern of the neighborhood. Here

is an opportunity to strengthen the the commonalities with similar structures within the district.

Siding reveal should seek to match the historic dimension, and materials to follow suit. Fenestration patterns will reclaim the historic pattern rather than continue the unpermitted replacement design.



Assessor Reval photo 1984-85.

Window pattern 6/6 evident in upper floors.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials recognizing that new technologies may provide an appropriate alternative in order to adapt to ever changing conditions and provide for an efficient contemporary use. Replacement of missing features will be substantiated by documentary and physical evidence.

See comments above re: replacement windows.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

No chemical treatments are proposed. Not applicable.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

No archaeological resources have been identified at this site. Not applicable.

9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale, and proportion, and massing to protect the integrity of the property and its environment.

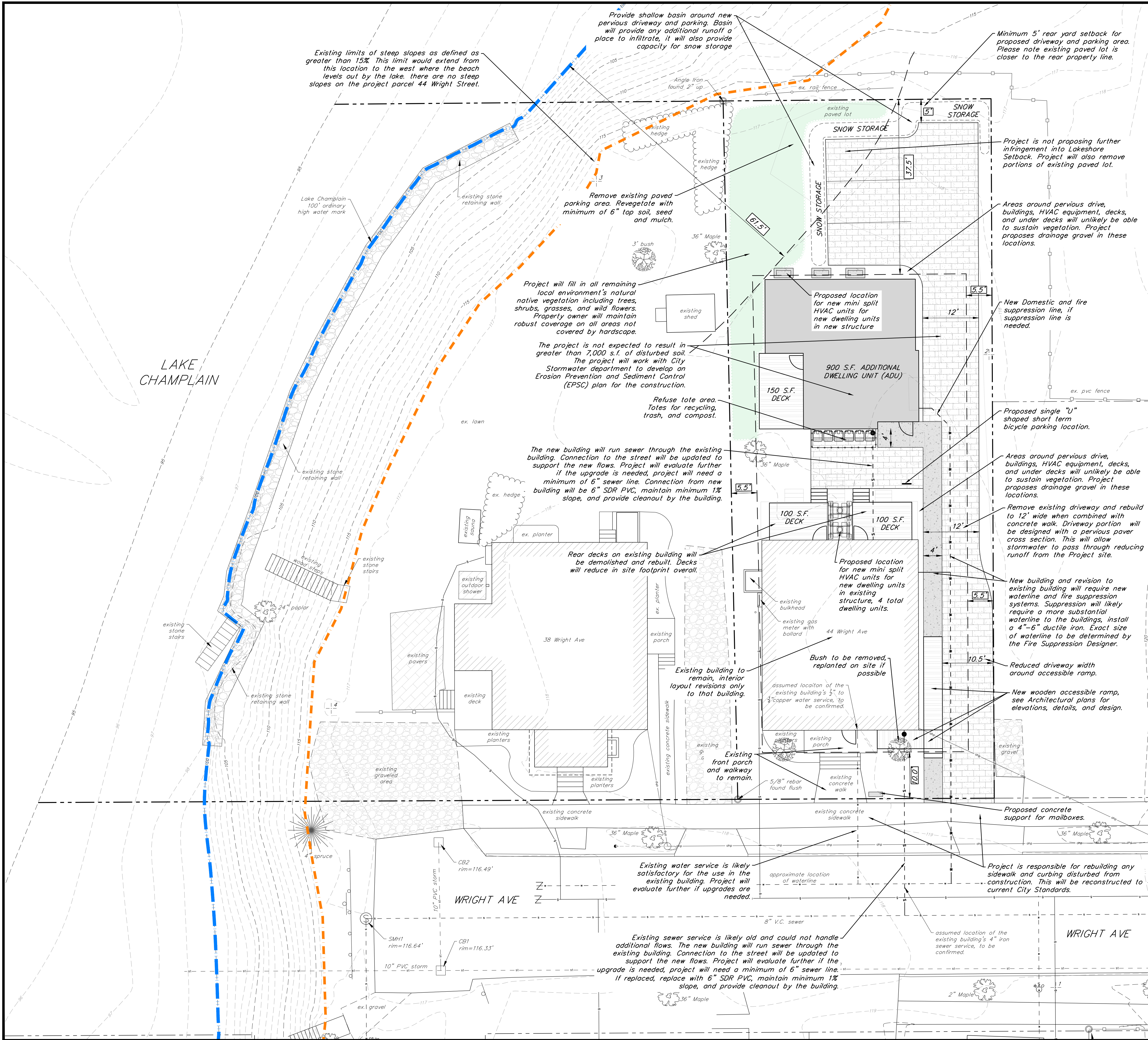
See comments above re: replacement siding and windows.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

While unlikely, it is possible to consider removal of new siding, roofing and windows that would allow for the easy identification of the essential form and integrity of the property.

Items for the Board's consideration:

1. A landscaping plan is required.
2. A Stormwater Management Plan is required.
3. Lot coverage shall be revised to comply with Table 4.4.5-1 as revised by the Neighborhood Code.
4. The location of trash/recycling/compost shall be defined, and appropriately screened if necessary.
5. Mailbox location will need to be identified for the Secondary building.



LEGEND

IRON PIPE / CONCRETE MONUMENT FOUND

EXISTING TREELINE

EXISTING GRADE CONTOUR LINES (5 FOOT INTERVALS)

EXISTING GRADE CONTOUR LINES (1 FOOT INTERVALS)

APPROXIMATE PROPERTY LINES

EXISTING STOCKADE FENCE

EXISTING RAIL FENCE

EXISTING SEWER LINE/MANHOLE

EXISTING STORM LINE/MANHOLE/BASIN

EXISTING OVERHEAD ELECTRIC LINE/ POWER POLE

EXISTING UNDERGROUND POWER

EXISTING WATER LINE/HYDRANT/VALVE /SHUTOFF

EXISTING UNDERGROUND GAS SYSTEMS

ELEVATION 100' THE ORDINARY HIGH WATER MARK OF LAKE CHAMPLAIN AS DEFINED BY THE CITY OF BURLINGTON

LIMIT OF STEEP SLOPES EXCEEDING 15%

PROPOSED PERVIOUS PAVERS DRIVES AND WALKWAYS

PROPOSED CONCRETE WALKWAYS AND UTILITY SUPPORTS

PROPOSED DECKING AND STAIRS FOR DECKS - NON-CONCRETE

CALCULATIONS:

EXISTING CONDITIONS:

- PARCEL AREA FOR 44 WRIGHT AVE. = ±8,430 S.F.
- BUILDING COVERAGE: ±1,388 S.F. (17.4%)
- NON-CONCRETE DECKS AND STAIRS: ±392 S.F.
- CONCRETE STAIRS: ±30 S.F.
- CONCRETE SIDEWALK: ±64 S.F.
- PAVED DRIVEWAY: ±2,222 S.F.
- OVERALL IMPERVIOUS: ±4,096 S.F.
- PERCENT COVERAGE: 48.8%

PROPOSED CONDITIONS:

- PARCEL AREA FOR 44 WRIGHT AVE. = ±8,430 S.F.
- (A) BUILDING COVERAGE: ±2,288 S.F. (29.9%)
- (B) NON-CONCRETE DECKS AND STAIRS: ±598 S.F.
- (C) CONCRETE STAIRS: ±30 S.F.
- (D) CONCRETE SIDEWALK: ±336 S.F.
- (E) CONCRETE UTILITY & MAILBOX SUPPORTS: ±37 S.F.
- (F) PERVIOUS DRIVEWAY: ±2,409 S.F.

PROPOSED COVERAGE:

- OVERALL IMPERVIOUS (A+C+D+E): ±2,691 S.F.
- PERCENT IMPERVIOUS COVERAGE: 31.9%
- TOTAL LOT COVERAGE (A+B+C+D+E+F): ±5,698 S.F.
- PERCENT TOTAL LOT COVERAGE: 67.6%

CALCULATION OF BONUS FEATURES: ALLOWABLE 10% (843 S.F.)

- (A) PROPOSED DECKS (THREE): ±356 S.F.
- (B) EXISTING FRONT PORCH: ±77 S.F.
- (C) EXISTING FRONT CONCRETE WALK: ±64 S.F.
- (D) PROPOSED CONCRETE WALK: ±272 S.F.
- (E) REMAINDER TAKEN UP BY PERVIOUS PAVERS: 74 S.F.

PROPOSED COVERAGE PER CITY OF BURLINGTON REGULATIONS:

- TOTAL LOT COVERAGE - BONUS FEATURES
- 5,698 S.F. - 843 S.F. = 4,855 S.F.
- PERCENTAGE = 57.6%

NOTES:

- ASPECTS OF PLAN ARE APPROXIMATE AND DERIVED FROM AERIAL PHOTOGRAPHY.
- THIS PLAN IS NOT INTENDED TO BE A BOUNDARY SURVEY. PROPERTY LINES SHOWN ON THIS PLAN ARE BASED ON EXISTING EVIDENCE LOCATED IN THE FIELD AND TAX MAP INFORMATION FROM THE CITY OF BURLINGTON.
- THE HORIZONTAL COORDINATE SYSTEM IS BASED ON NAD83 VERMONT STATE PLANE 4400 (US SURVEY FEET). ELEVATIONS ARE BASED ON NAVD88 (US SURVEY FEET).
- EXISTING CONDITIONS ARE BASED ON A TOPOGRAPHIC SURVEY COMPLETED BY KREBS & LANSING ON AUGUST 17, 2023.
- UTILITIES ARE BASED ON VISIBLE STRUCTURES LOCATED DURING THE TOPOGRAPHIC SURVEY AND ARE NOT WARRANTED TO EXACT OR COMPLETE. CONTRACTOR SHALL CONTACT DIG SAFE AND OTHER NON-MEMBER UTILITIES PRIOR TO BEGINNING ANY EXCAVATION.
- SETBACKS SHOWN ARE BASED ON CITY OF BURLINGTON ZONING REGULATIONS, PG. 4-34.
- THE 100' LAKE CHAMPLAIN ORDINARY HIGH WATER MARK SHOWN WITHIN THE PROPERTY LINES OF 38 WRIGHT AVENUE IS BASED ON A TOPOGRAPHIC SURVEY BY KREBS & LANSING CONSULTING ENGINEERS ON AUGUST 17, 2023. THE 100' HIGH WATER MARK SHOWN BEYOND THE PROPERTY LINES IS BASED ON LIDAR DATA FROM VERMONT CENTER FOR GEOGRAPHIC INFORMATION (VCGI).

44 WRIGHT AVENUE

Burlington, Vermont

KREBS & LANSING CONSULTING ENGINEERS
164 Main Street, Suite 201
Colchester, Vermont 05446
P: (802) 878-0375
www.krebsandlansing.com

**ISSUED FOR PERMIT REVIEW
NOT FOR CONSTRUCTION**

OWNER/APPLICANT:
44 Wright LLC
688 Pine Street, Unit 2D
Burlington, Vermont 05401

PROPERTY INFORMATION:
Address: 44 Wright Avenue, Burlington Vermont
Parcel ID: 052-4-003.000
SPAN: 114-035-18307
Area: 0.19 Acres (±8,430 s.f.)
Zoning: Residential - Medium Intensity (RM)

SETBACKS & COVERAGE:
FRONT YARD SETBACK: 10.0'
SIDE YARD SETBACK: 5.5'
REAR YARD SETBACK: 15'
LAKESHORE SETBACK: 61.5'
MAX LOT COVERAGE: 60%

STAMP:

0' 5' 10' 20' 30'
0" 1" 2" 3"
STANDARD GRAPHIC SCALE (1" = 10')
VALID WHEN PLOTTED ON 24" BY 36" MEDIA

REV. NO.	REVISIONS/COMMENTS	DATE
1.	Add steep slopes to the plans	02/23/24
2.	Update coverage calculations and add additional revisions requested by City	02/29/24
3.	Update coverage calculations and add additional revisions requested by City	03/12/24

DRAWING TITLE:
PROPOSED SITE PLAN

DATE ISSUED: 02/21/24
DRAWN BY: CP6/JBC
CHECKED BY: GTD
PROJECT NO.: 23236
SCALE: 1" = 10'
DRAWING NO.:
REV. NO.:

C-1.00

3

DWG NAME: VFB-Post-Apartments-Base_Construction.dwg

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EXISTING BUILDING STREET VIEW



EXISTING BUILDING WEST ELEVATION (RIGHT) • STREET VIEW.



EXISTING BUILDING EAST ELEVATION



EXISTING BUILDING NORTH ELEVATION

44-46 WRIGHT AVE.

BURLINGTON, VERMONT

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DUNCAN • WISNIEWSKI ARCHITECTURE
A Professional Corporation

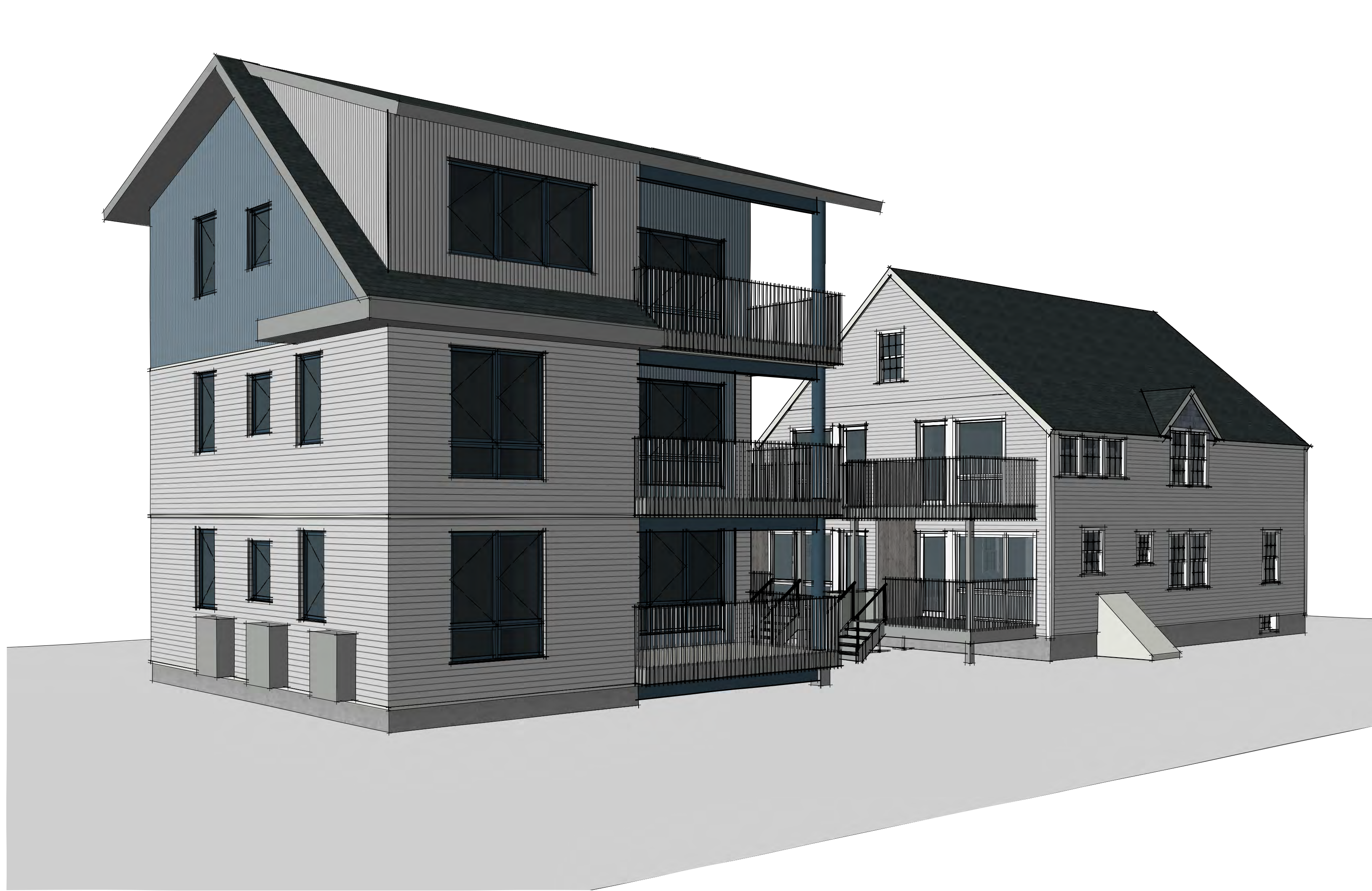
PERMIT SET

Duncan
Wisniewski
ARCHITECTURE

255 SOUTH CHAMPLAIN STREET
BURLINGTON, VERMONT 05401
T: 802.864.6693

DATE: 02.21.2024
DRAWN: ABC

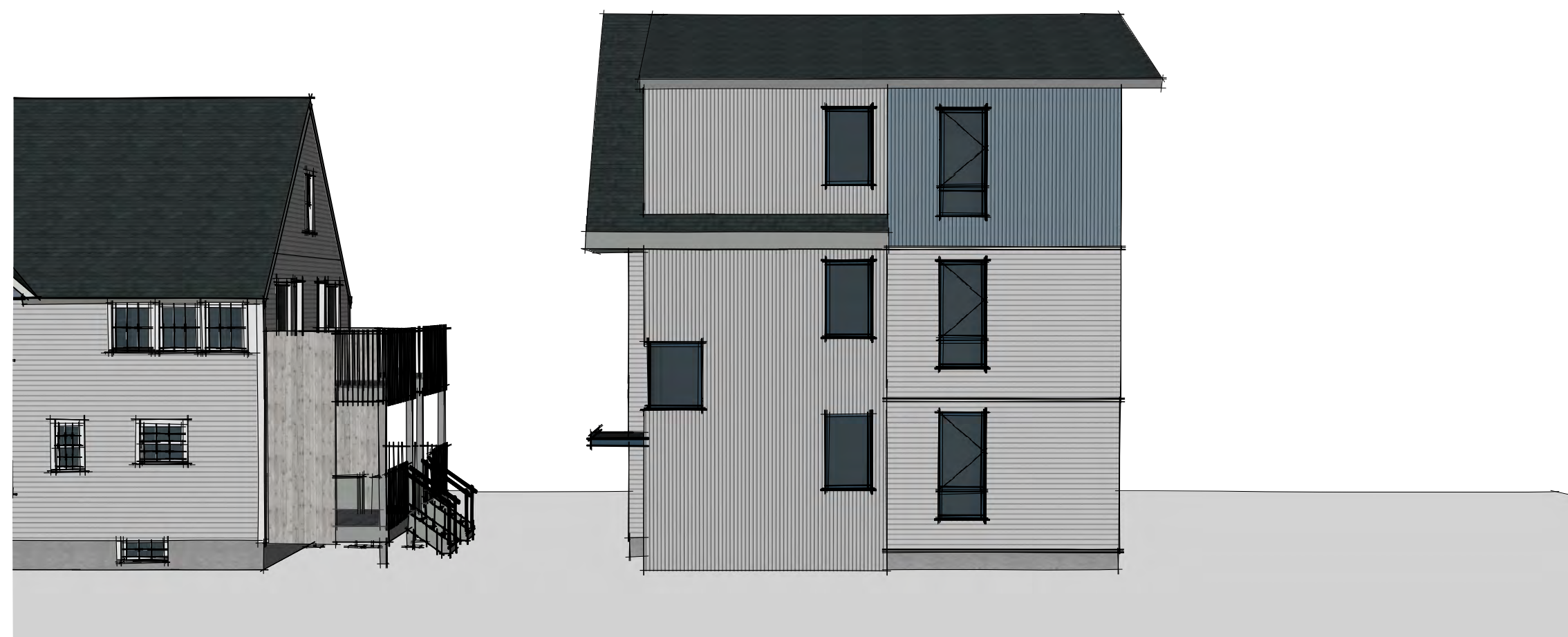
A0-0



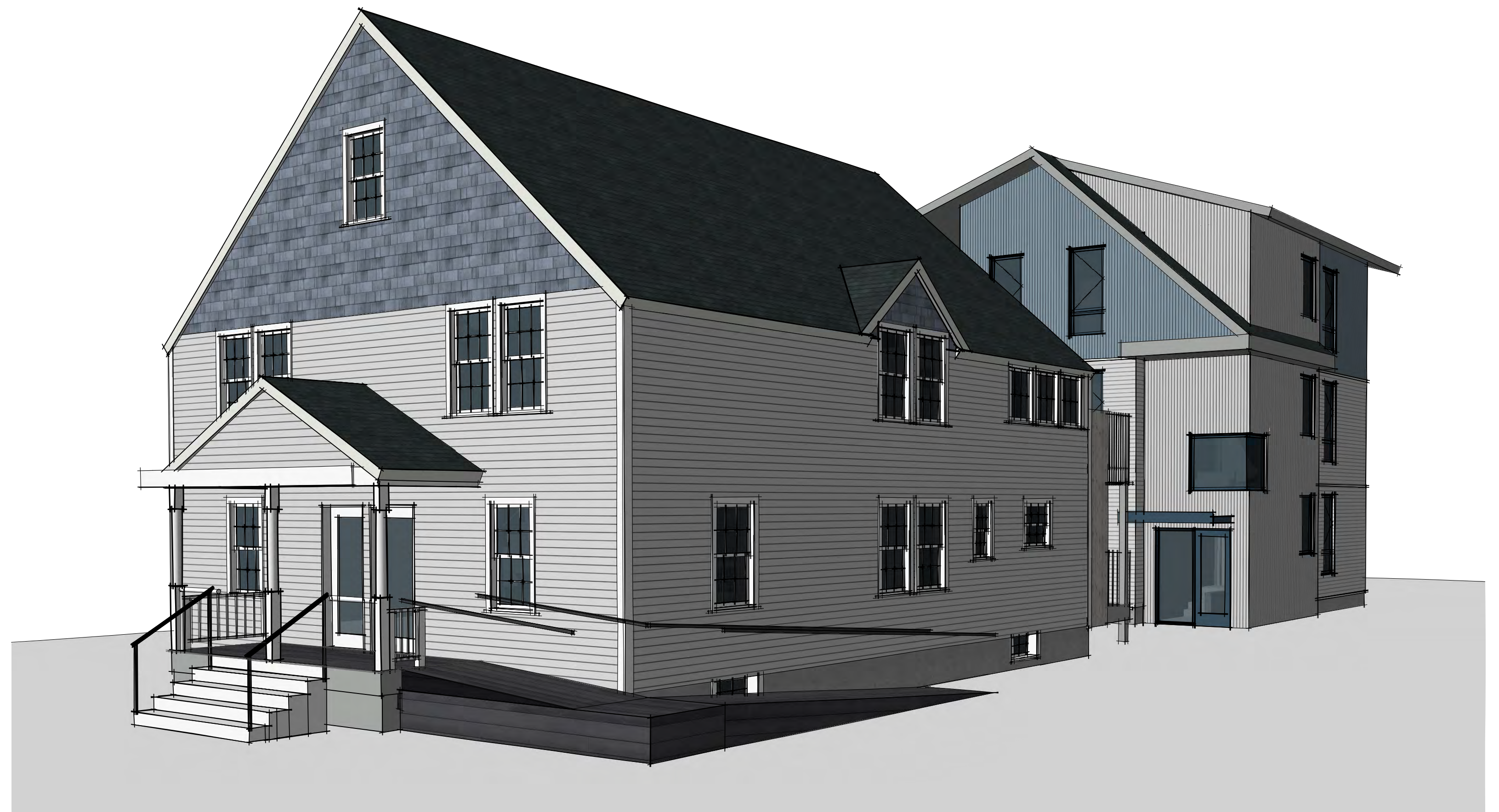
VIEW FROM NORTH WEST



VIEW FROM NORTH EAST



VIEW FROM EAST



VIEW FROM SOUTH EAST (STREET VIEW)

44-46 WRIGHT AVE.

BURLINGTON, VERMONT

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A Professional Corporation

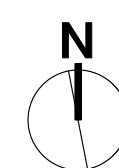
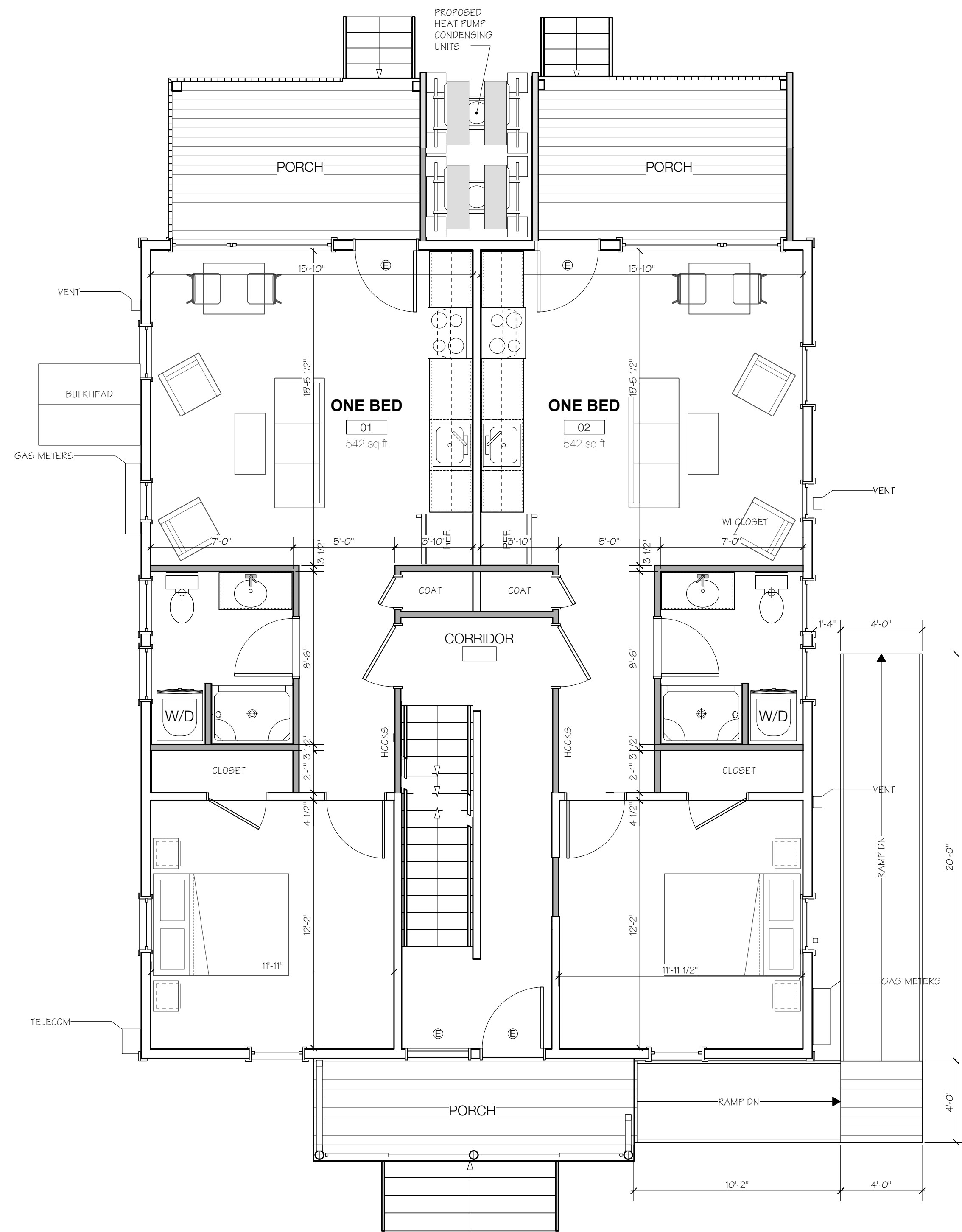
PERMIT SET

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Wisniewski**
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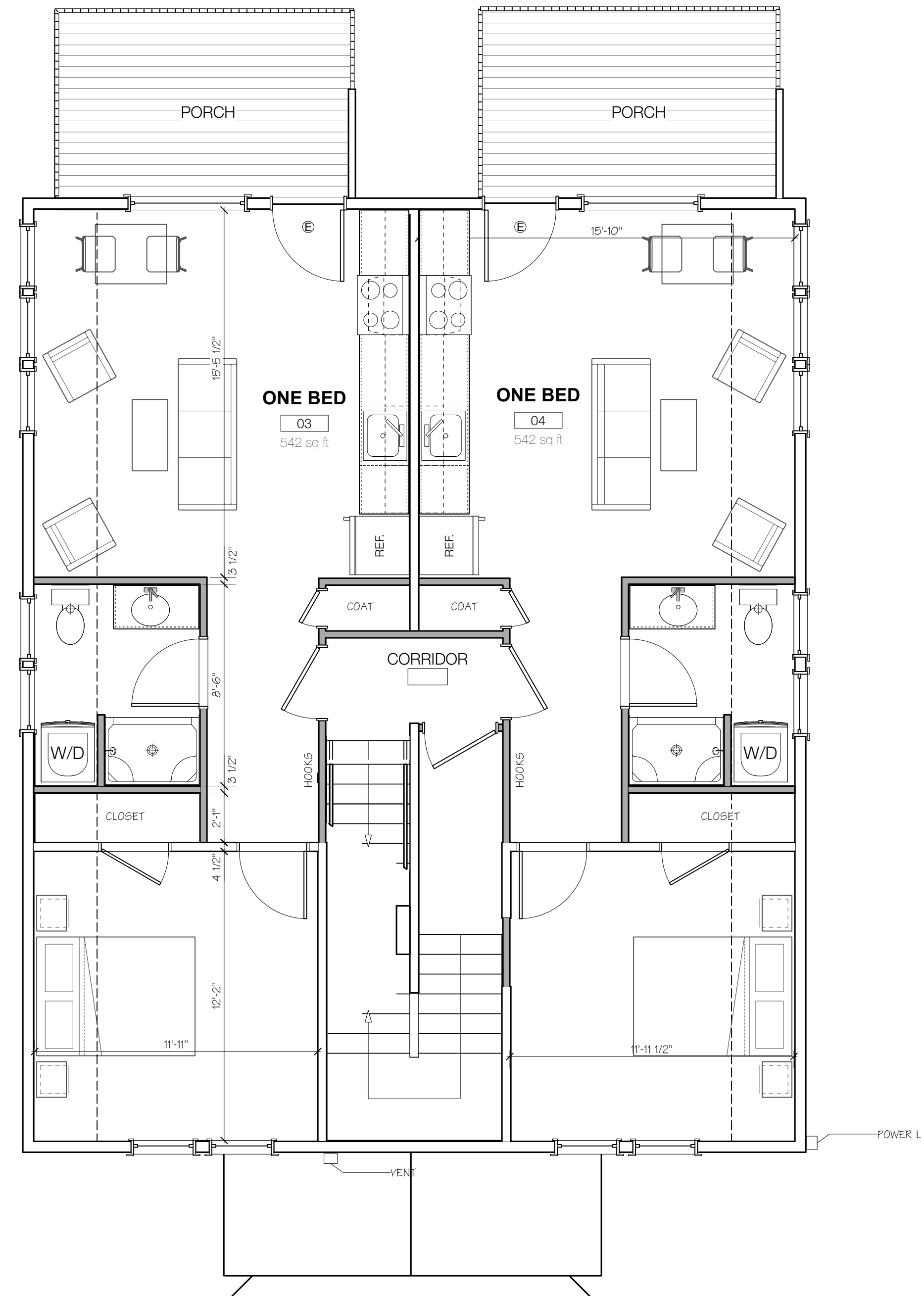
255 SOUTH CHAMPLAIN STREET
BURLINGTON, VERMONT 05401
T: 802.864.6693

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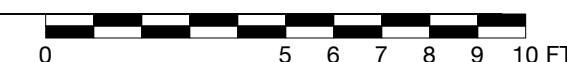
A0-1



FIRST FLOOR PLAN • EXISTING BUILDING
Scale: 1/4" = 1'-0"



SECOND FLOOR PLAN • EXISTING BUILDING
Scale: 1/4" = 1'-0"



44-46 WRIGHT AVE.

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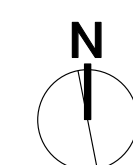
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Duncan
Wisniewski
ARCHITECTURE

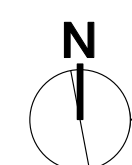
255 SOUTH CHAMPLAIN STREET
BURLINGTON, VERMONT 05401
T: 802.864.6693

DATE: 02.21.2024
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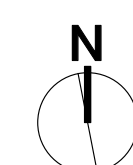
A1-1



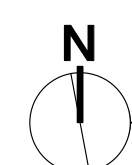
FIRST FLOOR PLAN
Scale: 1/4" = 1'-0"



THIRD FLOOR PLAN
Scale: 1/4" = 1'-0"



BASEMENT FLOOR PLAN
Scale: 1/4" = 1'-0"



SECOND FLOOR PLAN
Scale: 1/4" = 1'-0"

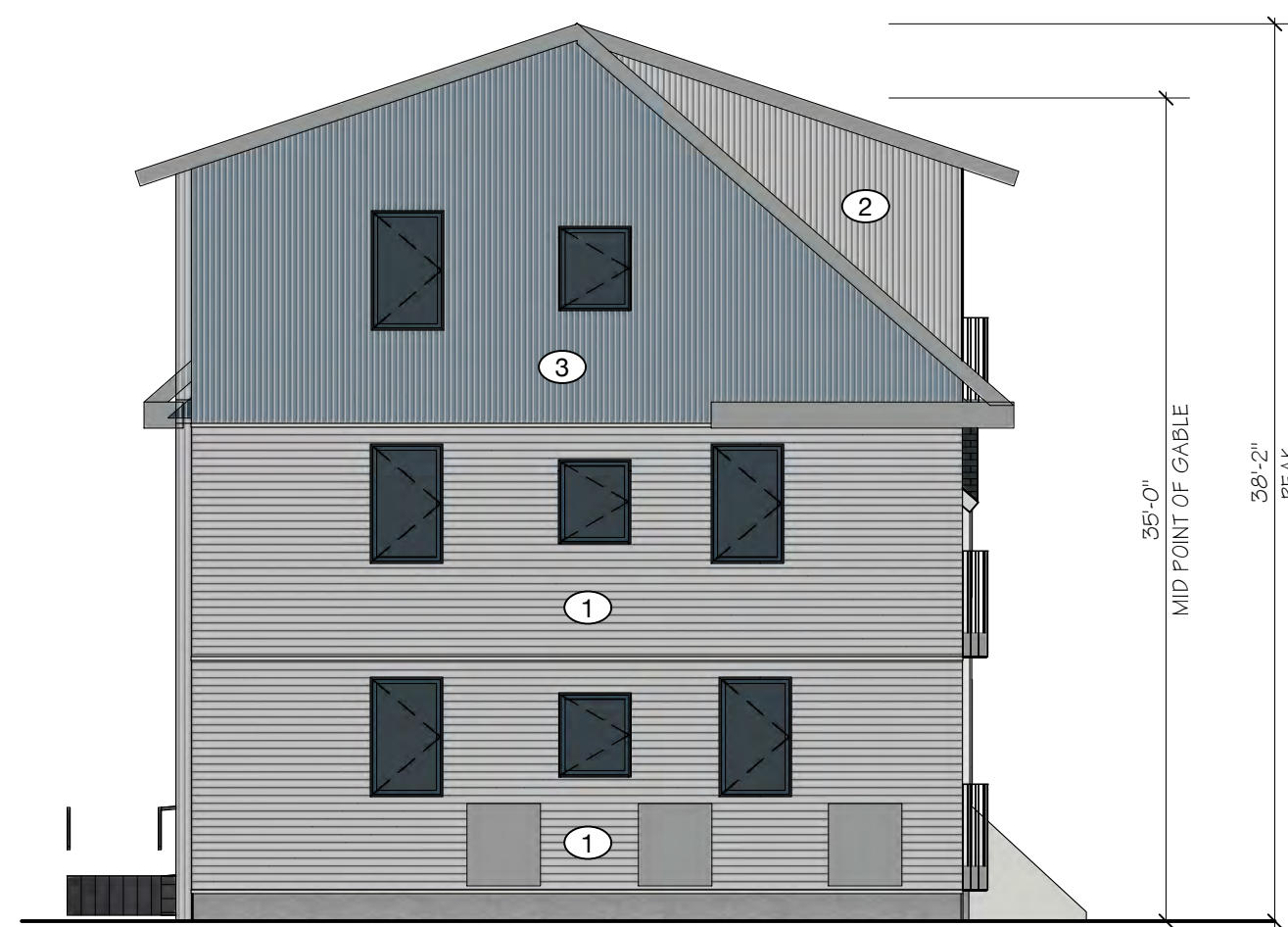
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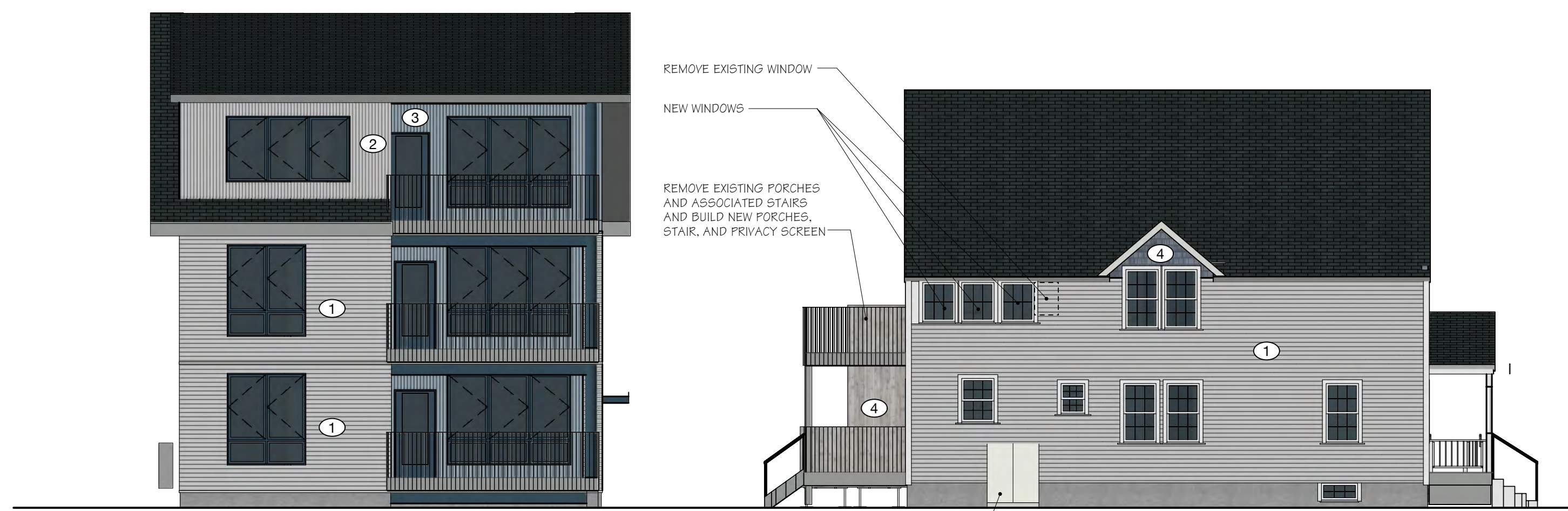
255 SOUTH CHAMPLAIN STREET
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T: 802.864.6693

DATE: 02.21.2024
DRAWN: ABC

A1-2



1 NORTH ELEVATION • PROPOSED BUILDING
Scale: 1/8" = 1'-0"

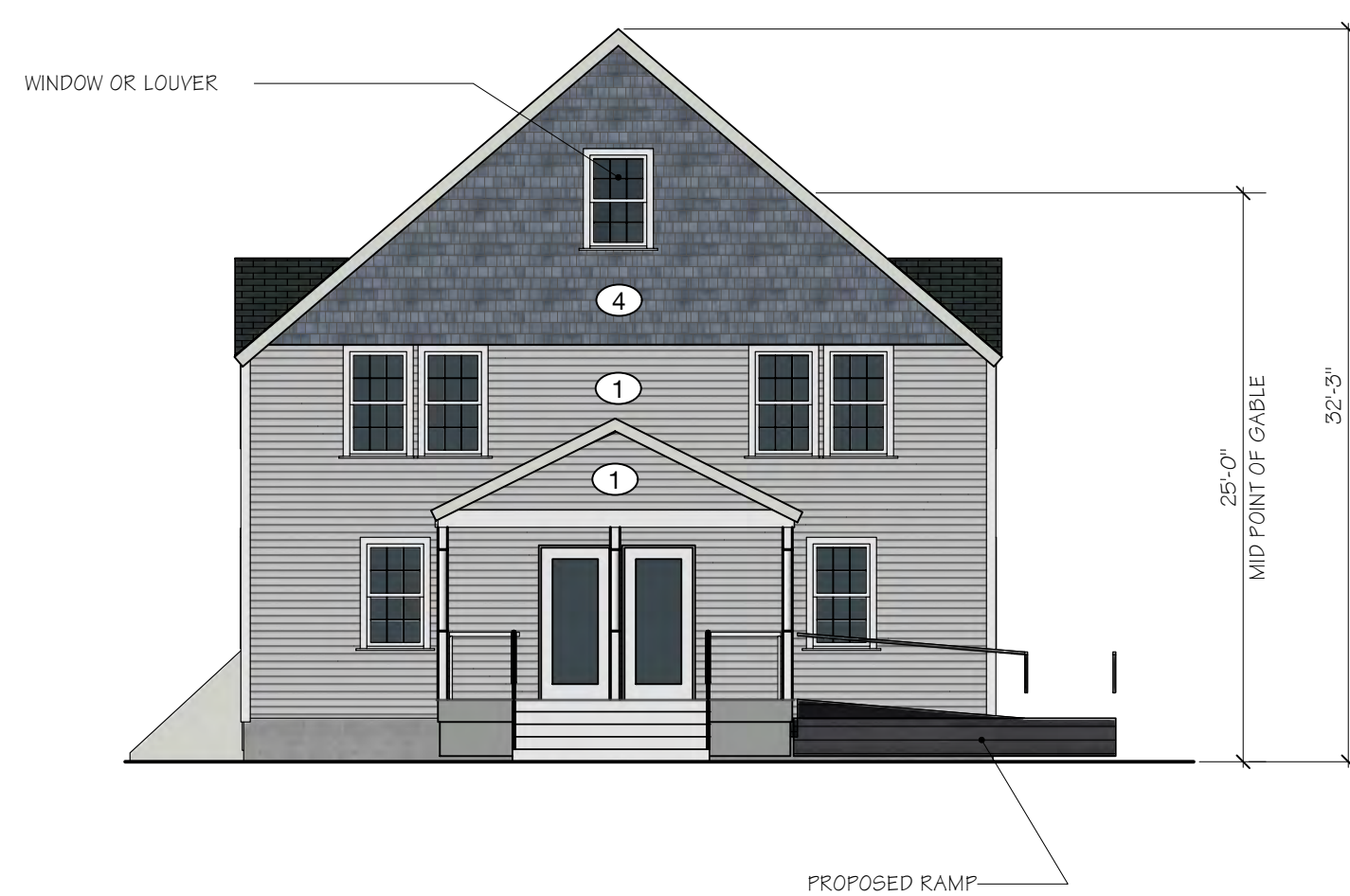


2 WEST ELEVATION • EXISTING AND PROPOSED BUILDING
Scale: 1/8" = 1'-0"

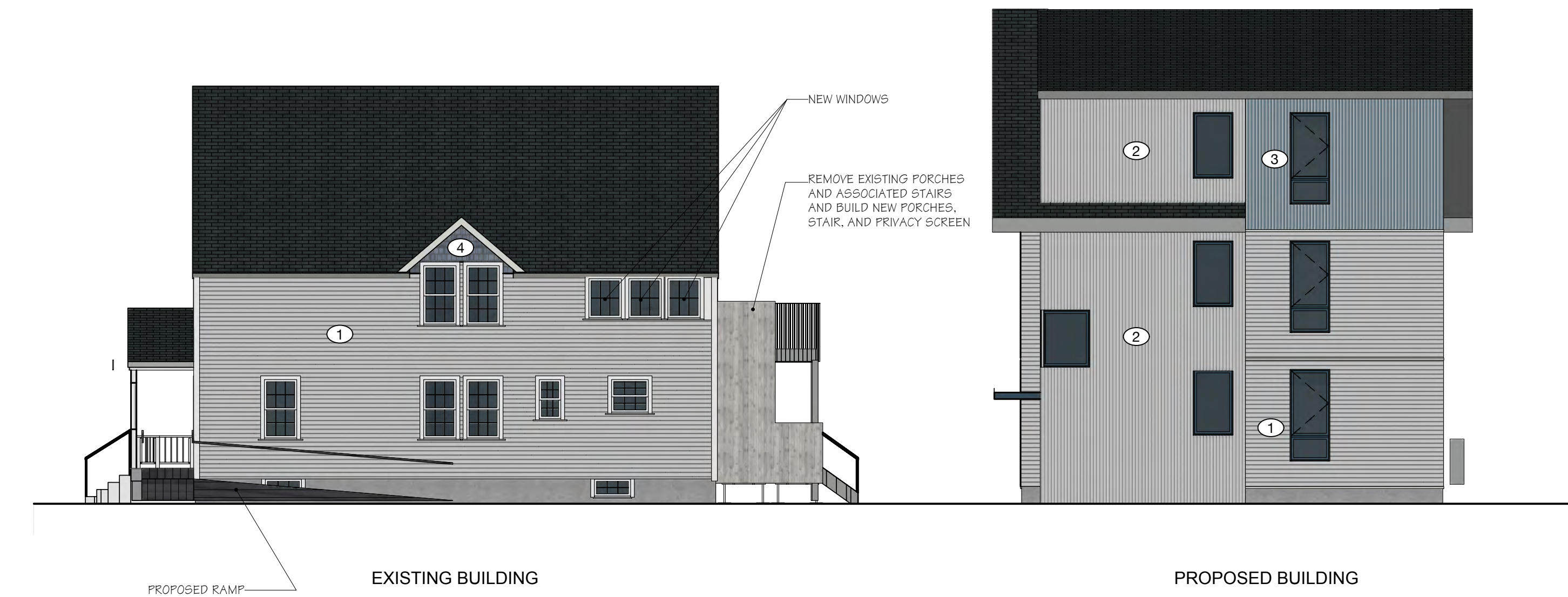


3 SOUTH ELEVATION • PROPOSED BUILDING
Scale: 1/8" = 1'-0"

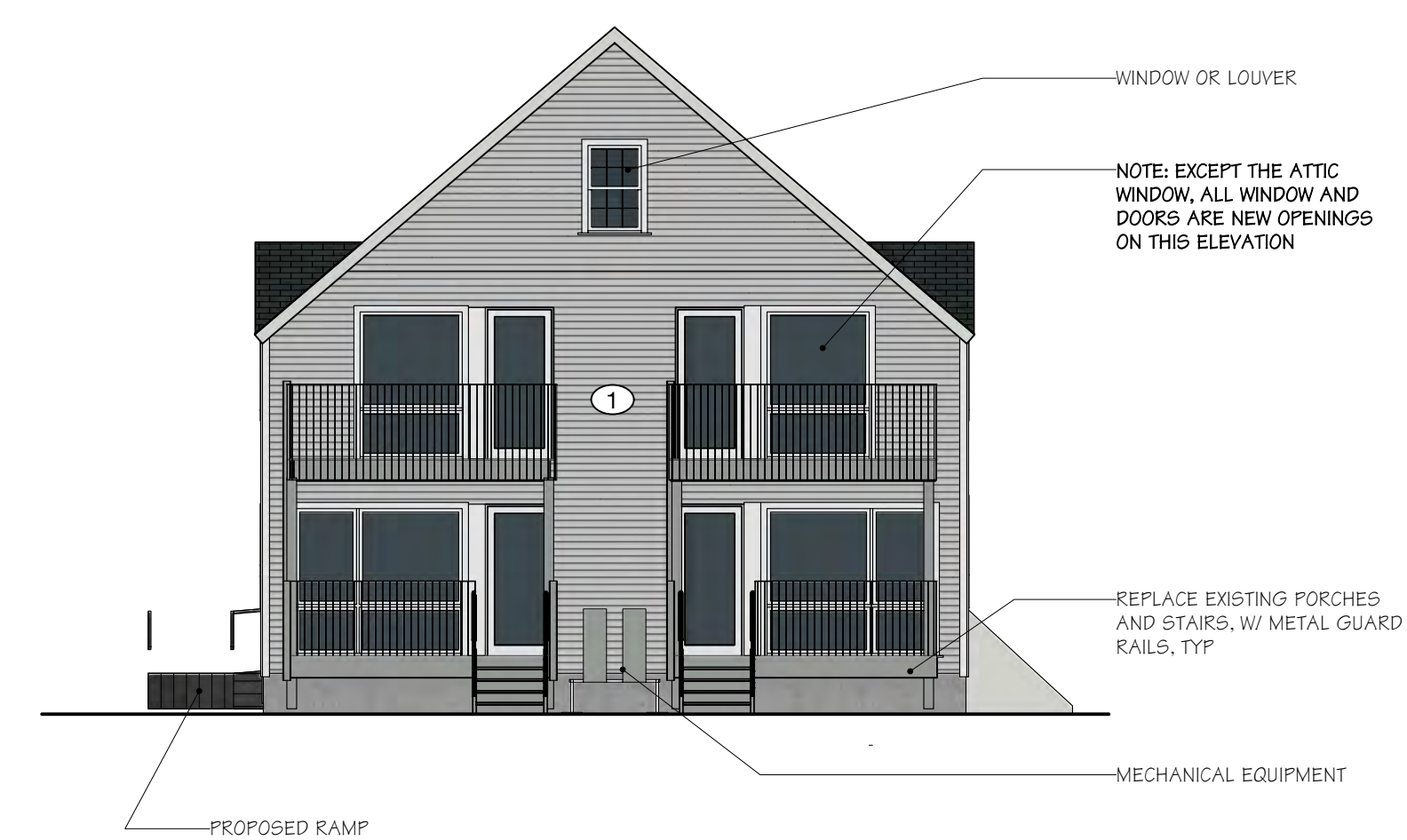
EXTERIOR SIDING KEY	
①	5 1/2" LP SMART SIDE CLAPBOARD SIDING (TO WEATHER DIM. MATCH EXISTING)
②	CORRUGATED METAL COLOR 1
③	CORRUGATED METAL COLOR 2
④	SHINGLE SIDING



4 SOUTH ELEVATION • EXISTING BUILDING
Scale: 1/8" = 1'-0"



5 EAST ELEVATION • EXISTING AND PROPOSED BUILDINGS
Scale: 1/8" = 1'-0"



6 NORTH ELEVATION • EXISTING BUILDING
Scale: 1/8" = 1'-0"

44-46 WRIGHT AVE.
BURLINGTON, VERMONT

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PERMIT SET

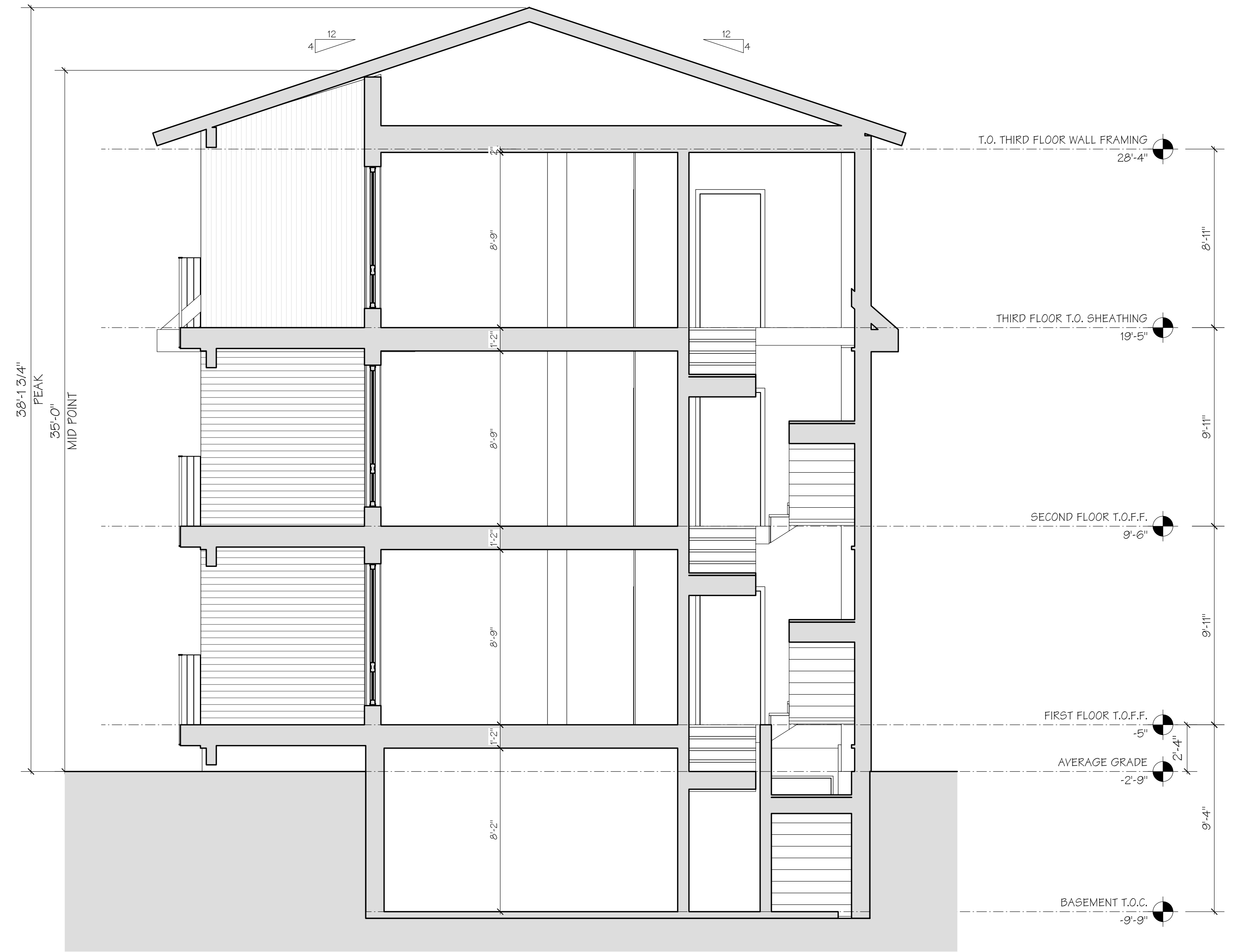
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DATE: 02.21.2024
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A2-1



1 SECTION • EXISTING BUILDING
Scale: 1/4" = 1'-0"



2 SECTION • NEW BUILDING
Scale: 1/4" = 1'-0"

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BURLINGTON, VERMONT

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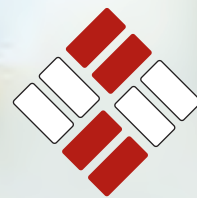
308

309

Build your dreams with authentic clay pavers

Durable • Colorfast • Sustainable

Spring 2022



PINE HALL BRICK

AUTHENTIC CLAY PAVERS



Here's what makes our clay pavers so great.

Pine Hall Brick pavers have a wide range of colors with great aesthetic appeal to create hardscapes for both modern and historic settings.

Homeowners covet clay pavers because they are authentic brick.

Designers and architects value the latitude to fit them into almost any design.

- **Durability** – clay pavers withstand generations of use in the most demanding environments.
- **Colorfast** – our pavers never fade, because the color is integral to the molding and firing process.
- **Cost Savings** – no costly sealers ever needed for durability or color retention.
- **Extreme Weathering** – Pine Hall Brick clay pavers greatly exceed the most rigorous Freeze-Thaw test in the paving industry.
- **Strength** – we make our pavers to the demanding specification of 12,000 psi average compressive strength.
- **Sustainability** – clay pavers are formed from two of the most basic materials there are: dirt and water. They last for generations and can also provide permeable surfaces to protect the environment from water runoff.

Since 1922, Pine Hall Brick has continuously developed new and better ways to manufacture clay pavers. At our state-of-the-art facilities, we produce thousands of pavers daily.

Family owned with plants in North Carolina, we are a business dedicated to defining the standard of segmental paving with America's Premier Paver™.



PINE HALL BRICK

AUTHENTIC CLAY PAVERS

Live chat with us at [PineHallBrick.com](https://www.PineHallBrick.com)

Rumbled Full Range



For your backyard

A great outdoor living space enhances the beauty, function and value of any home. Your dream backyard starts with authentic clay pavers from Pine Hall Brick.

Rumbled Full Range and Rumbled Bluffs



For your driveway

Strong. Durable. Colorfast. Make a statement with a clay paver driveway. They are virtually maintenance free and don't need expensive sealers to look good over time. Decades from now they will look as good as the day they were installed.

For your interior

Our 1/2" thick Paver Tiles allow the homeowner to bring the beauty and authentic appeal of clay pavers indoors.

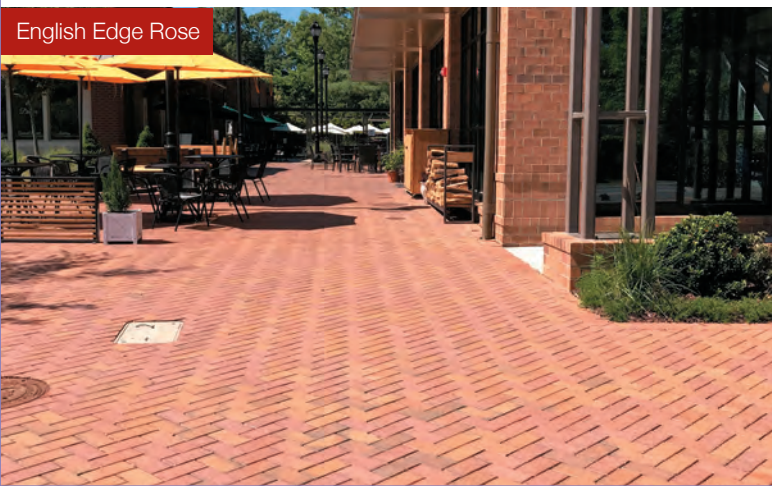
Rumbled Main Street Paver Tiles



For commercial

Servicing commercial projects with the highest quality clay pavers is what made us the largest clay paver supplier in the world. Our team of experts is waiting to assist you with technical support, CEU presentations and samples.
Call or chat with us online.

English Edge Rose







Beveled Edge Pavers

English Edge pavers have both beveled edges and spacer bars for a crisp look that installs with ease. Beveled edge pavers are available in standard 4" x 8" by 2-1/4" thickness, as well as 2-3/4" thickness for heavy vehicular applications. Beveled edge pavers are recommended for driveways and other vehicular applications.

English Edge



Autumn



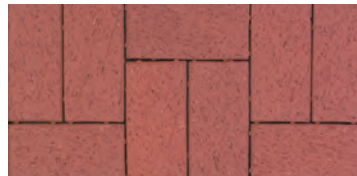
Gray



Buff



Cocoa



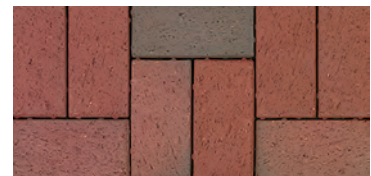
Red



Dark Accent



Rose



Full Range

Beveled edge gives projects a crisp joint

Space bars provide for best interlock and consistent joint



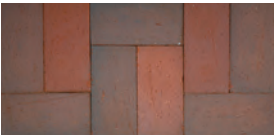




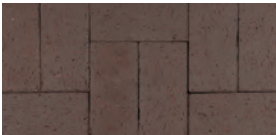
Traditional Edge Pavers

Traditional Edge pavers have square edges for the timeless appearance of authentic clay pavers made for over a hundred years. Traditional Edge pavers need to be laid with a minimum 1/16" sand joint to minimize chipping.

Pathway



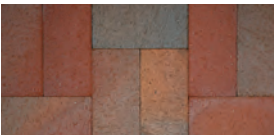
Autumn



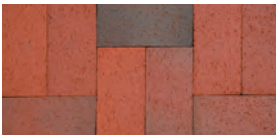
Dark Accent



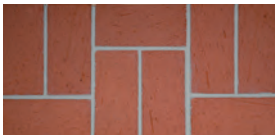
Red



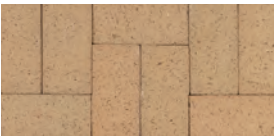
Beale Street (new)



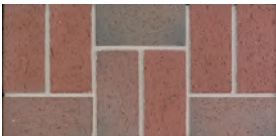
Full Range



Red Modular



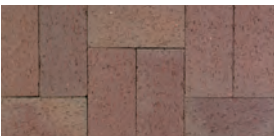
Buff



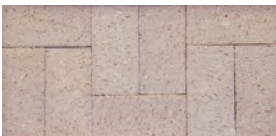
Full Range Modular



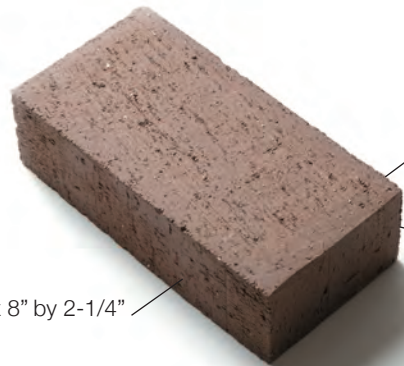
Rose



Cocoa



Gray



Square Edges create a classic appearance

Colors don't fade

4" x 8" by 2-1/4"



Rumbled Pavers

Tumbled after firing to produce a look similar to an historic street paver that has been around for decades. Rumbled pavers are available in standard 4" x 8" by 2-1/4" thickness, as well as 2-3/4" thickness for heavy vehicular applications. Rumbled pavers are recommended for driveways and other vehicular applications.



Autumn



Cocoa



Main Street



Beale Street (new)



Dark Accent



*Madrid



Bluffs



Full Range



Red



Buff



Gray



Rose

*Special blend creation for color mix. May vary slightly from batch to batch. Check our website for current color.





StormPave™ Water Permeable Pavers

StormPave™ is an amazing breakthrough in water permeable paving. StormPave clay pavers have beveled edges and large spacer bars that allow rain to filter between washed aggregate in the joints to a specially constructed catchment area underneath the pavers. The water then dissipates naturally into the native soils. StormPave pavers are available in standard 4" x 8" by 2-1/4" thickness as well as 2-3/4" thickness for heavy vehicular applications. For more information, go to pinehallbrick.com/permeable



Autumn



Full Range



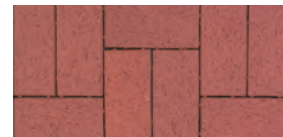
Buff



Gray



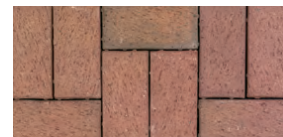
Cocoa



Red



Dark Accent



Rose

Rumbled StormPave™ Heavy Duty Autumn with English Edge Dark Accent



1/4" spacer bars allow water to filter between the joints

Legacy Stamped Paver Program

Ideal for:

- Colleges & Universities
- Cities & Towns
- Commercial Developments
- Memorials

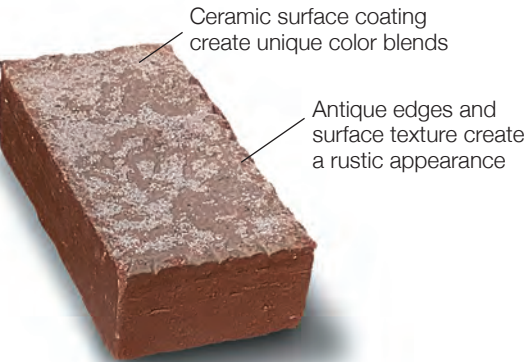
We make one-of-a-kind pavers for one-of-a-kind projects. Our proprietary equipment stamps one paver per three square feet. Custom ratios are also available.

Call 336-721-7514 for more details.



Old Series

Here's another take on "timeless" with our specially cut antique edge pavers that pay tribute to early American structures and streets. Old Series pavers feature antique edges and surface texture for a rustic appearance in unique colors. Old Series pavers are suitable for light vehicular applications with appropriate spacing.



Old Mill



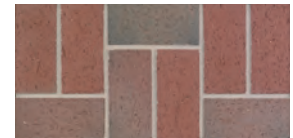
Old Towne

Thin Pavers

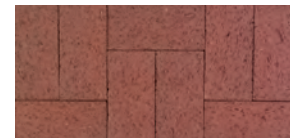
Traditional Edge 1-3/8" thick pavers are ideal for installation over concrete. Great for DIY projects. These pavers are available in two sizes: 4" x 8" to be laid with sand-joints and 3-5/8" x 7-5/8" modular size for mortared applications.



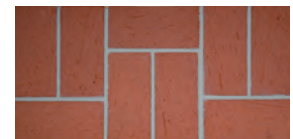
Brookstown Full Range 4x8



Brookstown Full Range Modular



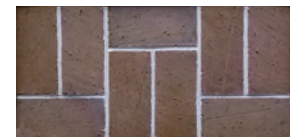
Brookstown Red 4x8



Brookstown Red Modular



Harbourtown Full Range 4x8



Harbourtown Full Range Modular

Plymouth Tumbled

New Product A true tumbled paver, Plymouth Tumbled Modular paver is 7-5/8" by 3-5/8" by 2-1/4" thickness. It can be laid both with mortar or with sand in a running bond or chevron pattern.



Large Format Pavers

4"x12" and 8"x8"

Pavers are 4"x12" or 8"x8" by 2-1/4" thickness. The pavers are available in Traditional Edge, Rumbled or Beveled Edge (no spacer bar) style and are available in the following colors: Red, Full Range, Autumn, Cocoa, Rose and Dark Accent. Traditional Edge in both Red and Full Range are stock colors.



Pathway 4 x 12



Rumbled
Pathway 4 x 12



Pathway 8 x 8



Rumbled
Pathway 8 x 8



Beveled Edge 8 x 8

ADA Pavers

Our ADA paver is the truncated dome of choice for pavement designers due to their durability and permanent color. Comes in a 2-1/4" x 4" x 8" size.



Firebrick

Our Firebrick comply with ASTM C1261 – Standard Specification for Firebox Brick for Residential Fireplaces. They come in a natural buff color in a 4" x 8" by 2-1/4" and a 4" x 8" x 1-3/8" size. The firebrick have a PCE Value of 17 (2754 degrees F).



Rumbled Full Range 4 x 12 with Rumbled Full Range 4 x 8



Step Treads

Nothing finishes off a great looking clay pavement better than brick steps with an ST-1 or ST-2 paver shape. The ST-1 is 2-1/4" thick with an ogee curve on the end and the ST-2 is 1-3/8" thick with a bullnose curve on the end. Both are 3-5/8" wide by 7-5/8" long (including the curved end).



ST-1

The ST-1 is 2-1/4" thick, 7-5/8" long and 3-5/8" wide.



ST-2

The ST-2 is 1-3/8" thick, 7-5/8" long and 3-5/8" wide.

Street Pavers



Get a thicker vehicular paver for the look of legacy streets with Street Pavers. These 3" x 4" x 8" Rumbled pavers can be stamped and are available in three colors Full Range Red, Red and Autumn. Non-stock.



Paver Tiles

Paver Tiles are 1/2" thick tiles made from full thickness pavers. They are ideal for kitchens, wine cellars and mud rooms. In exterior applications, Paver Tiles can be used when height or weight restrictions prevent using a thicker paver. Paver Tiles are available in most of Pine Hall's favorite paver colors. (*These colors come in 3/4" thickness only.)



Rumble PaverTile



Traditional Edge PaverTile

Old School 8's

Old School 8's are a throwback to the original 8" brick from decades ago. Measuring 1/2" x 8" x 2-1/4" they can be used on walls, floors, interiors and exteriors. Old School 8's can bring old world charm or contemporary style to any project. (*Chicago Reclaimed comes in 3/4" thickness only.)



Alleyway



Speakeasy



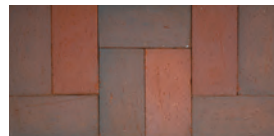
Chicago Reclaimed*



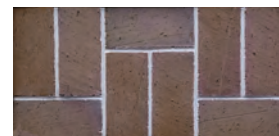
The Original



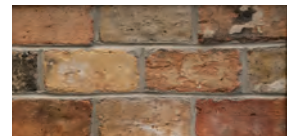
Rich Mahogany



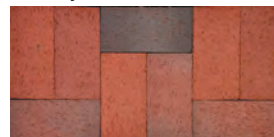
Pathway Autumn



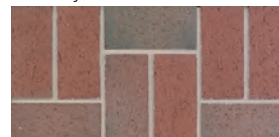
Pathway Cocoa



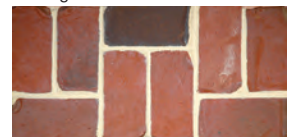
Chicago Reclaimed*



Pathway Full Range



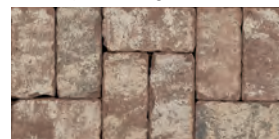
Pathway Full Range modular



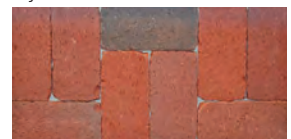
Plymouth Tumbled*



Rumbled Autumn



Rumbled Bluff 4x8



Rumbled Full Range 4x8



Rumbled Cocoa





Getting Started

Pine Hall Brick and our distributor network can collaborate with your projects from the get-go with samples, suggestions and technical specifications. Our experts on staff can answer your technical questions and if you're a professional design firm we offer a number of certified CEU programs. Visit our website to chat with a live person or scan the QR code below to go to our technical design portal for DIY instructions, technical design guides and discussion briefs on segmental paving with Pine Hall Brick pavers, "America's Premier Paver."



PINE HALL BRICK

AUTHENTIC CLAY PAVERS

2701 Shorefair Drive
Winston-Salem NC 27105
Phone: 336-721-7500
www.pinehallbrick.com



**TEST REPORT**

100 Clemson Research Blvd.
Anderson, SC 29625
(864) 656-1094
Fax: (864) 656-1095
www.bishopmaterialsllab.com

Results of Tests on Brick conducted in accordance with ASTM C67-14 Standard Method for Sampling and Testing Brick and Structural Clay Tile
03/02/2015

Name:	Pine Hall Brick Company, Inc	Plant:	Madison	*Temperature: 60 - 90F
	P. O. Box 836	Report Number:	6126.11806	*Humidity: 30% - 70%
	Madison, NC 27025	Received Date:	01/29/2015	
Phone:	336-548-6007	Sampled Date:	01/29/2015	
Fax:	336-548-1837	Lot:		
		Product Code:		

Sample Description: **Heavy Duty Stormpave**

							Test Date
Absorption	1	2	3	4	5	Average	
24 Hour Submersion in Cold Water (%)	3.15	3.53	3.74	3.04	3.37	3.37	01/30/2015
5 Hour Submersion in Boiling Water (%)	5.64	6.16	6.47	5.70	5.92	5.98	
Saturation Coefficient (Ratio of 24H to 5H)	0.56	0.57	0.58	0.53	0.57	0.56	
*The 1 and 2 hour boiled water absorption tests are not required by the customer							
Compressive Strength	1	2	3	4	5	Average	
psi	16,141	15,131	16,623	16,079	17,021	16,199	02/02/2015
MPa	111.3	104.3	114.6	110.9	117.4	111.7	
Breaking Load	6	7	8	9	10	Average	
(lb/in.)	1,250	1,715	1,605	1,411	1,242	1,445	01/30/2015
Efflorescence	11	12	13	14	15		
	Not Effloresced	Not Effloresced	Not Effloresced	Not Effloresced	Not Effloresced		02/10/2015
Abrasion Resistance	1	2	3	4	5	Average	
	0.02	0.02	0.02	0.02	0.02	0.02	02/10/2015

The brick represented by the test results shown here comply with the physical property requirements of the standards listed below:

ASTM C 1272 - 14 Standard Specification for Heavy Vehicular Paving Brick

Type: R, F

ASTM C 902 - 14 Standard Specification for Pedestrian and Light Traffic Paving Brick

Class: SX, MX, NX

Type: I, II, III

R. Parker Stroble, Quality Manager

**The temperature and humidity of the Bishop Materials Laboratory is constantly kept between 60 -90F, and 30-70% RH
The results shown above apply only to the samples tested, which are provided by the customer.
This test report shall not be reproduced except in full, without written approval of the laboratory.*

PERMEABLE CLAY PAVERS
SECTION _____

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Permeable clay paver units
- B. Open graded setting bed (#89)
- C. Open-graded base aggregate (#57)
- D. Open-graded sub-base aggregate (#2)
- E. Bedding and joint/opening filler materials
- F. Edge restraints
- G. Geotextiles (optional)

1.02 RELATED SECTIONS

- A. Section _____ – Earthwork and sub-grade preparation
- B. Section _____ – Bases, ballasts, pavements and appurtenances
- C. Section _____ – Cast-in place concrete

1.03 REFERENCES

- A. American Society of Testing Materials (ASTM):

- 1. C902 Standard Specification for Pedestrian And Light Traffic Paving Brick
- 2. C1272 Standard Specification for Heavy Vehicular Paving Brick
- 3. C136 Method for Sieve Analysis for Fine and Coarse Aggregate.
- 4. C67 Method of Sampling and Testing Brick and Structural Clay Tile.
- 5. D448 Standard Classification for Sizes of Aggregates for Road and Bridge

- B. Definitions:

- A. Base Course: Layer of open-graded washed aggregate beneath the bedding course comprised of small to medium particle-sized crushed stone (1/2" to 1" typ.). Recommended depth of base layer shall be 4" but shall not exceed 6".
- B. Bedding Course: Commonly called the setting bed is the layer of open-graded washed aggregate directly beneath the clay paver units comprised of small particle-sized crushed stone chips (1/4" to 3/8" typ.). Recommended depth of setting bed is 1" to 2" max.
- C. Laying Face: The working edge of the pavement where the laying of the pavers is occurring.
- D. Method Statement: The paver installer's and manufacturer's plan for construction and quality control of the pavers.

- E. Spacer Bars: Small protrusions on the sides of pavers which are used to create uniform joint spacing between pavers and minimize chipping.
- F. Sub-base Course: Layer of open-graded washed aggregate beneath the base course comprised of large particle-sized crushed stone (2-1/2" to 3" typ.). Recommended depth will vary depending on site conditions and specific water detention volume requirements. Minimum depth of sub-base course shall be 12".
- G. Void Filler: Open-graded aggregate used to fill the joints between pavers. The bedding course aggregate may be used as the void filler. Smaller particle-sized stone chips (1/8" to 1/4") are preferable if available.
- H. Wearing Course: The top surface of the paver.

1.04 QUALITY ASSURANCE

- A. Paver Installation Subcontractor Qualifications:
 - 1. Utilize an installer having successfully completed permeable paver installation similar in design, material and extent indicated on this project.
 - 2. Utilize an installer holding a completion certificate from the Pave Tech School for Advanced Segmental Paving Permeable Paving Systems course or equivalent.
- B. Regulatory Requirements and Approvals: [Specify applicable licensing, bonding or other requirements of regulatory agencies.].
- C. Review the manufacturers' quality control plan, paver installation subcontractor's Method Statement and Quality Control Plan with pre-construction meeting of representatives from the manufacturer, paver installer, general contractor, engineer and/or owners representative.

1.05 SUBMITTALS

- A. Submit shop or product drawings and
- B. Submit permeable clay paver product data.
 - 1. Manufacturer's (Pine Hall Brick Company, Inc.) product catalog sheets with specifications.
 - 2. Three representative full-size samples of each paver type, thickness, and color. Submit samples indicating the range of color expected in the finished installation.
 - 3. Accepted samples become the standard of acceptance for the work of this Section.
 - 4. Laboratory test reports certifying compliance of the clay pavers with ASTM C 902 or C1272.
 - 5. Manufacturer's material safety data sheets for the safe handling of the specified materials and products.
- C. Submit sieve analysis for grading of sub-base, base, and bedding materials per ASTM C136
- D. Submit minimum 3lb samples of sub-base, base and bedding aggregate materials.

- E. Submit test results for compliance of paving unit requirements to ASTM C 902 or ASTM C 1272 from and independent testing laboratory.
- F. Erosion and sediment control plan
- G. Submit installer qualifications: provide satisfactory evidence that the installer complies with the qualifications set out in section 1.03.
 - 1. The installer shall provide installation history, including references from projects of a similar size and complexity in writing with contact information, demonstrating to the owner's satisfaction their ability to perform the paver installation and related work indicated in the plans and specifications.
 - 2. The installer shall have experienced personnel and a management capability to execute the work detailed in the project drawings and specifications. The installer's foreman should have a minimum of 5 years experience in the installation of unit pavers including clay pavers.
- H. Schedule & Work Plan: submit a detailed schedule and work plan

1.06 MOCK UPS

- A. Install a 10 ft. x 10 ft. paver area. This area will be used to determine surcharge of the bedding layer, joint sizes, lines, laying pattern(s), color(s), and texture of the job. This area shall be the standard from which the work will be judged.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver brick pavers to the site in steel banded, plastic banded, or plastic wrapped cubes or on pallets capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.

1.08 ENVIRONMENTAL CONDITIONS

- A. Do not install bedding or pavers during heavy rain or snowfall.
- B. Do not install frozen bedding.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

Permeable clay brick pavers have spacer bars on each unit. These insure a minimum joint width between each unit in which the aggregate is placed. Spacer bars help prevent contact of the edges with adjacent pavers and subsequent chipping.

- A. Permeable clay brick pavers shall be A Grade pavers manufactured/supplied by a member of the Brick Institute of America (BIA). The BIA manufacturer/supplier shall be:

Name: **PINE HALL BRICK**

Address: P. O. Box 11044

2701 Shorefair Drive

Winston-Salem, NC 27116-1044

Phone: (800) 334-8689

- B. Product name/shape, overall dimensions, and thickness of the permeable clay paver units shall be:

1. Paver Type: RainPave™/StormPave™ (Specify type, thickness, etc.)
 - a. Material Standard: Comply with ASTM C 902 or C1272.
 - b. Color : [Specify color.]
 - c. Size: [Specify.] inches x [Specify.] inches x [Specify.] inches thick.
 - d. Manufacturer item number.

**** NOTE: WHEN USING THESE SPECS IN YOUR BID PACKAGE, SPECIFY THE SIZES OF PAVERS SPECIFIED ON THE PROJECT AND INSERT YOUR PRODUCT CHOICE AND COLOR. i.e. RainPave™ Full Range 4"x 8"x 2-1/4" AFTER INSERTING THIS INFORMATION DELETE THIS NOTE.**

- C. Pavers shall meet the following requirements set forth in ASTM C 902, Specification for Pedestrian and Light Traffic Paving Brick or C 1272 Specification for Heavy Vehicular Paving Brick and shall conform to the PX standard.

1. Minimum average compressive strength of 10,000 psi.
2. The average cold water absorption shall not be greater than 6% with no individual unit testing greater than 7%. Absorption test results may not be achieved through the use of sealers or other products applied to the clay paver. (Sealer protection degrades over time requiring re-application after several years.)
3. Resistance of 50 freeze-thaw cycles, when tested in accordance with ASTM C67. In addition the clay paver must pass CSA-A231.2 freeze thaw test in saline solution without the use of sealers or other products applied to the paver. A test report must be submitted by the manufacturer. (Salt is the most common substance used for de-icing during the winter months.)
4. Dimensional tolerances should meet the PX standard. In addition, the dimensional

tolerances around the mean values for length, width, and depth shall be 1/16". (Studies show that dimensional tolerances are directly linked to joint width size and proper interlock.)

5. The pavers should be solid units without core holes or other perforations.
6. The contractor shall ensure that the manufacturer conducts a test sampling of 24 pavers every 50,000 pavers manufactured to determine the pavers compliance with dimensional and water absorption characteristics. The 24 paver sample shall be representative of the color mix in the typical finished package and chosen on a consistent basis from one kiln car. (Proper control procedures and testing are standard operating procedure for high quality manufacturers.)

2.02 AGGREGATE MATERIALS

A. Bedding Course and Void Filler Aggregate

The bedding course and void filler aggregate shall be washed, crusher run, free of fines, organics and soluble salts or other contaminants likely to cause efflorescence. The grading requirement shall comply with the following table.

Table 1 – ASTM No. 89 Grading Requirements for Bedding Course Aggregates	
ASTM Sieve Size	Percent Passing (by weight)
½ in.	100
3/8 in.	90 to 100
No. 4	20 to 55
No. 8	5 to 30
No. 16	0 to 10
No. 50	0 to 5

B. Base Course Aggregates

The base course aggregate shall consist of washed open-graded stone and comply with the following table.

Table 2 – ASTM No. 57 Grading Requirements for Base Course Aggregates	
ASTM Sieve Size	Percent Passing (by weight)
1-½ in.	100
1 in.	95 to 100
½ in.	25 to 60
¼ in.	0 to 10
No. 4	0 to 5

C. Sub-Base Course Aggregate

The sub-base course and void filler aggregate shall be washed, open graded stone and comply with the following table.

Table 3 – ASTM No. 2 Grading Requirements for Sub-Base Course Aggregates	
ASTM Sieve Size	Percent Passing (by weight)
3 in.	100
2-1/2 in.	90 to 100
2 in.	35 to 70
1-1/2 in.	0 to 15
1 in.	0 to 5

2.03 EDGE RESTRAINTS

- A. Edge restraints are required on all installations. Edge restraints are to be pre-cast or cast-in-place concrete, plastic, or steel as specified in the drawings. Install as per manufacturer's specifications.

2.04 FILTER GEOTEXTILE (IF APPLICABLE)

- A. A non-woven geotextile fabric shall be used if specified

****NOTE: ELIMINATE THE TEXT IN THIS SECTION (2.05) IF NO FILTER GEOTEXTILE IS SPECIFIED. CHANGE TITLE TO (NOT APPLICABLE). DELETE THIS NOTE AFTER MAKING THE APPROPRIATE CHANGES.**

PART 3 EXECUTION

3.01 SUBGRADE

- A. The site engineer shall verify that the sub-grade has been shaped and compacted in conformance to the lines, grades and cross-sections shown on the plans.
- B. If necessary, site grades can be raised using the same material as the largest base course (i.e. #2 or #57) being used on the project. The stone should be laid in 6" lifts and compacted using a vibratory smooth-drum roller.
- C. The requirements to include sub-drains in the pavement base design would depend on the sub-grade soil conditions. It is recommended that an experienced, qualified geotechnical engineer determine the requirements for sub-drains. If required, the sub-drain pipe shall consist of a four inch diameter pvc perforated pipe wrapped with filter fabric. The pipe would be placed at sub-grade elevation and surrounded with a minimum of four inches of approved open-graded stone. The sub-drain shall drain into a catch basin or other frost-free positive outlet.

3.02 SUB-BASE COURSE

- A. The thickness of the sub-base course layer will depend upon the sub-grade soil conditions and the anticipated traffic loadings. It is recommended that a site assessment be carried out by an experienced qualified geotechnical engineer to determine the required thickness of the sub-base course.
- B. The sub-base shall consist of a minimum thickness of twelve inches and be compacted using a vibratory smooth-drum roller. It shall be installed in lifts not to exceed six inches. Upon completion of the sub-base course installation, the area shall be proof-rolled using a heavy rubber tired vehicle (such as a loaded tandem truck) to identify any areas requiring additional compaction. The sub-base course shall be installed to the elevation and cross section per the plan documents.

3.03 EDGE RESTRAINTS

- A. All edge restraints shall be constructed as shown on the plans and in place prior to the installation of the base course, bedding course and pavers. Poured-in-place concrete curbs are recommended for commercial permeable paver installations.

3.04 BASE COURSE

A. The base course shall consist of a thickness of four inches of aggregate placed in one lift and compacted using a vibratory smooth-drum roller until there is no visible movement of aggregate under static rolling. The base course shall be installed to the elevation and cross section per the plan documents.

3.05 BEDDING COURSE

A. The bedding course shall be spread loose in a uniform layer to give a depth after compaction of the pavers of two inches, plus or minus $\frac{1}{2}$ ". The contractor shall screed the bedding course using either a mechanical screed beam apparatus or by the use of screed guides and boards.

B. The screeded bedding aggregate shall not be subjected to any traffic by either mechanical equipment or pedestrian use prior to the installation of the pavers. The voids left after the removal of the screed rails shall be filled with loose aggregate as the paver bedding course proceeds.

3.06 PERMEABLE CLAY PAVERS

A. The pavers should be installed according to the information on the cube tag. The pavers should be laid from several cubes throughout the installation.

B. Lay pavers in the pattern as shown on the drawings. Lay pavers away from the existing laying face or edge restraint in such a manner as to ensure that the pattern remains square. Chalk lines (use a heavier chalk cord) shall be used upon the bedding course to maintain straight lines. Joint spacing between pavers shall be between $\frac{1}{8}$ " and $\frac{1}{4}$ "; however the joint width may need to be increased to $\frac{3}{8}$ " to maintain straight lines. Lines and grades shown on the plans shall be established and maintained during the installation of the pavers.

C. Pavers should be cut according to the instructions on the cube tag. Pavers shall be cut using a table mounted masonry wet saw.

D. Once the pavers have been placed upon the bedding course and all cut pavers have been inserted to provide the complete surface, inspect the pavers for damaged units and remove and replace those units. Once all pattern lines have been straightened, the void filler shall then be placed into the paver openings to the top of the chamfer on the pavers and the surface swept broom clean.

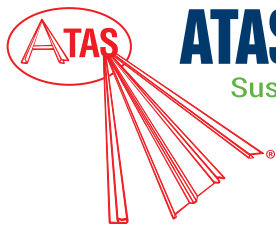
E. The pavement surface shall be compacted to achieve consolidation of the bedding course

and pavers and brought to design levels and profiles by two passes of a suitable plate compactor. Compaction of the pavers shall be accomplished by the use of a vibratory plate compactor capable of a minimum of 4,500 pounds of compaction force. No compaction shall be permitted within three feet of unrestrained edges of the pavement. After compaction, inspect the pavers for damaged units and remove and replace those units.

- F. After completing compaction, the surface tolerances shall be plus or minus 1/2" from finished grades. The pavers shall be flush to 1/2" above edge restraints. Additional void filler material shall be swept into the joints as required, to within 1/2" from the bottom of the chamfer on the paver. Upon completion, the pavement surface shall be swept clean of all excess materials. Remove from the site all surplus materials, equipment and debris resulting from these operations.

End of Section

**PLEASE NOTE BEFORE USING THESE SPECS:
THESE SPECIFICATIONS ARE BASED ON GENERALLY ACCEPTED
INDUSTRY STANDARDS FOR PERMEABLE PAVER
INSTALLATIONS. NO SINGLE SPECIFICATION CAN BE APPLIED TO
EVERY PROJECT OR COVER ALL APPLICATIONS OR
CIRCUMSTANCES. AS A RESULT, THESE SPECIFICATIONS ARE
OFFERED TO THE DESIGNER AS A GUIDELINE TOOL ONLY. IT IS
UP TO THE DESIGNER TO CUSTOMIZE AND APPLY THESE
GENERAL PROCEDURES TO THE INDIVIDUAL CIRCUMSTANCES OF
THEIR INDIVIDUAL PROJECT.**



1. PRODUCT NAME

CORRUGATED PANEL BWC374

2. MANUFACTURER

ATAS INTERNATIONAL, INC.

Website: www.atas.com

Email: info@atas.com

Corporate Headquarters:

Allentown, PA 18106

Phone: (800) 468-1441

3. PRODUCT DESCRIPTION

Basic Uses:

BWC374 is an economical, 7/8" high corrugated product with excellent performance characteristics. This panel can be installed vertically or horizontally on walls and used for roofing applications.

Composition & Materials:

Standard Offerings: The BWC374 panel is roll-formed from .032, .040 and .050 aluminum; 24 gauge metallic coated steel; or 24 gauge 55% Al-Zn alloy coated steel with acrylic coating.

Special Offerings: 20, 22 gauge metallic coated steel; 20, 22 gauge 55% Al-Zn alloy coated steel with acrylic coating; 0.8, 1.0, 1.2 mm zinc 16, 20 oz. copper may be specified, subject to minimum quantities and lead time.

Sizes:

The BWC374 panels are 39½" wide (nominal) with a 37 1/4" wide net coverage area. Panel lengths are cut to customer specifications, with a minimum of 6' and a maximum to transportation limitations and/or product and project design considerations.

Colors & Finishes:

A choice of over 40 stock colors is available in a 70% PVDF finish. (Request color chart or chips). Custom colors available. An anodized finish is available in Clear Satin or Dark Bronze. Texture may be smooth or stucco embossed. Perforations are available.

4. TECHNICAL DATA

70% PVDF based finishes tested by paint supplier for:

- Dry Film Thickness: ASTM D 1005, ASTM D 1400, ASTM D 4138 or ASTM D 5796
- Specular Gloss: ASTM D 523
- Pencil Hardness: ASTM D 3363
- T-Bend Flexibility: ASTM D 4145
- Mandrel Bend Flexibility: ASTM D 522
- Impact Resistance: ASTM D 2794
- Adhesion: ASTM D 3359
- Water Immersion Resistance: ASTM D 870
- Abrasion Resistance: ASTM D 968

- Acid Resistance: ASTM D 1308
- Acid Rain Resistance (Kesternich): ASTM G 87 or DIN 50018
- Salt Spray: ASTM B 117
- Cyclic Salt Spray: ASTM D 5894 and ASTM D 5487
- Humidity Resistance: ASTM D 2247
- Accelerated Weathering: ASTM D 822 and ASTM G 155, ASTM G 151 or ASTM G 153
- Color Retention, Florida Exposure: ASTM D 2244
- Chalking Resistance: ASTM D 4214
- Cleveland Condensing Cabinet: ASTM D 4585
- Cure Test, MEK Resistance: ASTM D 5402
- Alkali Resistance, Sodium Hydroxide: ASTM D 1308, Procedure 7.2
- Flame Spread Rating: ASTM E 84
- Organic coatings meet requirements of AAMA 2605 when applied to aluminum.

Panel testing/ratings:

- UL Fire resistance rating design numbers: See www.ul.com, File R12113, or contact ATAS for current listing.
- Galvanized Steel: ASTM A 653
- 55% Al-Zn alloy Coated Steel: ASTM A 792
- Aluminum: ASTM B 209
- Copper: ASTM B 370
- Coil Coating: ASTM A 755
- Load Tables available upon request.

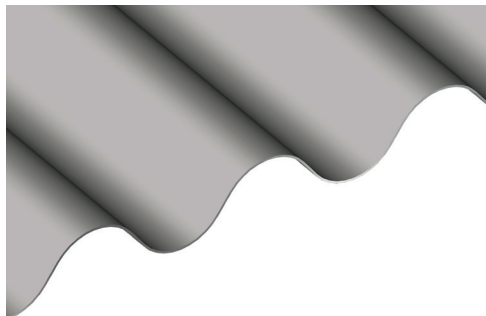
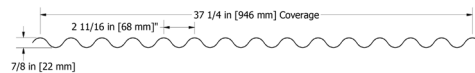
5. INSTALLATION

Installation is with direct fastening methods. When used in roofing applications special practices and restrictions apply. Recommended minimum slope is 3:12. Installation details and hands-on training via seminars are available through ATAS. Visit www.atas.com for more information.

6. AVAILABILITY & COST

Availability:

The BWC374 panel is available through ATAS product distributors. A complete line of related components and trim accessories is available to



complete the roof or wall system. In addition, a complete line of rainware and perimeter roof edge trims can be supplied by ATAS to complement the project. Flat sheet and/or coil stock is available in matching color for fabrication of related components by the installing contractor.

Cost:

Contact ATAS product distributors for current pricing.

7. WARRANTY

Products coated with a fluoropolymer, 70% PVDF finish carry a limited warranty against chalking and fading.

8. MAINTENANCE

The BWC374 panel requires minimal maintenance. Surface residue may be easily removed by conventional cleaning methods. For painted products, minor scratches should be touched up with a matching paint, available from the manufacturer.

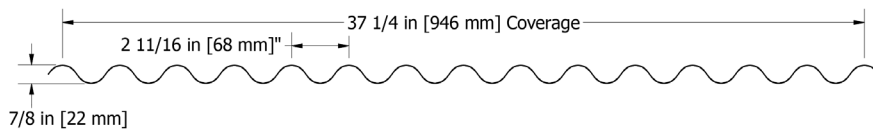
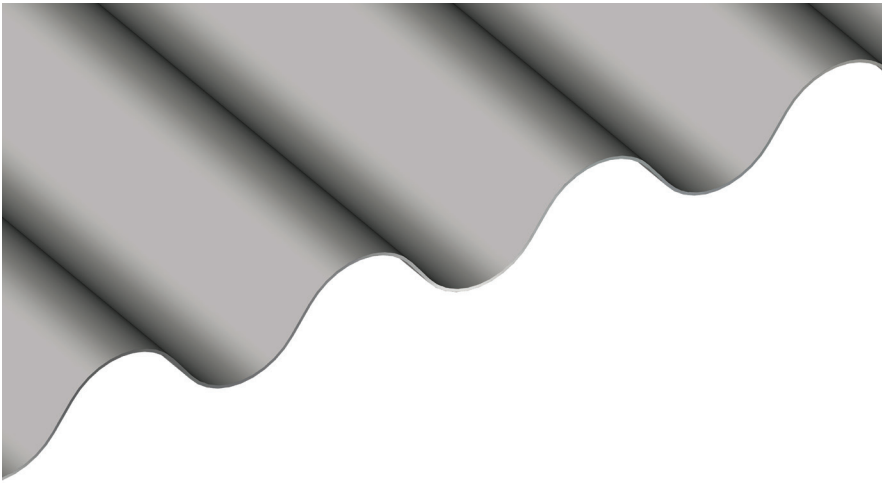
9. TECHNICAL SERVICES

Complete technical information and literature are available at www.atas.com. ATAS will assist with design ideas and shop drawings.

10. FILING SYSTEM

- www.atas.com
- Additional product information is available from the manufacturer upon request.





CORRUGATED PANEL

SKU: BWC374

MATERIAL

.032, .040, .050 aluminum

24, 22*, 20* ga. metallic coated steel

24, 22*, 20* ga. 55% Al-Zn alloy coated steel with acrylic coating

16, 20 oz. copper**

.8, 1.0, 1.2 mm zinc**

^Inquire for available panel widths

PANEL SPECS

Coverage: 37 1/4"

Minimum Length: 6'-0"

Depth: 7/8"

AVAILABLE

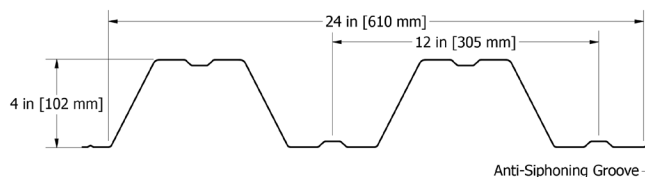
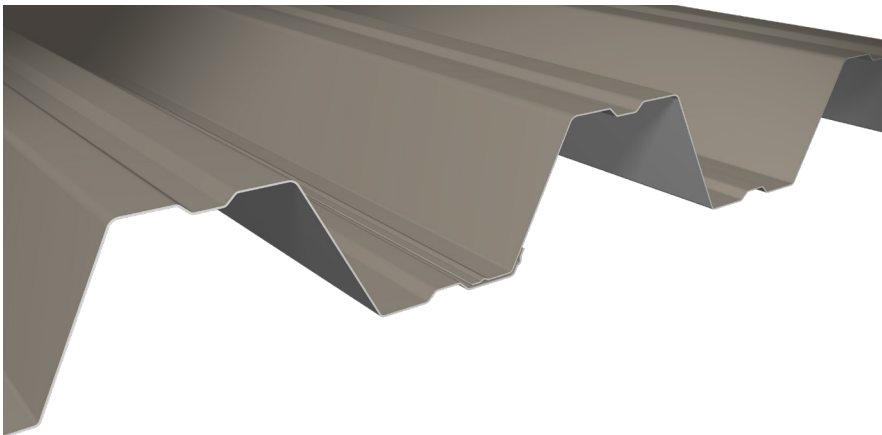
Crimp-Curving (convex and concave)

Stretch Curving

TEXTURE

Smooth or Stucco Embossed

 www.atas.com/corrugated



SPAN WALL™

SKU: BWS240

MATERIAL

.032, .040, .050 aluminum

24, 22*, 20, 18 ga. metallic coated steel

24, 22*, 20*, 18* ga. 55% Al-Zn alloy coated steel with acrylic coating

.8, 1.0 mm zinc*

16, 20 oz. copper*

PANEL SPECS

Coverage: 24"

Minimum Length: 6'-0"

Depth: 4"

AVAILABLE

Crimp-Curving (convex and concave)

TEXTURE

Smooth or Stucco Embossed

 www.atas.com/spanwall



ATAS International, Inc.

Sustainable Building Envelope Technology



STOCK • MATTE • PREMIUM • NATURAL
WOODLAND • OXIDE • LAMINATE

COLOR CHART

A leading manufacturer of sustainable building envelope technology, ATAS utilizes cool pigment paint on many color offerings. Our products reflect infrared radiation, which results in cooler surface temperatures, and maximum fade resistance.

Many of the ATAS products meet the qualifications for potential green building certification credits and industry ratings. See ATAS website for specific SRI values (www.atas.com/sri). Information on ATAS' sustainable products can be found at www.atas.com/sustainability.

70% PVDF finish carries a limited warranty against fading and chalking. ATAS coated materials are non-staining and virtually maintenance free. Any surface residue is easily removed with conventional cleaning solutions or detergents.



STOCK COLORS

70% PVDF resin based coatings provide high-performance durability for exterior and interior applications. These coatings are designed to resist fading, chalking, and abrasion. Meets the requirement of AAMA 2605-13 for aluminum substrates.



Black (02)



Classic Bronze (01)



Medium Bronze (03)



Hartford Green (27)



Forest Green (11)



Teal (19)



Hemlock Green (30)



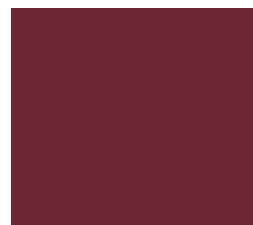
Patina Green (12)



Chocolate Brown (04)



Boysenberry (25)



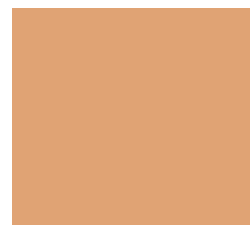
Redwood (07)



Mission Red (08)



Sierra Tan (09)



Rawhide (15)



Concord Cream (05)



Sandstone (06)



Regal Blue (18)



Slate Blue (21)



Siam Blue (14)



Rocky Grey (16)



Charcoal Grey (62)



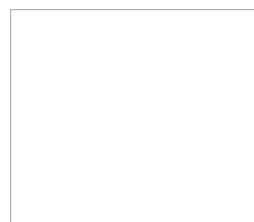
Slate Grey (20)



Dove Grey (13)



Ascot White (10)



Bone White (26)



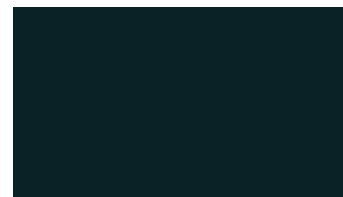
www.atas.com/colors

MATTE FINISH

Designed to simulate natural metal hues in a high-performance 70% PVDF paint system.



Matte Black (32)



Char Brown (29)



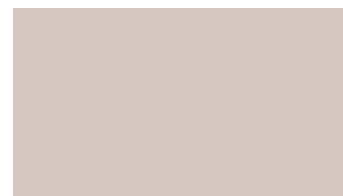
Thunder Grey (34)



Anchor Grey (37)



Ash Grey (33)



Almond (36)

PREMIUM FINISH

70% PVDF resin based coatings, with premium pigmentation to obtain metallic or deep color for desired aesthetics.



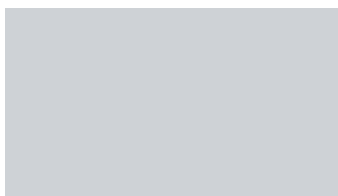
Antique Patina (24)



Champagne (31)



Coppertone (23)



Titanium (35)



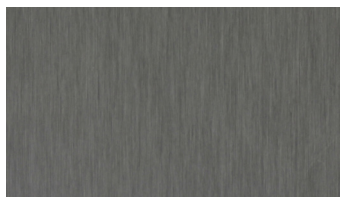
Silversmith (28)



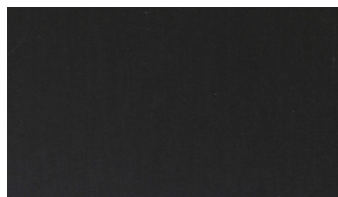
Brite Red (17)

NATURAL METALS

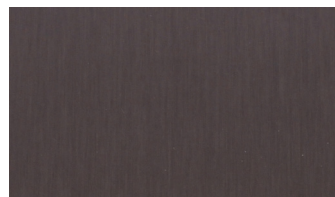
Natural metals will weather and patina naturally over time, adding character and aesthetic appeal to any building design. In addition to natural metals, ATAS offers 55% Al-Zn alloy coated steel with acrylic coating and anodized aluminum as standard available materials.



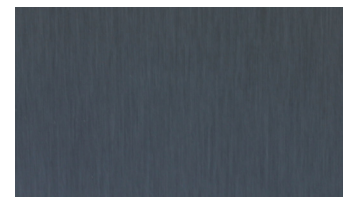
Grey Zinc (50)*



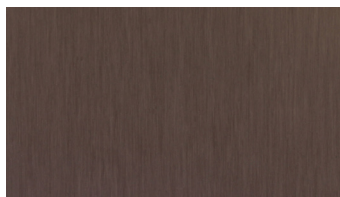
Dark Zinc (51)*



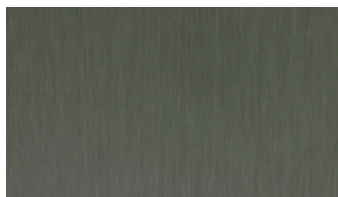
Brown Zinc (89)*



Blue Zinc (94)*



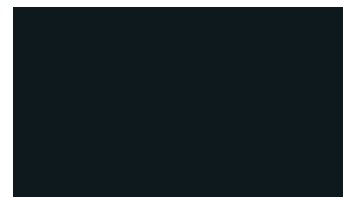
Red Zinc (95)*



Green Zinc (96)*



Clear Satin Anodized (70)



Dark Bronze Anodized (71)



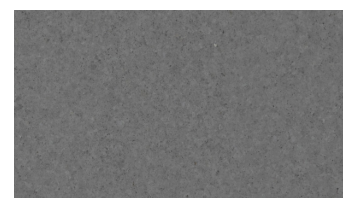
55% Al-Zn Alloy Coated Steel with Acrylic Coating (97)



Copper (49)*



Classic Stainless Steel (40)*



Tin Matte Stainless Steel (41)*

*Special material. Pricing and availability dependent upon project specifics. Color chips available upon request.

WOODLAND SERIES

Add the warmth of wood with the durability of metal to your next project. ATAS offers four classic woodgrain patterns with a 70% PVDF coating. The Woodland Series is available in .032 aluminum.



Birch (57)



Cedar (54)



Driftwood (53)



Walnut (55)

OXIDE SERIES

Made to look like weathered steel with a rust-like appearance, these color choices add a timeless appearance with a 70% PVDF finish to your project.



Copper Brown (42)



Tarnished Red (47)

www.atas.com
800.468.1441

ATAS International, Inc.
Allentown, PA | Mesa, AZ | University Park, IL



Stainless steel products provided by ROOFINOX®. Colors are as close to the actual colors as modern printing allows. Exact metal color chips available upon request (this is a requirement for all premium colors), and should be used for final color selection. If you have requirements or preference for colors or finishes other than shown, contact ATAS. Color availability varies by material, gauge and profile. ATAS is not responsible for colors selected from color chart. ATAS reserves the right to modify, eliminate and/or change its products without prior notification. All colors are produced under stringent guidelines and tolerances that are identified within the coated metal industry. Batch to batch variations may occur within these established industry tolerances. Care should be exercised by customer when mixing lots. Contact ATAS for more information. Please visit www.atas.com for the most up-to-date information. © 2020 ATAS International, Inc. LRD0121 LAT400

TRIM



The Freedom To Create **Your Custom Look**

TruExterior offers you the versatility to create virtually any custom look that you want for your homes. With the ability to cut, miter and route TruExterior Trim, you can shape your perfect profile and know your trim will outlast traditional wood.

- Better workability compared to wood, fiber cement or engineered wood trim
- Installs with standard woodworking tools and methods
- No edge sealing of cuts required
- Pre-primed and ready to paint any color
- Available in 16' lengths

Technical Data

[TruExterior Trim – Product Data Sheet](#)

Product Certifications

MAIBEC GENUINE WOOD SIDING

Maibec Genuine Wood, Eastern White Cedar Shingles

Naturally durable, cedar shingles have been a homeowner's favorite for centuries as an exterior siding material. Inspiring, it is offered in an almost infinite variety of solid colors and a selection of semi-transparent colors.

[Find a dealer](#)

Squarely the best.

Maibec is the largest manufacturer of Eastern white cedar shingles in North America. It's a title we've enjoyed since 1964. As the recognized benchmark for quality in our industry, Maibec shingles can be used to enhance the original beauty of your home, emphasize architectural details, or pair harmoniously with other materials for a more contemporary look.

Revision A:

- 3. SPECIFICATION has been modified.
 - 10. TROUBLESHOOTING has been modified.
- Please void OBH684.

OUTDOOR UNIT SERVICE MANUAL



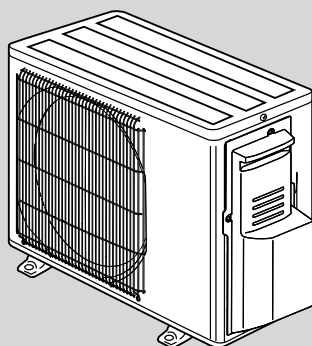
No. OBH684
REVISED EDITION-A

Models

MUZ-FH09NA
MUZ-FH12NA
MUZ-FH15NA

MUZ-FH09NAH
MUZ-FH12NAH
MUZ-FH15NAH

Indoor unit service manual
MSZ-FH•NA Series (OBH683)



MUZ-FH09NA MUZ-FH09NAH
MUZ-FH12NA MUZ-FH12NAH

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PARTS CATALOG (OBB684)

NOTE:

RoHS compliant products have <G> mark on the spec name plate.

Use the specified refrigerant only

Never use any refrigerant other than that specified.

Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.

Correct refrigerant is specified in the manuals and on the spec labels provided with our products.

We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Revision A:

- 3. SPECIFICATION has been modified.
(The values of COP have been modified.)
- 10. TROUBLESHOOTING has been modified.

1

TECHNICAL CHANGES

MUZ-FH09NA MUZ-FH09NAH

MUZ-FH12NA MUZ-FH12NAH

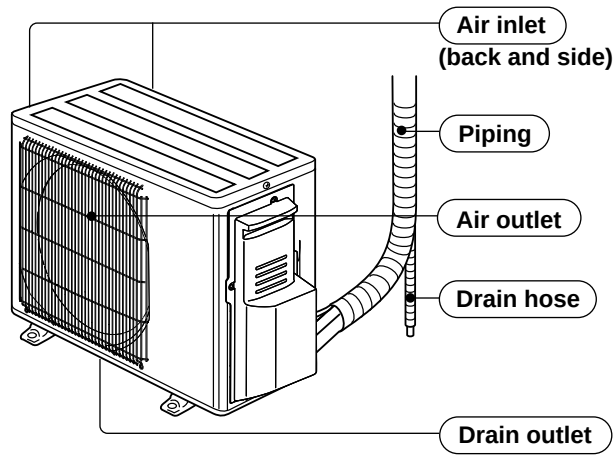
MUZ-FH15NA MUZ-FH15NAH

1. New model

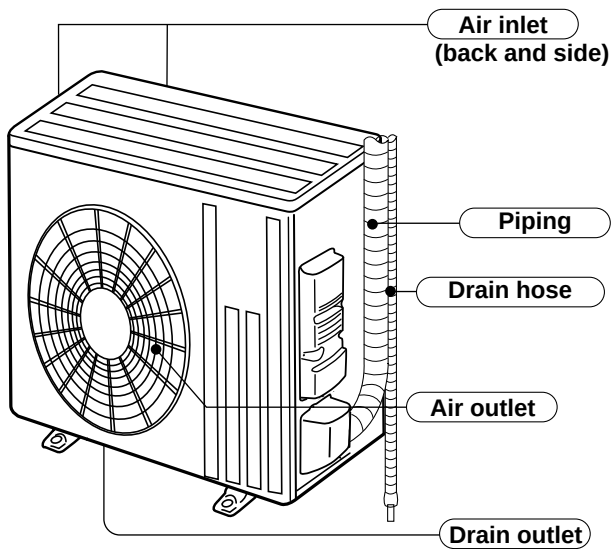
2

PART NAMES AND FUNCTIONS

MUZ-FH09NA MUZ-FH12NA
MUZ-FH09NAH MUZ-FH12NAH



MUZ-FH15NA MUZ-FH15NAH



Outdoor unit model			MUZ-FH09NA MUZ-FH09NAH	MUZ-FH12NA MUZ-FH12NAH	MUZ-FH15NA MUZ-FH15NAH
Capacity Rated (Minimum~Maximum)	Cooling ※1	Btu/h	9,000 (1,700 ~ 12,000)	12,000 (2,500 ~ 13,600)	15,000 (6,450 ~ 19,000)
	Heating 47 ※1	Btu/h	10,900 (1,600 ~ 18,000)	13,600 (3,700 ~ 21,000)	18,000 (5,150 ~ 24,000)
Capacity Rated (Maximum)	Heating 17 ※2	Btu/h	6,700 (12,200)	8,000(13,600)	11,000 (18,000)
Power consumption Rated (Minimum~Maximum)	Cooling ※1	W	560 (100 ~ 1,000)	870 (170 ~ 1,150)	1,200 (410 ~ 2,200)
	Heating 47 ※1	W	710 (110 ~ 1,470)	950 (280 ~ 2,300)	1,300 (430 ~ 3,360)
Power consumption Rated (Maximum)	Heating 17 ※2	W	600 (1,440)	720 (1,900)	1,020 (2,480)
EER ※1 [SEER] ※3	Cooling		16.1 [30.5]	13.8 [26.1]	12.5 [22.0]
HSPF IV ※4	Heating		NA: 13.5	NA: 12.5	NA: 12.0
			NAH: 12.5	NAH: 11.5	NAH: 11.0
COP	Heating ※1		4.50	4.20	4.06
Power supply	V , phase , Hz		208/230, 1 , 60		
Max. fuse size (time delay)		A	15		20
Min. circuit ampacity		A	11		16
Fan motor		F.L.A	0.50		0.93
Compressor	Model		SNB092FQAMT	SNB140FQUMT	SNB172FQKMT
	R.L.A		8.2		12.0
	L.R.A		10.3		15.0
	Refrigeration oil L (Model)		0.35 (FV50S)	0.35 (FV50S)	0.40 (FV50S)
Refrigerant control			Linear expansion valve		
Sound level ※1	Cooling	dB(A)	48	49	51
	Heating	dB(A)	49	51	55
Defrost method			Reverse cycle		
Dimensions	W	in.	31-1/2		33-1/16
	D	in.	11-1/4		13
	H	in.	21-5/8		34-5/8
Weight		lb.	81	83	124
External finish			Munsell 3Y 7.8/1.1		
Remote controller			Wireless type		
Control voltage (by built-in transformer)		VDC	12 - 24		
Refrigerant piping			Not supplied		
Refrigerant pipe size (Min. wall thickness)	Liquid	in.	1/4 (0.0315)		
	Gas	in.	3/8 (0.0315)		1/2 (0.0315)
Connection method	Indoor		Flared		
	Outdoor		Flared		
Between the indoor & outdoor units	Height difference	ft.	40		50
	Piping length	ft.	65		100
Refrigerant charge (R410A)			2 lb. 9 oz.		3 lb. 7 oz.

NOTE: Test conditions are based on AHRI 210/240.

*1: Rating conditions (Cooling) — Indoor: 80°FDB, 67°FWB, Outdoor: 95°FDB, (75°FWB)
(Heating) — Indoor: 70°FDB, 60°FWB, Outdoor: 47°FDB, 43°FWB

*2: (Heating) — Indoor: 70°FDB, 60°FWB, Outdoor: 17°FDB, 15°FWB

Test condition

※3,※4

ARI	Mode	Test	Indoor air condition (°F)		Outdoor air condition (°F)	
			Dry bulb	Wet bulb	Dry bulb	Wet bulb
	SEER (Cooling)	"A-2" Cooling Steady State at rated compressor Speed	80	67	95	(75)
		"B-2" Cooling Steady State at rated compressor Speed	80	67	82	(65)
		"B-1" Cooling Steady State at minimum compressor Speed	80	67	82	(65)
		"F-1" Cooling Steady State at minimum compressor Speed	80	67	67	(53.5)
		"E-V" Cooling Steady State at Intermediate compressor Speed ※5	80	67	87	(69)
	HSPF (Heating)	"H1-2" Heating Steady State at rated compressor Speed	70	60	47	43
		"H3-2" Heating at rated compressor Speed	70	60	17	15
		"H0-1" Heating Steady State at minimum compressor Speed	70	60	62	56.5
		"H1-1" Heating Steady State at minimum compressor Speed	70	60	47	43
		"H2-V" Heating at Intermediate compressor Speed ※5	70	60	35	33

※5: At Intermediate compressor Speed
= ("Cooling rated compressor speed" - "minimum compressor speed") / 3 + "minimum compressor speed".

OPERATING RANGE

(1) POWER SUPPLY

	Rated voltage	Guaranteed voltage (V)
Outdoor unit	208/230 V 1 phase 60 Hz	Min. 187 208 230 Max. 253

(2) OPERATION

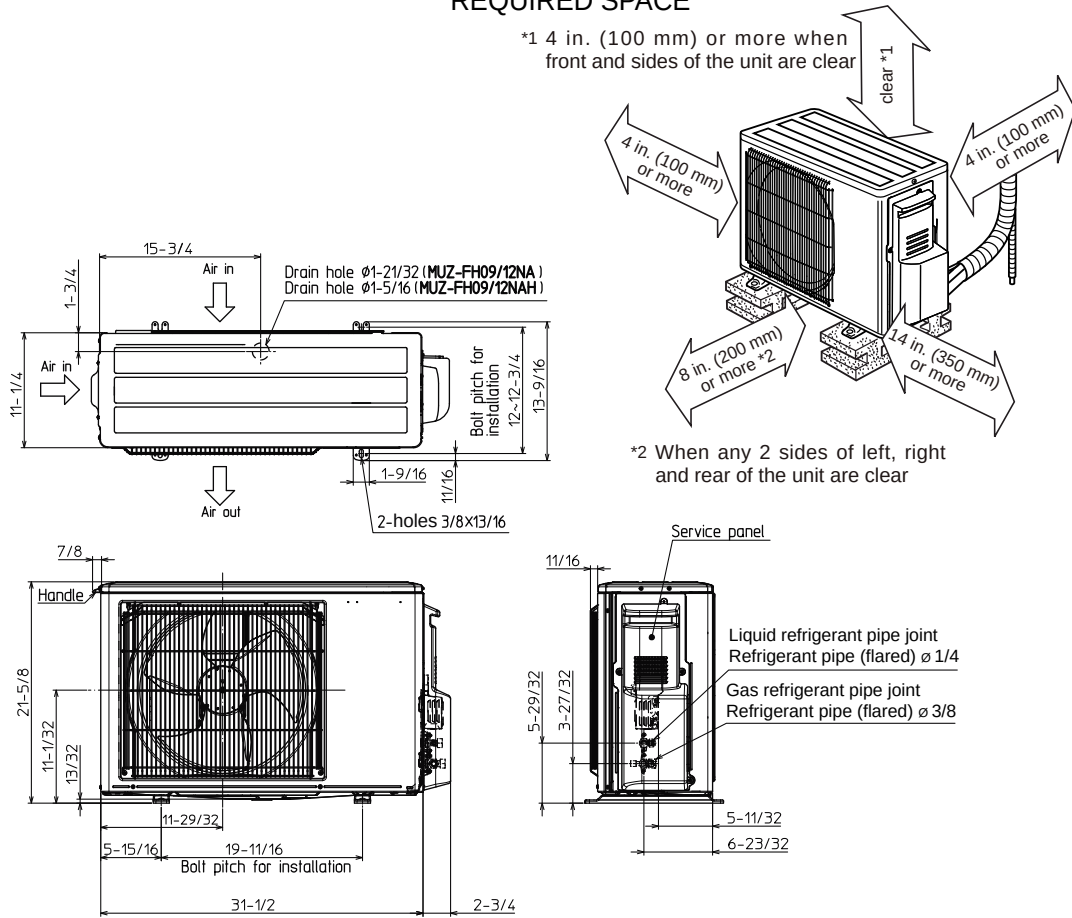
Mode	Condition	Intake air temperature (°F)			
		Indoor		Outdoor	
		DB	WB	DB	WB
Cooling	Standard temperature	80	67	95	—
	Maximum temperature	90	73	115	—
	Minimum temperature	67	57	14	—
	Maximum humidity	78 %		—	
Heating	Standard temperature	70	60	47	43
	Maximum temperature	80	67	75	65
	Minimum temperature	70	60	-13	-14

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH

Unit: inch

REQUIRED SPACE

*1 4 in. (100 mm) or more when front and sides of the unit are clear

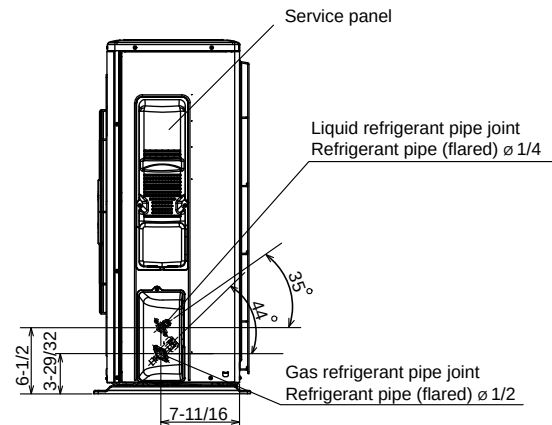
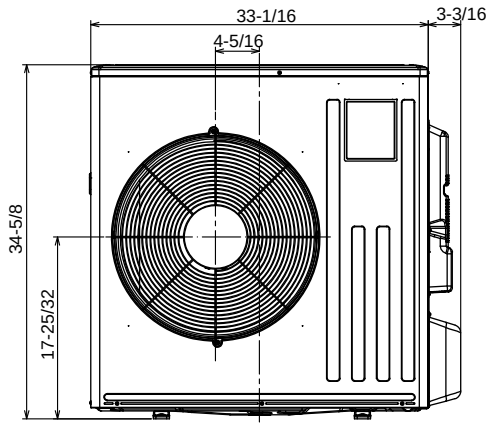
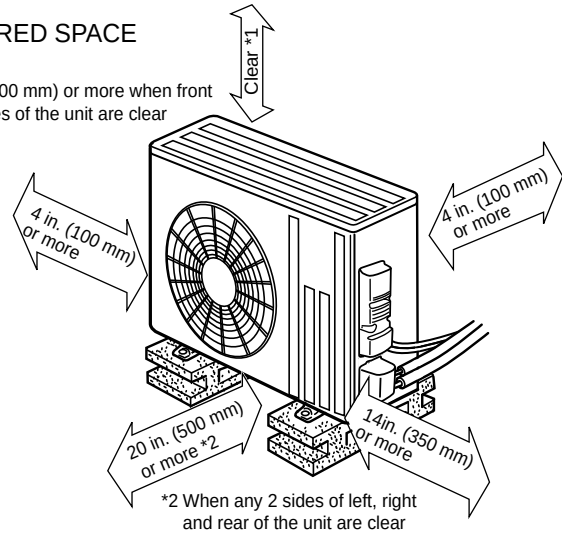
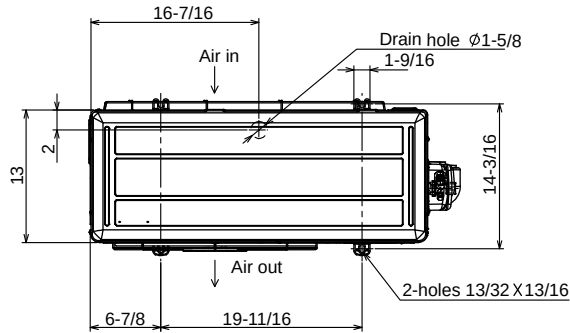


MUZ-FH15NA MUZ-FH15NAH

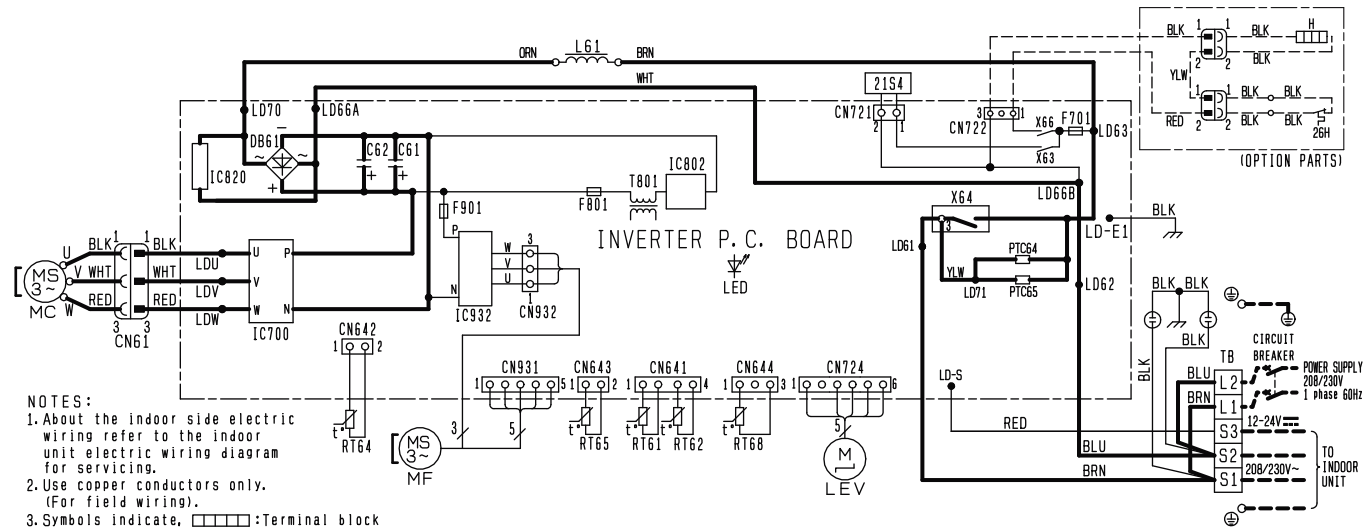
Unit: inch

REQUIRED SPACE

*1 20 in. (500 mm) or more when front and sides of the unit are clear

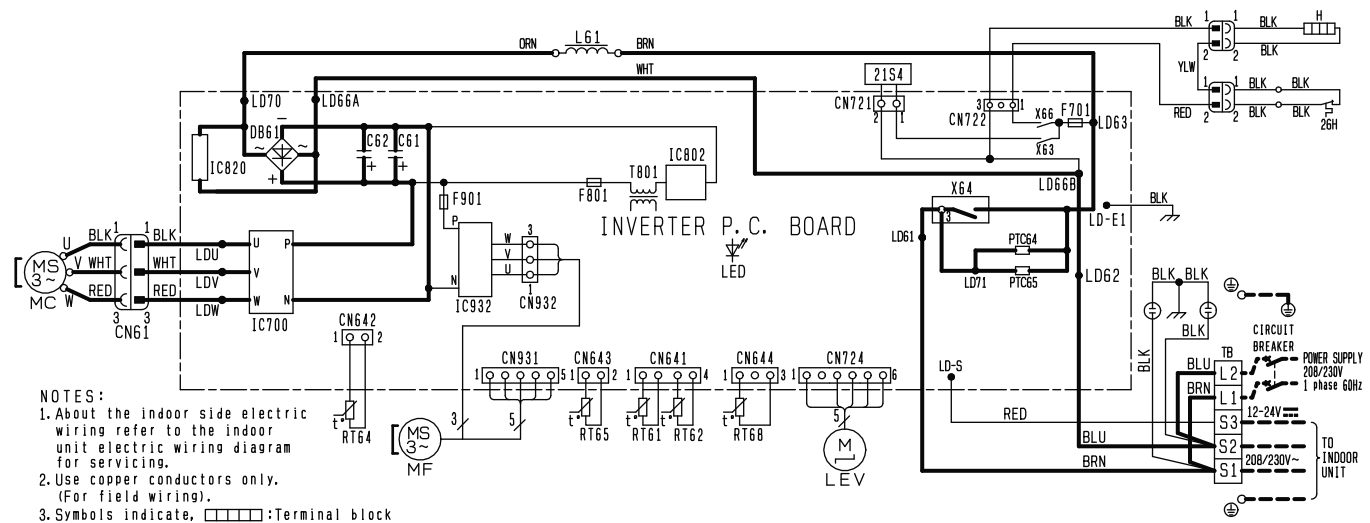


MUZ-FH09NA MUZ-FH12NA



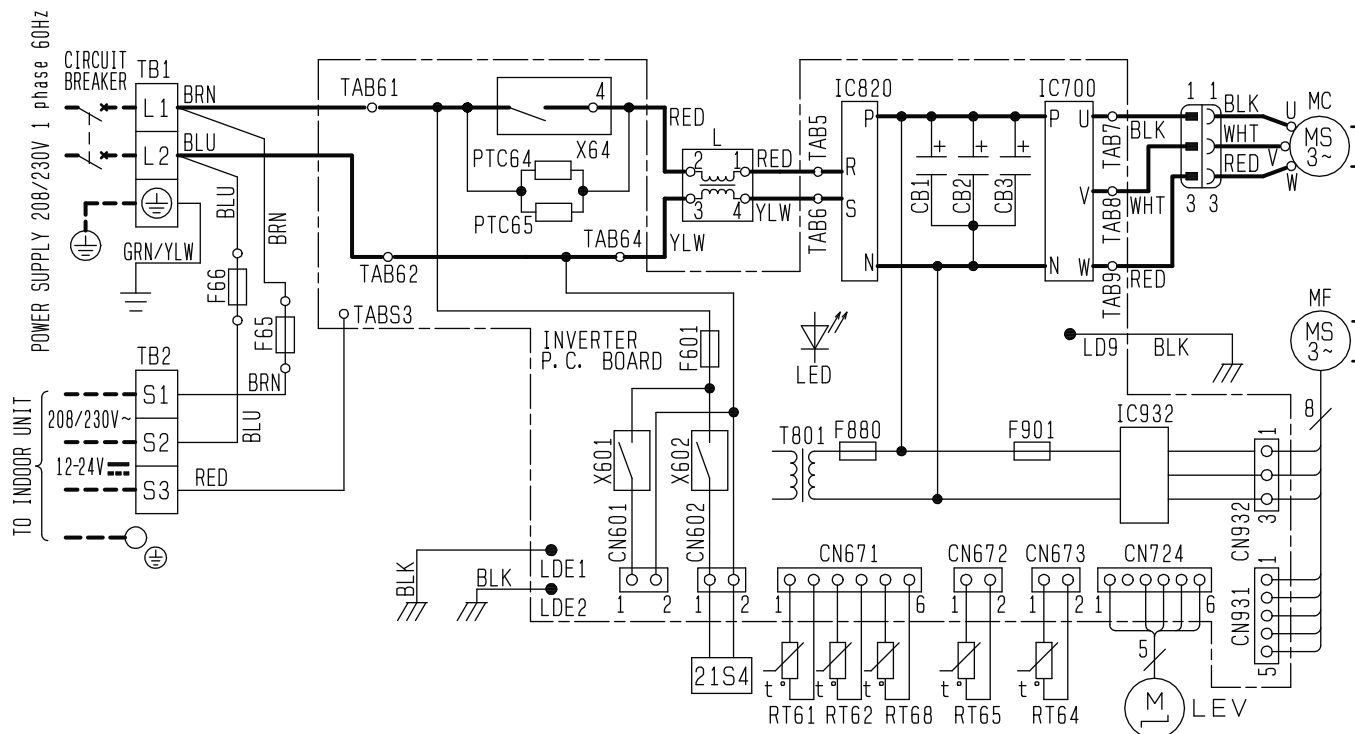
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61,C62	SMOOTHING CAPACITOR	L61	REACTOR	RT68	OUTDOOR HEAT EXCHANGER TEMP. THERMISTOR.
DB61	DIODE MODULE	MC	COMPRESSOR	TB	TERMINAL BLOCK
F701,F801,F901	FUSE (T3, 15A/250V)	MF	FAN MOTOR	T801	TRANSFORMER
H	DEFROST HEATER (OPTION PARTS)	PTC64, PTC65	CIRCUIT PROTECTION	X63, X64, X66	RELAY
IC700, IC820, IC932	POWER MODULE	RT61	DEFROST THERMISTOR	21S4	REVERSING VALVE COIL
IC802	POWER DEVICE	RT62	DISCHARGE TEMP. THERMISTOR	26H	HEATER PROTECTOR (OPTION PARTS)
LED	LED	RT64	FIN TEMP. THERMISTOR		
LEV	EXPANSION VALVE COIL	RT65	AMBIENT TEMP. THERMISTOR		

MUZ-FH09NAH MUZ-FH12NAH



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C61,C62	SMOOTHING CAPACITOR	L61	REACTOR	RT68	OUTDOOR HEAT EXCHANGER TEMP. THERMISTOR.
DB61	DIODE MODULE	MC	COMPRESSOR	TB	TERMINAL BLOCK
F701,F801,F901	FUSE (T3, 15A/250V)	MF	FAN MOTOR	T801	TRANSFORMER
H	DEFROST HEATER	PTC64, PTC65	CIRCUIT PROTECTION	X63, X64, X66	RELAY
IC700, IC820, IC932	POWER MODULE	RT61	DEFROST THERMISTOR	21S4	REVERSING VALVE COIL
IC802	POWER DEVICE	RT62	DISCHARGE TEMP. THERMISTOR	26H	HEATER PROTECTOR
LED	LED	RT64	FIN TEMP. THERMISTOR		
LEV	EXPANSION VALVE COIL	RT65	AMBIENT TEMP. THERMISTOR		

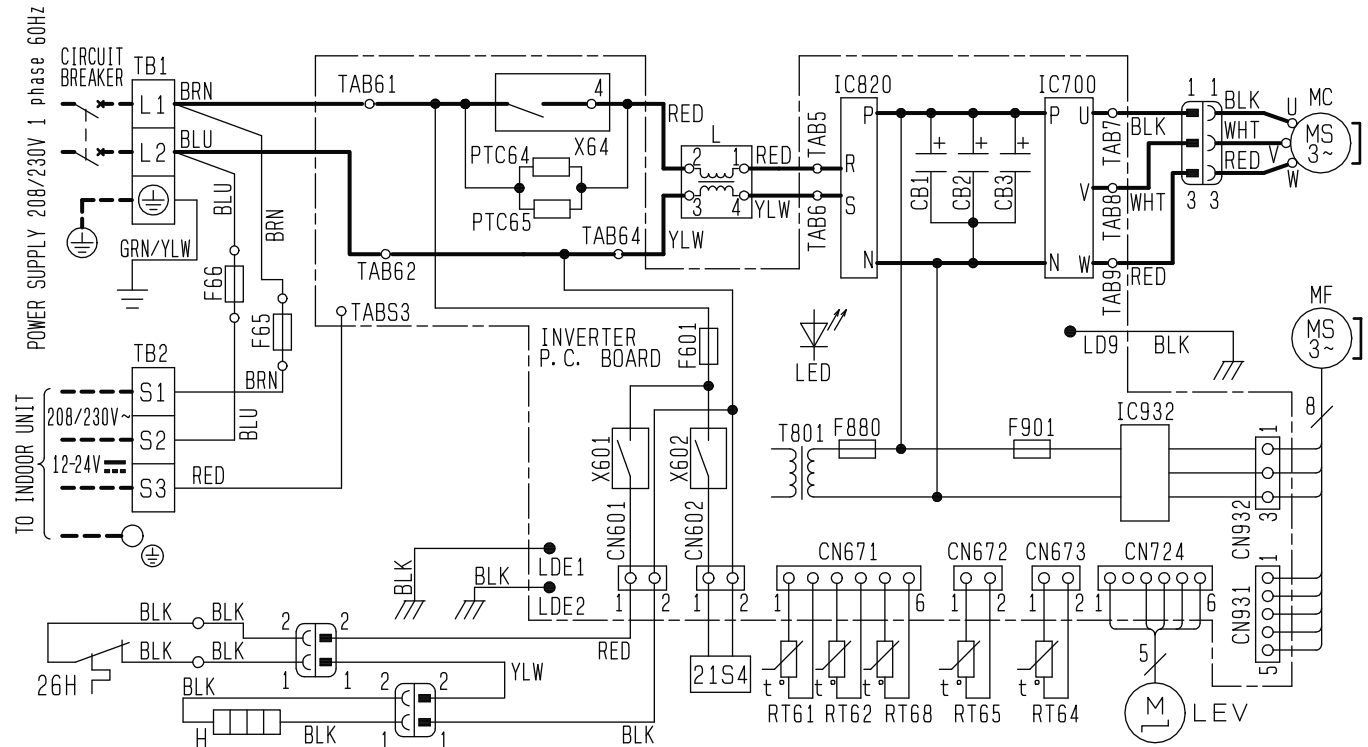
MUZ-FH15NA



SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC932	IGBT Module	PTC65	CIRCUIT PROTECTION	TB1, TB2	TERMINAL BLOCK
F65, F66	FUSE (T6. 3AL250V)	L	REACTOR	RT61	DEFROST THERMISTOR	T801	TRANSFORMER
F601	FUSE (T3. 15AL250V)	LED	LED	RT62	DISCHARGE TEMP. THERMISTOR	X601	RELAY
F880	FUSE (T3. 15AL250V)	LEV	EXPANSION VALVE COIL	RT64	FIN TEMP. THERMISTOR	X602	RELAY
F901	FUSE (T3. 15AL250V)	MC	COMPRESSOR	RT65	AMBIENT TEMP. THERMISTOR	X64	RELAY
IC700	IGBT Module	MF	FAN MOTOR	RT68	OUTDOOR HEAT EXCHANGER TEMP. THERMISTOR	21S4	REVERSING VALVE COIL
IC820	DIODE Module	PTC64	CIRCUIT PROTECTION				

NOTES 1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.
2. Use copper conductors only (for field wiring). 3. Symbols indicate, : Terminal block

MUZ-FH15NAH

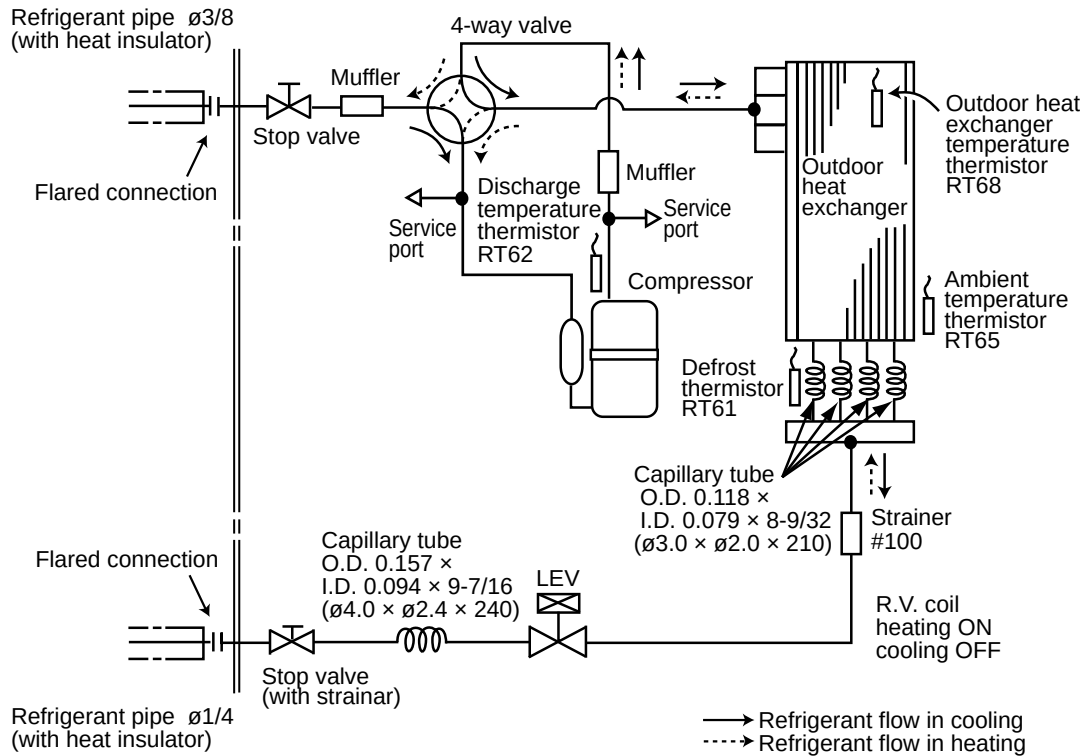


SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
CB1~3	SMOOTHING CAPACITOR	IC932	IGBT Module	RT61	DEFROST THERMISTOR	X601	RELAY
F65, F66	FUSE (T6. 3A 250V)	L	REACTOR	RT62	DISCHARGE TEMP. THERMISTOR	X602	RELAY
F601	FUSE (T3. 15A 250V)	LED	LED	RT64	FIN TEMP. THERMISTOR	X64	RELAY
F880	FUSE (T3. 15A 250V)	LEV	EXPANSION VALVE COIL	RT65	AMBIENT TEMP. THERMISTOR	21S4	REVERSING VALVE COIL
F901	FUSE (T3. 15A 250V)	MC	COMPRESSOR	RT68	OUTDOOR HEAT EXCHANGER TEMP. THERMISTOR		HEATER PROTECTOR
H	DEFROST HEATER	MF	FAN MOTOR	TB1, TB2	TERMINAL BLOCK		
IC700	IGBT Module	PTC64	CIRCUIT PROTECTION	T801	TRANSFORMER		
IC820	DIODE Module	PTC65	CIRCUIT PROTECTION				

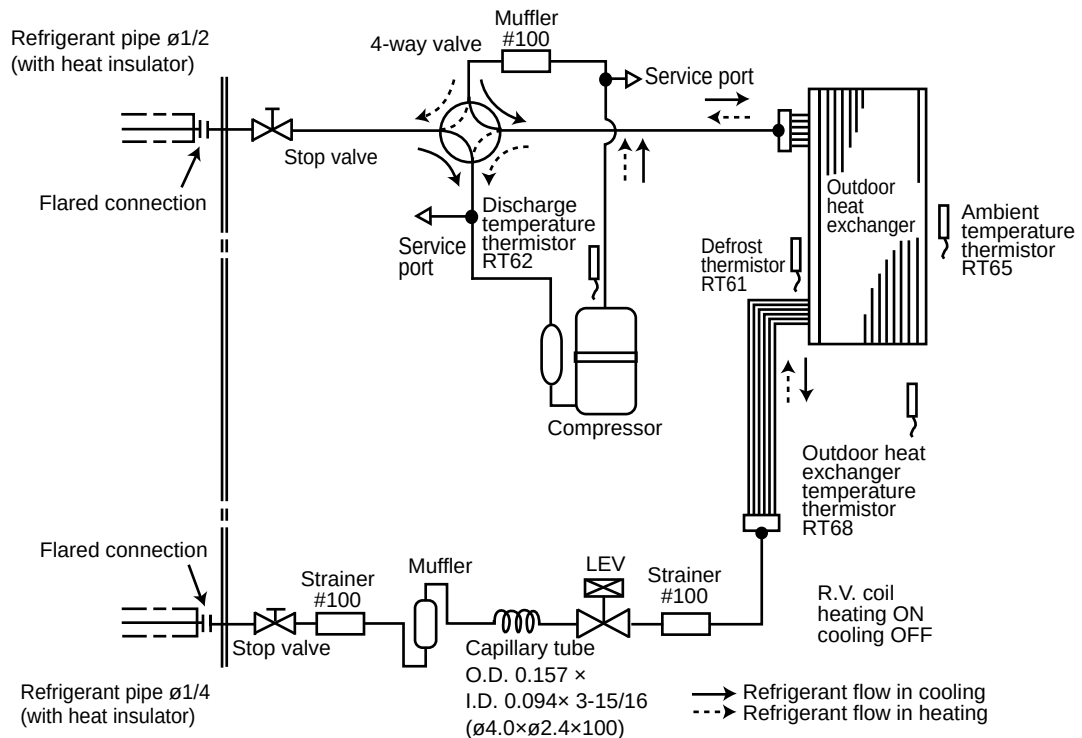
NOTES 1. About the indoor side electric wiring, refer to the indoor unit electric wiring diagram for servicing.
 2. Use copper conductors only (for field wiring). 3. Symbols indicate, : Terminal block

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH

Unit: inch

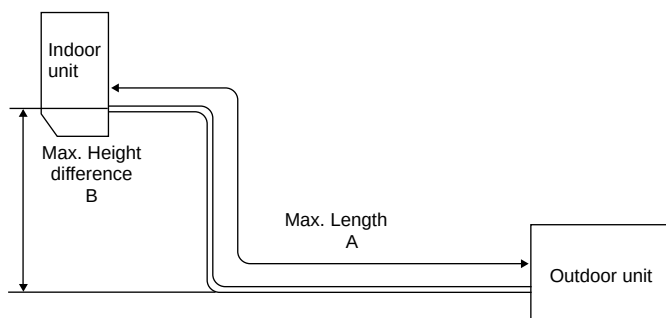


MUZ-FH15NA MUZ-FH15NAH



MAX. REFRIGERANT PIPING LENGTH and MAX. HEIGHT DIFFERENCE

Model	Refrigerant piping: ft.		Piping size O.D: in.	
	Max. Length A	Max. Height difference B	Gas	Liquid
MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH	65	40	3/8	1/4
MUZ-FH15NA MUZ-FH15NAH	100	50	1/2	1/4



ADDITIONAL REFRIGERANT CHARGE (R410A: oz.)

NOTE: Refrigerant piping exceeding 25 ft. requires additional refrigerant charge according to the calculation.

Model	Outdoor unit precharged	Refrigerant piping length (one way): ft.					
		25	30	40	50	60	65
MUZ-FH09NA MUZ-FH09NAH	2 lb. 9 oz.	0	1.08	3.24	5.40	7.56	8.64

Calculation: X oz. = 1.08/5 oz./ft. × (Refrigerant piping length (ft.) - 25)

NOTE: Refrigerant piping exceeding 25 ft. requires additional refrigerant charge according to the calculation.

Model	Outdoor unit precharged	Refrigerant piping length (one way): ft.					
		25	30	40	50	60	65
MUZ-FH12NA MUZ-FH12NAH	2 lb. 9 oz.	0	1.62	4.86	8.10	11.34	12.96

Calculation: X oz. = 1.62/5 oz./ft. × (Refrigerant piping length (ft.) - 25)

NOTE: Refrigerant piping exceeding 25 ft. requires additional refrigerant charge according to the calculation.

Model	Outdoor unit precharged	Refrigerant piping length (one way): ft.								
		25	30	40	50	60	70	80	90	100
MUZ-FH15NA MUZ-FH15NAH	3 lb. 7 oz.	0	1.08	3.24	5.40	7.56	9.72	11.88	14.04	16.20

Calculation: X oz. = 1.08/5 oz./ft. × (Refrigerant piping length (ft.) - 25)

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH MUZ-FH15NA MUZ-FH15NAH
7-1. PERFORMANCE DATA
1) COOLING CAPACITY

Model	Indoor air	Outdoor intake air DB temperature (°F)														
	IWB (°F)	75			85			95			105			115		
		TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC	TC	SHC	TPC
MUZ-FH09NA MUZ-FH09NAH	71	11.0	8.7	0.50	10.3	8.1	0.55	9.7	7.6	0.59	9.0	7.1	0.62	8.3	6.5	0.64
	67	10.4	9.6	0.47	9.7	8.9	0.52	9.0	8.3	0.56	8.4	7.7	0.59	7.7	7.1	0.62
	63	9.8	10.3	0.45	9.1	9.6	0.50	8.5	8.9	0.53	7.7	8.1	0.57	7.0	7.4	0.59
MUZ-FH12NA MUZ-FH12NAH	71	14.7	10.2	0.77	13.7	9.6	0.85	12.9	9.0	0.91	12.0	8.4	0.96	11.0	7.7	1.00
	67	13.9	11.6	0.73	13.0	10.8	0.80	12.0	10.0	0.87	11.2	9.3	0.92	10.3	8.5	0.97
	63	13.1	12.6	0.70	12.1	11.7	0.77	11.3	10.9	0.83	10.3	9.9	0.89	9.4	9.0	0.92
MUZ-FH15NA MUZ-FH15NAH	71	18.4	10.4	1.07	17.2	9.7	1.17	16.1	9.1	1.26	15.0	8.5	1.33	13.8	7.8	1.38
	67	17.4	12.2	1.01	16.2	11.3	1.11	15.0	10.5	1.20	14.0	9.8	1.27	12.8	9.0	1.33
	63	16.4	13.6	0.96	15.2	12.6	1.06	14.1	11.8	1.15	12.8	10.7	1.22	11.7	9.8	1.27

NOTE: 1. IWB : Intake air wet-bulb temperature TC : Total Capacity ($\times 10^3$ Btu/h)
 SHC : Sensible Heat Capacity ($\times 10^3$ Btu/h) TPC : Total Power Consumption (kW)
 2. SHC is based on 80°F of indoor Intake air DB temperature.

2) COOLING CAPACITY CORRECTIONS

Refrigerant piping length (one way: ft.)				
	25 (std.)	40	65	100
MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH	1.0	0.954	0.878	-
MUZ-FH15NA MUZ-FH15NAH	1.0	0.954	0.878	0.771

3) HEATING CAPACITY

Model	Indoor air IDB (°F)	Outdoor intake air WB temperature (°F)													
		5		15		25		35		43		45		55	
		TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC	TC	TPC
MUZ-FH09NA	75	4.8	0.42	6.3	0.53	7.9	0.62	9.4	0.69	10.6	0.73	11.0	0.74	12.4	0.77
	70	5.2	0.40	6.7	0.51	8.2	0.61	9.6	0.67	10.9	0.71	11.2	0.72	12.7	0.75
	65	5.5	0.38	6.9	0.49	8.6	0.59	10.0	0.66	11.2	0.69	11.6	0.70	13.0	0.74
MUZ-FH09NAH	75	4.8	0.55	6.3	0.66	7.9	0.75	9.4	0.69	10.6	0.73	11.0	0.74	12.4	0.77
	70	5.2	0.53	6.7	0.64	8.2	0.74	9.6	0.67	10.9	0.71	11.2	0.72	12.7	0.75
	65	5.5	0.51	6.9	0.62	8.6	0.72	10.0	0.66	11.2	0.69	11.6	0.70	13.0	0.74
MUZ-FH12NA	75	6.0	0.56	7.9	0.71	9.9	0.83	11.8	0.93	13.3	0.97	13.7	0.99	15.5	1.03
	70	6.5	0.54	8.4	0.68	10.2	0.81	12.0	0.90	13.6	0.95	14.0	0.97	15.8	1.01
	65	6.8	0.51	8.6	0.66	10.7	0.78	12.4	0.88	14.0	0.93	14.4	0.94	16.2	0.99
MUZ-FH12NAH	75	6.0	0.69	7.9	0.84	9.9	0.96	11.8	0.93	13.3	0.97	13.7	0.99	15.5	1.03
	70	6.5	0.67	8.4	0.81	10.2	0.94	12.0	0.90	13.6	0.95	14.0	0.97	15.8	1.01
	65	6.8	0.64	8.6	0.79	10.7	0.91	12.4	0.88	14.0	0.93	14.4	0.94	16.2	0.99
MUZ-FH15NA	75	7.9	0.77	10.4	0.97	13.1	1.14	15.6	1.27	17.6	1.33	18.1	1.35	20.5	1.40
	70	8.6	0.73	11.1	0.94	13.5	1.11	15.9	1.24	18.0	1.30	18.5	1.33	21.0	1.38
	65	9.0	0.70	11.3	0.90	14.1	1.07	16.5	1.20	18.5	1.27	19.1	1.29	21.4	1.35
MUZ-FH15NAH	75	7.9	0.90	10.4	1.10	13.1	1.27	15.6	1.27	17.6	1.33	18.1	1.35	20.5	1.40
	70	8.6	0.86	11.1	1.07	13.5	1.24	15.9	1.24	18.0	1.30	18.5	1.33	21.0	1.38
	65	9.0	0.83	11.3	1.03	14.1	1.20	16.5	1.20	18.5	1.27	19.1	1.29	21.4	1.35

NOTE: 1. IDB : Intake air dry-bulb temperature

TC : Total Capacity (x10³ Btu/h)

TPC : Total Power Consumption (kW)

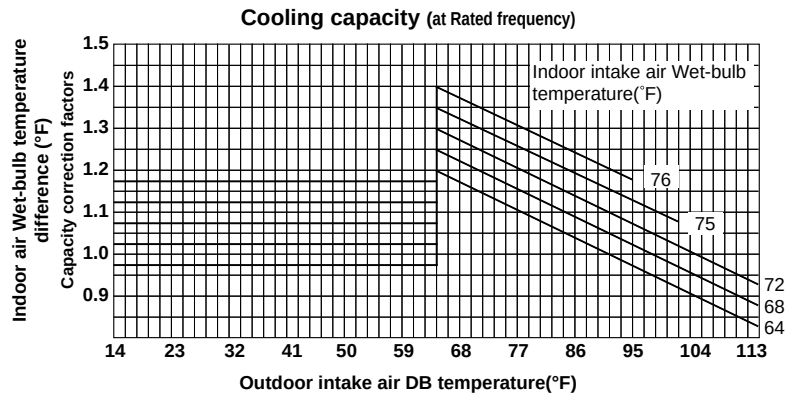
2. Above data is for heating operation without any frost.

How to operate with fixed operational frequency of the compressor.

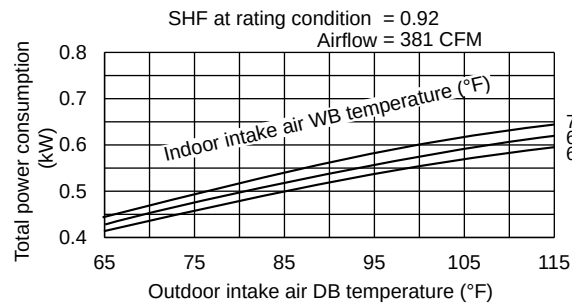
1. Press the EMERGENCY OPERATION switch on the front of the indoor unit, and select either EMERGENCY COOL mode or EMERGENCY HEAT mode before starting to operate the air conditioner.
2. The compressor starts with operational frequency.
3. The fan speed of the indoor unit is High.
4. This operation continues for 30 minutes.
5. In order to release this operation, press the EMERGENCY OPERATION switch twice or once, or press any button on the remote controller.

7-2. PERFORMANCE CURVE

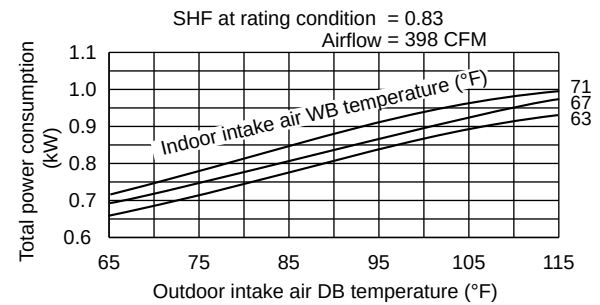
Cooling



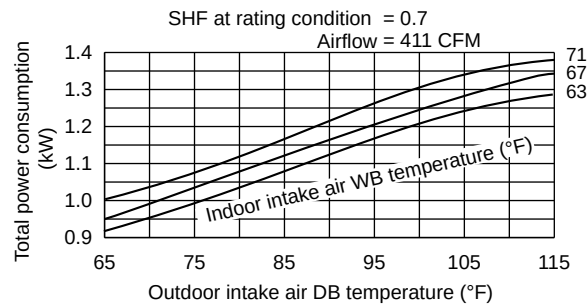
MUZ-FH09NA MUZ-FH09NAH



MUZ-FH12NA MUZ-FH12NAH

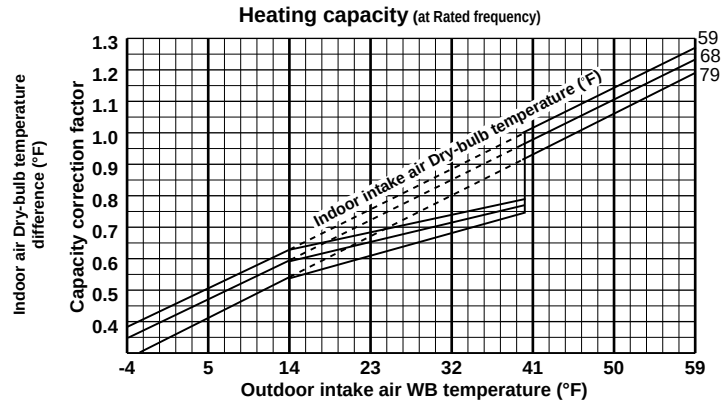


MUZ-FH15NA MUZ-FH15NAH

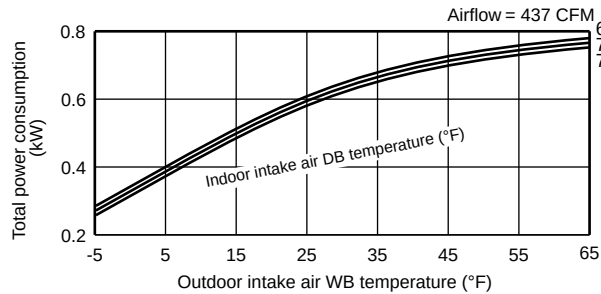


This value of frequency is not the same as the actual frequency in operating. Refer to 7-5 and 7-6 for the relationships between frequency and capacity.

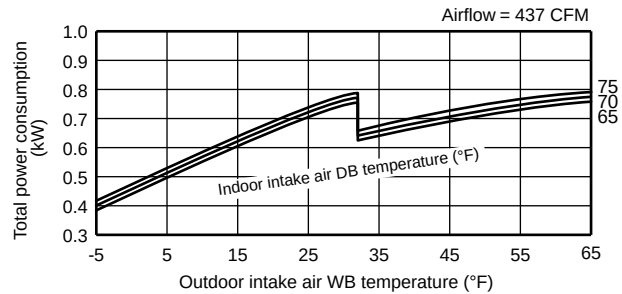
Heating



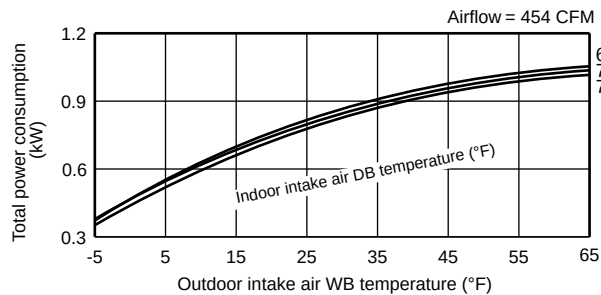
MUZ-FH09NA



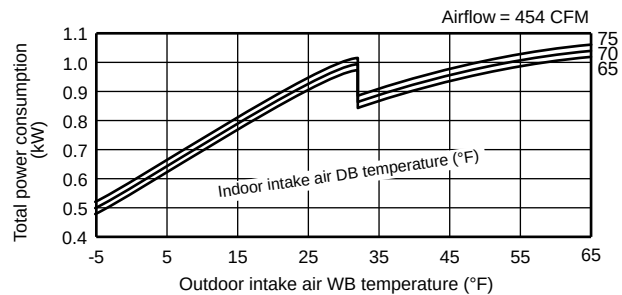
MUZ-FH09NAH



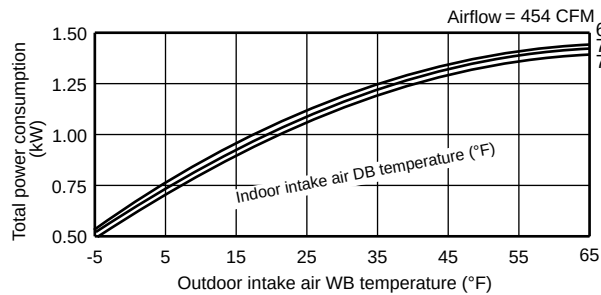
MUZ-FH12NA



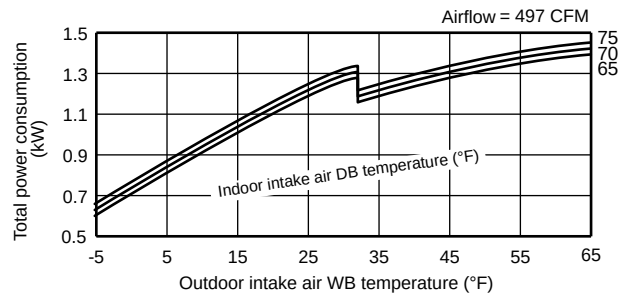
MUZ-FH12NAH



MUZ-FH15NA



MUZ-FH15NAH



This value of frequency is not the same as the actual frequency in operating. Refer to 7-5 and 7-6 for the relationships between frequency and capacity.

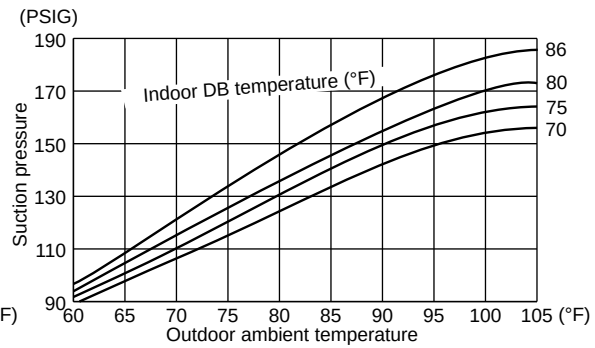
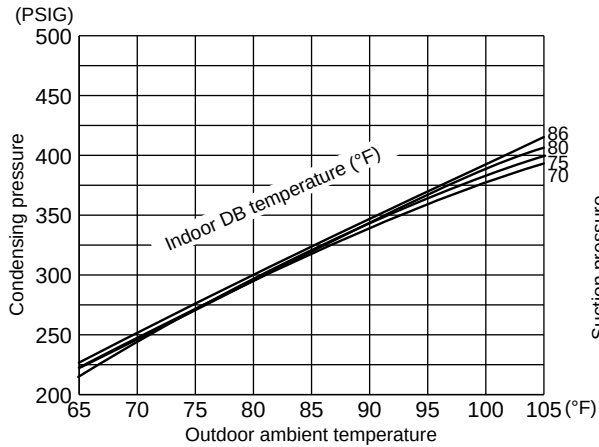
7-3. CONDENSING PRESSURE

Cooling

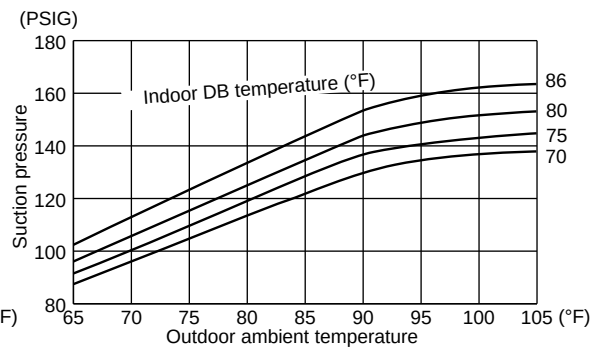
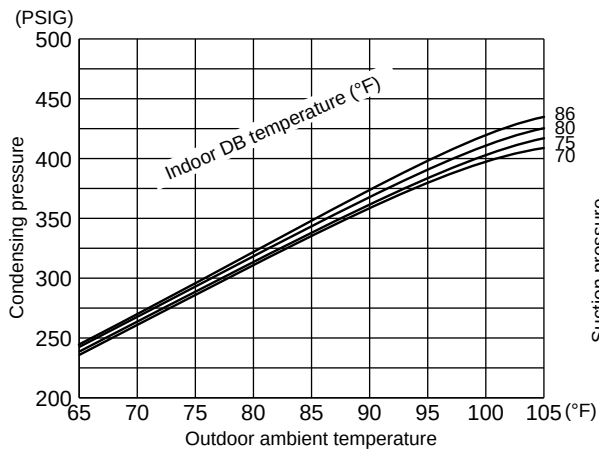
Data are based on the condition of indoor humidity 50 %.

Air flow should be set to High speed.

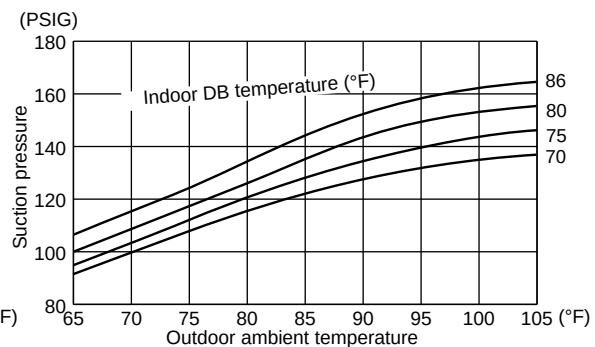
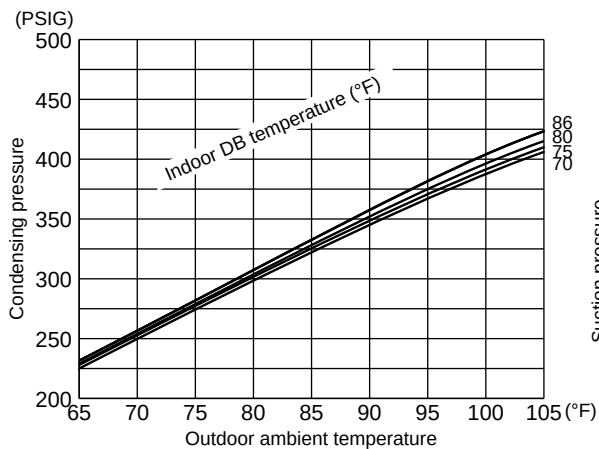
MUZ-FH09NA MUZ-FH09NAH



MUZ-FH12NA MUZ-FH12NAH



MUZ-FH15NA MUZ-FH15NAH



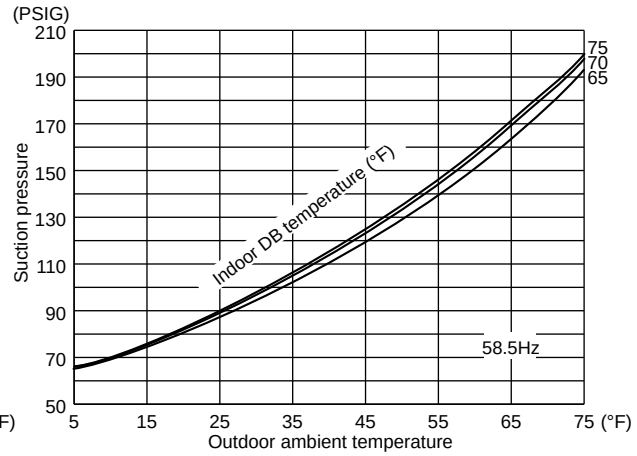
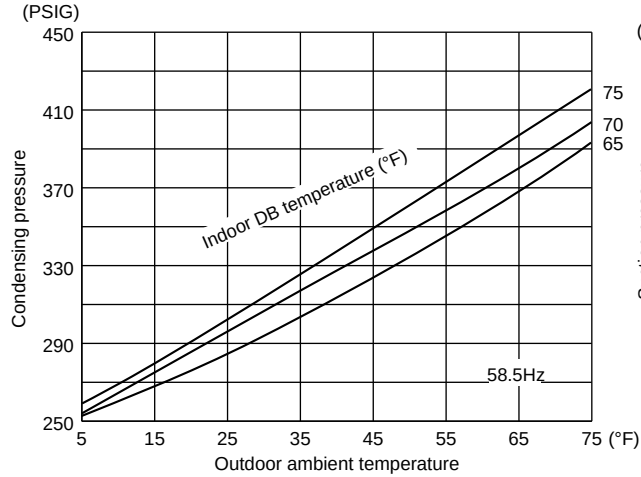
Heating

Data are based on the condition of outdoor humidity 75%.

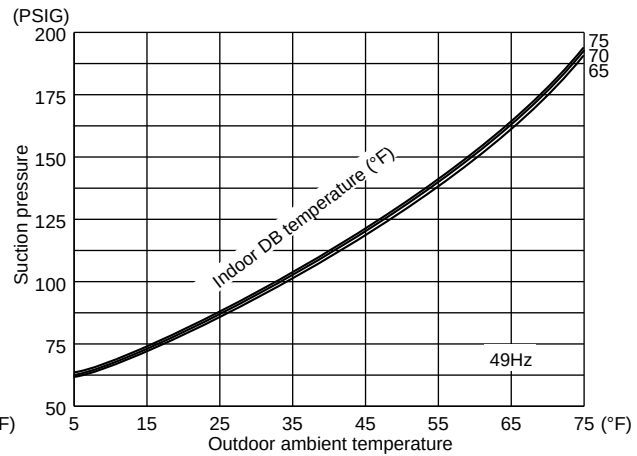
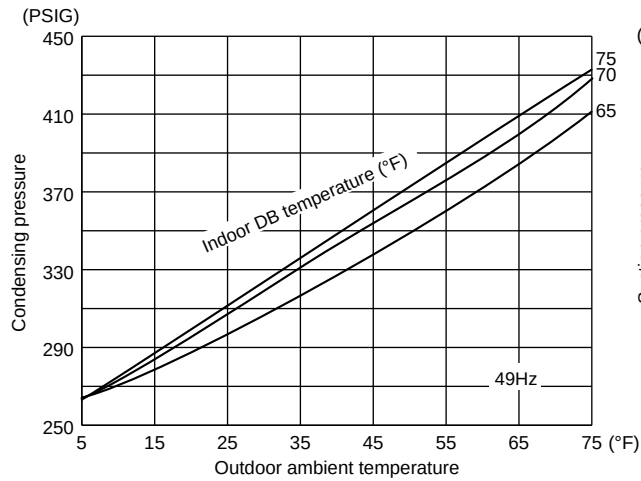
Air flow should be set to High speed.

Data are for heating operation without any frost.

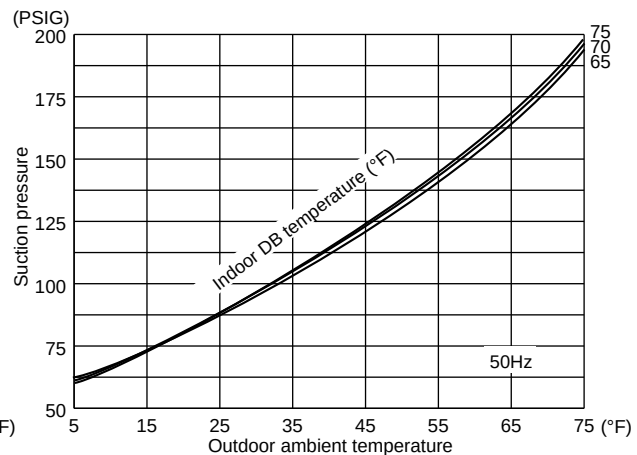
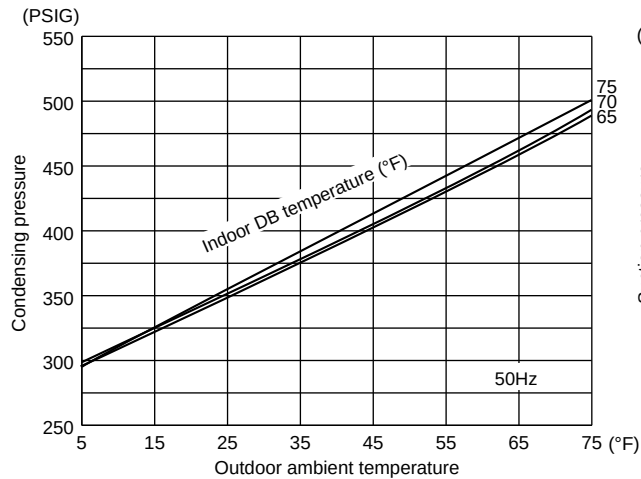
MUZ-FH09NA MUZ-FH09NAH



MUZ-FH12NA MUZ-FH12NAH



MUZ-FH15NA MUZ-FH15NAH

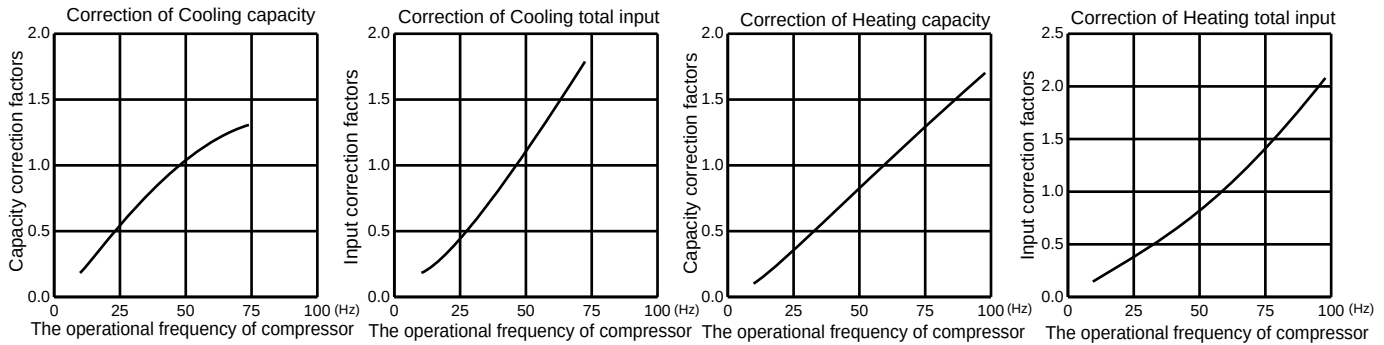


7-4. STANDARD OPERATION DATA

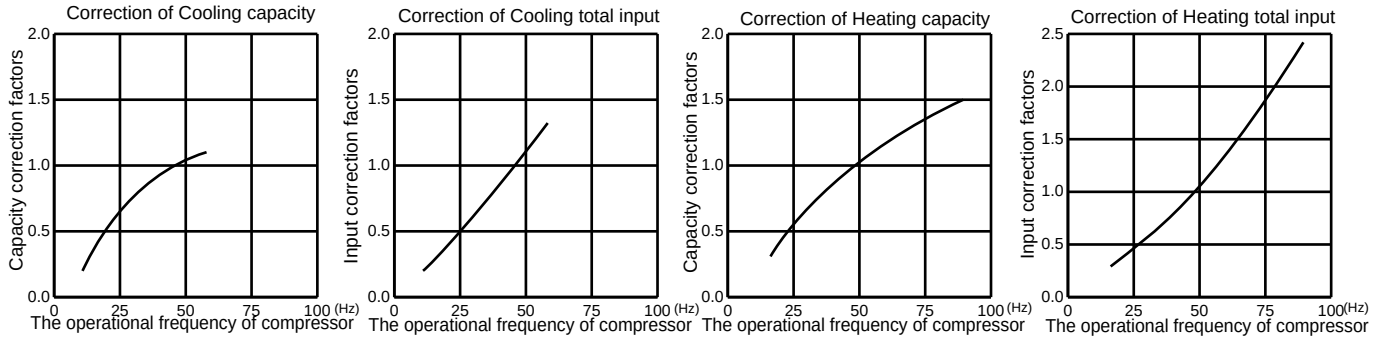
Model				MSZ-FH09NA		MSZ-FH12NA		MSZ-FH15NA		
Item			Unit	Cooling	Heating	Cooling	Heating	Cooling	Heating	
Total	Capacity		Btu/h	9,000	10,900	12,000	13,600	15,000	18,000	
	SHF		—	0.92	—	0.83	—	0.70	—	
	Input		kW	0.560	0.710	0.870	0.950	1.200	1.300	
	Rated frequency		Hz	47	58.5	46	49	50.5	50	
Electrical circuit	Indoor unit			MSZ-FH09NA		MSZ-FH12NA		MSZ-FH15NA		
	Power supply		V, phase, Hz	208/230, 1, 60						
	Input		kW	0.029		0.029		0.031		
	Fan motor current		A	0.30/0.27		0.30/0.27		0.31/0.28		
	Outdoor unit			MUZ-FH09NA MUZ-FH09NAH		MUZ-FH12NA MUZ-FH12NAH		MUZ-FH15NA MUZ-FH15NAH		
	Power supply		V, phase, Hz	208/230, 1, 60						
	Input		kW	0.531	0.681	0.841	0.921	1.169	1.269	
	Comp. current		A	2.32/2.10	3.01/2.72	3.60/3.26	4.06/3.67	4.46/4.03	4.87/4.40	
	Fan motor current		A	0.36/0.33	0.34/0.31	0.41/0.37	0.40/0.36	1.21/1.09	1.24/1.12	
	Refrigerant circuit	Condensing pressure		PSIG	352	323	374	340	361	391
Suction pressure		PSIG	153	110	135	106	131	108		
Discharge temperature		°F	148	145	156	148	152	170		
Condensing temperature		°F	107	101	112	105	109	115		
Suction temperature		°F	64	41	56	36	52	45		
Comp. shell bottom temperature		°F	129	125	137	128	135	147		
Ref. pipe length		ft.	25							
Refrigerant charge (R410A)			2 lb. 9 oz.				3 lb 7 oz.			
Indoor unit	Intake air temperature		DB	°F	80	70	80	70	80	70
			WB	°F	67	60	67	60	67	60
	Discharge air temperature		DB	°F	58	99	56	101	52	111
			WB	°F	55	—	54	—	51	—
	Fan speed (High)		rpm	1,150	1,280	1,190	1,320	1,220	1,420	
	Airflow (High)		CFM	381 (Wet)	437	398 (Wet)	454	411 (Wet)	497	
Outdoor unit	Intake air temperature		DB	°F	95	47	95	47	95	47
			WB	°F	—	43	—	43	—	43
	Fan speed		rpm	810	900	810	900	840	810	
	Airflow		CFM	1,074	1,202	1,074	1,202	1,692	1,634	

7-5. CAPACITY AND INPUT CORRECTION BY INVERTER OUTPUT FREQUENCY

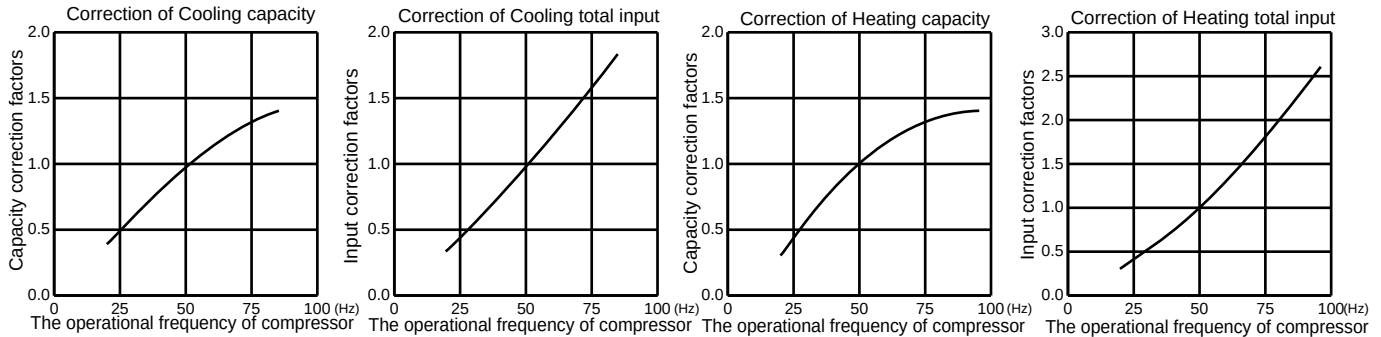
MUZ-FH09NA MUZ-FH09NAH



MUZ-FH12NA MUZ-FH12NAH



MUZ-FH15NA MUZ-FH15NAH



7-6. HOW TO OPERATE FIXED-FREQUENCY OPERATION (Test run operation)

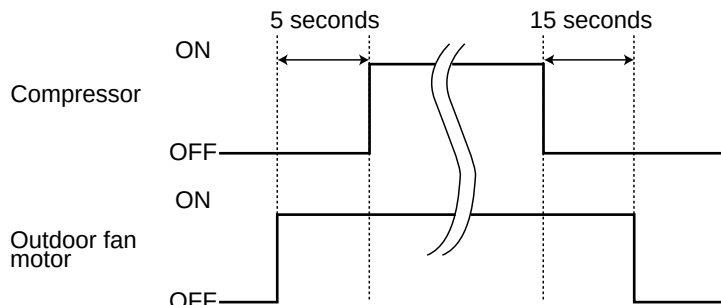
1. Press EMERGENCY OPERATION switch to start COOL or HEAT mode (COOL: Press once, HEAT: Press twice).
2. Test run operation starts and continues to operate for 30 minutes.
3. Compressor operates at rated frequency in COOL mode or 58 Hz in HEAT mode.
4. Indoor fan operates at High speed.
5. After 30 minutes, test run operation finishes and EMERGENCY OPERATION starts (operation frequency of compressor varies).
6. To cancel test run operation (EMERGENCY OPERATION), press EMERGENCY OPERATION switch or any button on remote controller.

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH MUZ-FH15NA MUZ-FH15NAH
8-1. OUTDOOR FAN MOTOR CONTROL

The fan motor turns ON/OFF, interlocking with the compressor.

[ON] The fan motor turns ON 5 seconds before the compressor starts up.

[OFF] The fan motor turns OFF 15 seconds after the compressor has stopped running.

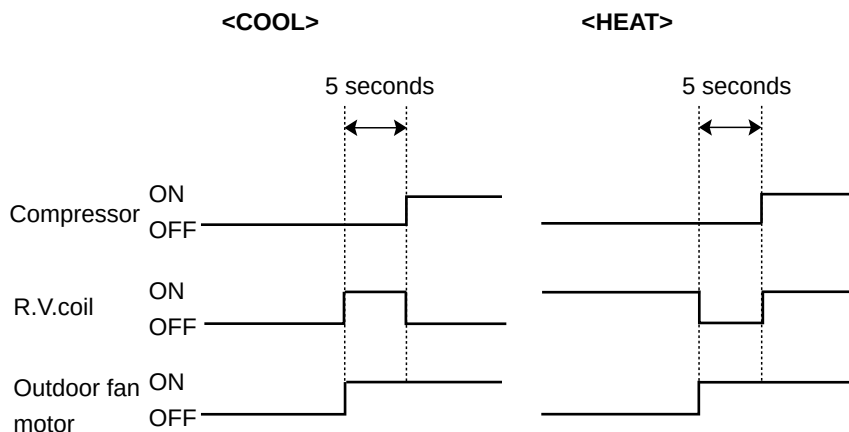

8-2. R.V. COIL CONTROL

Heating ON

Cooling OFF

Dry OFF

NOTE: The 4-way valve reverses for 5 seconds right before start-up of the compressor.


8-3. RELATION BETWEEN MAIN SENSOR AND ACTUATOR

Sensor	Purpose	Actuator					
		Compressor	LEV	Outdoor fan motor	R.V.coil	Indoor fan motor	Defrost heater *
Discharge temperature thermistor	Protection	○	○				
Indoor coil temperature thermistor	Cooling: Coil frost prevention	○					
	Heating: High pressure protection	○	○				
Defrost thermistor	Heating: Defrosting	○	○	○	○	○	
Fin temperature thermistor	Protection	○		○			
Ambient temperature thermistor	Cooling: Low ambient temperature operation	○	○	○			
	Heating: Defrosting (Heater)						○
Outdoor heat exchanger temperature thermistor	Cooling: Low ambient temperature operation	○	○	○			
	Cooling: High pressure protection	○	○	○			

*. MUZ-FH•NAH only.

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH MUZ-FH15NA MUZ-FH15NAH**9-1. CHANGE IN DEFROST SETTING****Changing defrost finish temperature**

<JS> To change the defrost finish temperature, cut/solder the JS wire of the outdoor inverter P.C. board (Refer to 10-6.1.).

Jumper		Defrost finish temperature	
		MUZ-FH09/12NA MUZ-FH09/12NAH	MUZ-FH15NA MUZ-FH15NAH
JS	Soldered (Initial setting)	41°F (5°C)	50°F (10°C)
	None (Cut)	50°F (10°C)	64°F (18°C)

9-2. PRE-HEAT CONTROL SETTING**MUZ-FH09/12**

When moisture gets into the refrigerant cycle, it may interfere the start-up of the compressor at low outside temperature. The pre-heat control prevents this interference. The pre-heat control turns ON when the discharge temperature thermistor is 68°F (20°C) or below. When the pre-heat control turns ON, the compressor is energized. (About 50 W)

MUZ-FH15

Prolonged low load operation, in which the thermostat is OFF for a long time, at low outside temperature [32°F (0°C) or less] may cause the following troubles. To prevent those troubles, activate the pre-heat control.

- 1) If moisture gets into the refrigerant cycle and freezes, it may interfere the start-up of the compressor.
- 2) If liquid refrigerant collects in the compressor, a failure in the compressor may occur.

The pre-heat control turns ON when the compressor temperature is 68°F (20°C) or below. When the pre-heat control turns ON, the compressor is energized. (About 70 W)

Pre-heat control setting

<JK>

ON: To activate the pre-heat control, cut JK wire of the inverter P.C. board.

OFF: To deactivate the pre-heat control, solder JK wire of the inverter P.C. board.
(Refer to 10-6.1)

NOTE: When the inverter P.C. board is replaced, check the jumper wires, and cut/solder them if necessary.

MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH MUZ-FH15NA MUZ-FH15NAH

10-1. CAUTIONS ON TROUBLESHOOTING

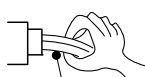
1. Before troubleshooting, check the following

- 1) Check the power supply voltage.
- 2) Check the indoor/outdoor connecting wire for miswiring.

2. Take care of the following during servicing

- 1) Before servicing the air conditioner, be sure to turn OFF the main unit first with the remote controller, then after confirming the horizontal vane is closed, turn off the breaker and/or disconnect the power plug.
- 2) Be sure to turn OFF the power supply before removing the front panel, the cabinet, the top panel, and the electronic control P.C. board.
- 3) When removing the electrical parts, be careful of the residual voltage of smoothing capacitor.
- 4) When removing the electronic control P.C. board, hold the edge of the board with care NOT to apply stress on the components.
- 5) When connecting or disconnecting the connectors, hold the housing of the connector. DO NOT pull the lead wires.

<Incorrect>



Lead wiring

<Correct>



Housing point

3. Troubleshooting procedure

- 1) Check if the OPERATION INDICATOR lamp on the indoor unit is flashing on and off to indicate an abnormality. To make sure, check how many times the OPERATION INDICATOR lamp is flashing on and off before starting service work.
- 2) Before servicing, check that the connector and terminal are connected properly.
- 3) When the electronic control P.C. board seems to be defective, check the copper foil pattern for disconnection and the components for bursting and discoloration.
- 4) Refer to 10-2 and 10-3.

10-2. FAILURE MODE RECALL FUNCTION

Outline of the function

This air conditioner can memorize the abnormal condition which has occurred once.

Even though LED indication listed on the troubleshooting check table (10-3.) disappears, the memorized failure details can be recalled.

1. Flow chart of failure mode recall function for the indoor/outdoor unit

Operational procedure

The cause of abnormality cannot be found because the abnormality does not recur.

Setting up the failure mode recall function

Turn ON the power supply.
<Preparation of the remote controller>
① While pressing OPERATION SELECT button and TEMP $\oplus$ button on the remote controller at the same time, press RESET button.
② First, release RESET button.
Hold down the other two buttons for another 3 seconds. Make sure that the indicators on the LCD screen shown in the right figure are all displayed. Then release the buttons.

Press OPERATE/STOP (ON/OFF) button of the remote controller (the set temperature is displayed) with the remote controller headed towards the indoor unit. ※1

※1. Regardless of normal or abnormal condition, a short beep is emitted once the signal is received.

Does the left lamp of the OPERATION INDICATOR lamp on the indoor unit blink at the interval of 0.5 seconds?
Blinks: Either indoor or outdoor unit is abnormal. Beep is emitted at the same timing as the blinking of the left lamp of the OPERATION INDICATOR lamp. ※2

No (OFF)

Indoor unit is normal.
But the outdoor unit might be abnormal because there are some abnormalities that can not be recalled with this way.
Check if outdoor unit is abnormal according to the detailed outdoor unit failure mode recall function. (Refer to 10-2.2)

Judgment of indoor/outdoor abnormality

Yes (Blinks)

Before blinking, does the left lamp of the OPERATION INDICATOR lamp stay ON for 3 seconds?
Stays ON for 3 seconds (without beep): The outdoor unit is abnormal.

Yes

No

The indoor unit is abnormal.
Check the blinking pattern, and identify the abnormal point by referring to the indoor unit failure mode table. (Refer to indoor unit service manual.)
Make sure to check at least two consecutive blinking cycles. ※2

The outdoor unit is abnormal.
Check the blinking pattern, and identify the abnormal point by referring to the outdoor unit failure mode table. (Refer to 10-2.3)
Make sure to check at least two consecutive blinking cycles. ※3

Releasing the failure mode recall function

Release the failure mode recall function by the following procedures.
Turn OFF the power supply and turn it ON again.
Press RESET button of the remote controller.

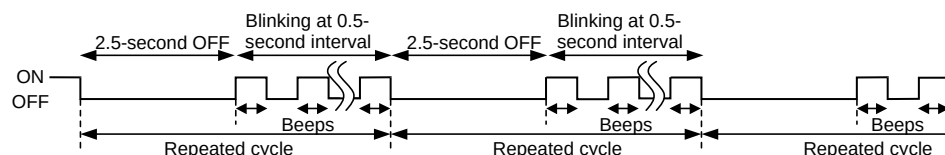
Repair the failure parts.

Deleting the memorized abnormal condition

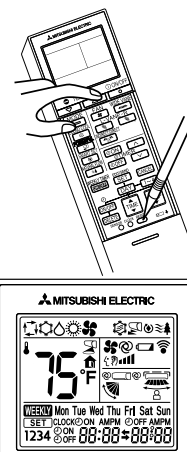
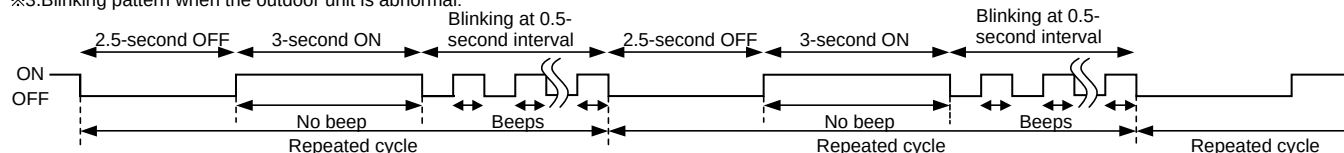
① After repairing the unit, recall the failure mode again according to "Setting up the failure mode recall function" mentioned above.
② Press OPERATE/STOP (ON/OFF) button of the remote controller (the set temperature is displayed) with the remote controller headed towards the indoor unit.
③ Press EMERGENCY OPERATION switch so that the memorized abnormal condition is deleted.
④ Release the failure mode recall function according to "Releasing the failure mode recall function" mentioned above.

NOTE: 1. Make sure to release the failure mode recall function after it is set up, otherwise the unit cannot operate properly.
2. If the abnormal condition is not deleted from the memory, the last abnormal condition is kept memorized.

※2. Blinking pattern when the indoor unit is abnormal:

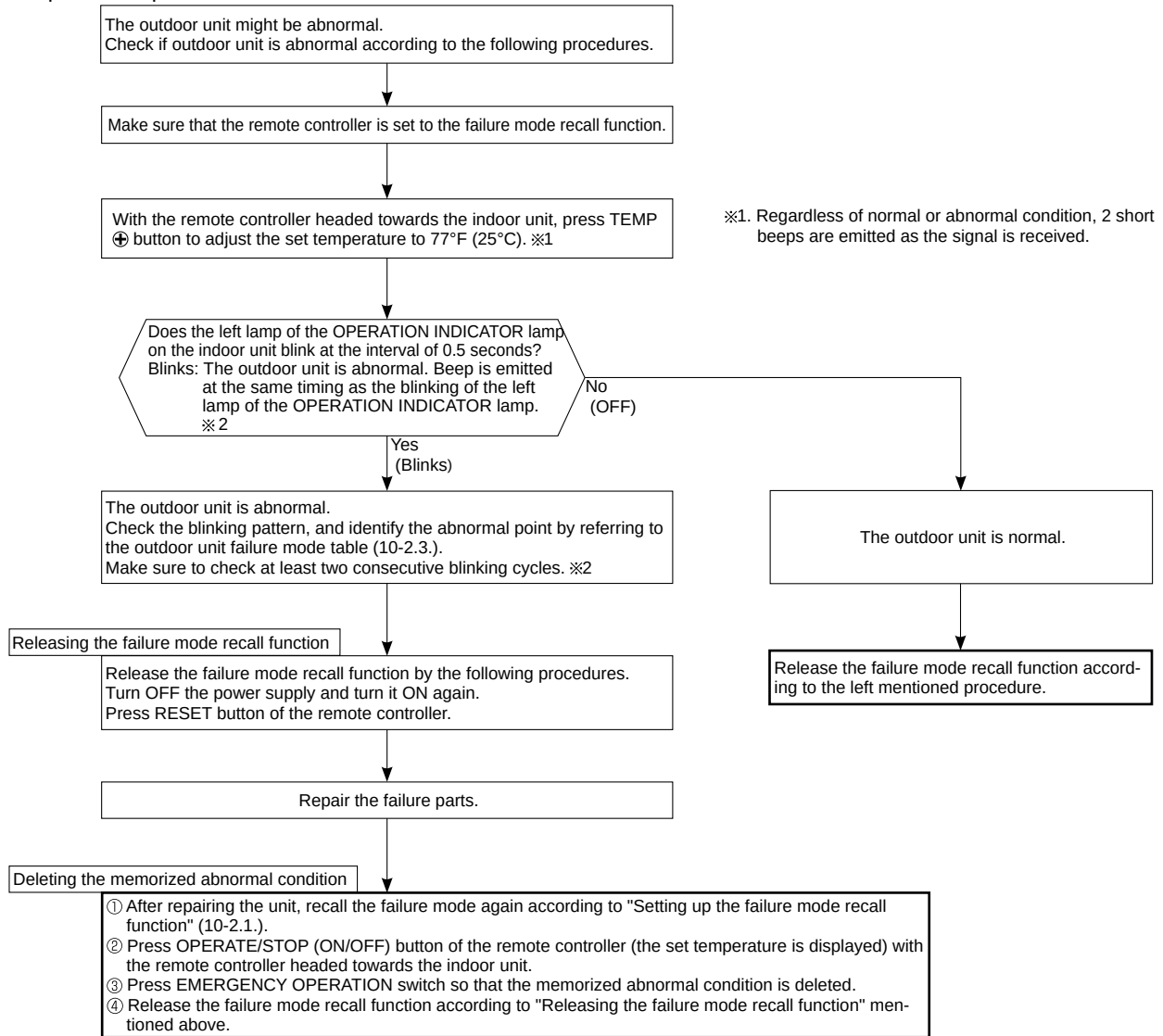


※3. Blinking pattern when the outdoor unit is abnormal:



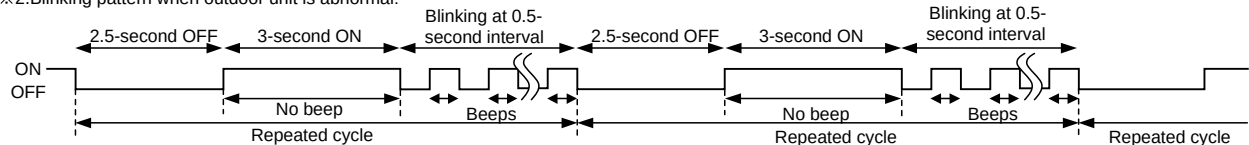
2. Flow chart of the detailed outdoor unit failure mode recall function

Operational procedure



NOTE: 1. Make sure to release the failure mode recall function after it is set up, otherwise the unit cannot operate properly.
2. If the abnormal condition is not deleted from the memory, the last abnormal condition is kept memorized.

※2. Blinking pattern when outdoor unit is abnormal:



--

3. Outdoor unit failure mode table

The left lamp of the OPERATION INDICATOR lamp (Indoor unit)	Abnormal point (Failure mode/protection)	LED indication (Outdoor P.C. board)	Condition	Remedy	Indoor/outdoor unit failure mode recall function	Outdoor unit failure mode recall function
OFF	None (Normal)	—	—	—	—	—
1-time flash 2.5 seconds OFF	Indoor/outdoor communication, receiving error	—	Any signals from the inverter P.C. board cannot be received normally for 3 minutes.	•Refer to 10-5. ⑩ How to check miswiring and serial signal error.	○	○
	Indoor/outdoor communication, receiving error	—	Although the inverter P.C. board sends signal "0", signal "1" has been received 30 consecutive times.	•Refer to 10-5. ⑩ How to check miswiring and serial signal error.		
2-time flash 2.5 seconds OFF	Outdoor power system	—	Overcurrent protection cut-out operates 3 consecutive times within 1 minute after the compressor gets started.	•Reconnect connectors. •Refer to 10-5. ④ "How to check inverter/compressor". •Check stop valve.	○	○
3-time flash 2.5 seconds OFF	Discharge temperature thermistor	1-time flash every 2.5 seconds	Thermistor shorts or opens during compressor running.	•Refer to 10-5. ⑥ "Check of outdoor thermistors". Defective outdoor thermistors can be identified by checking the blinking pattern of LED.	○	○
	Defrost thermistor					
	Fin temperature thermistor	3-time flash 2.5 seconds OFF				
	P.C. board temperature thermistor	4-time flash 2.5 seconds OFF				
	Ambient temperature thermistor	2-time flash 2.5 seconds OFF				
	Outdoor heat exchanger temperature thermistor	—				
4-time flash 2.5 seconds OFF	Overcurrent	11-time flash 2.5 seconds OFF	Large current flows into the power module (IC700) (FH09/12)/ IGBT module (IC700) (FH15).	•Reconnect compressor connector. •Refer to 10-5. ④ "How to check inverter/compressor". •Check stop valve.	—	○
	Compressor synchronous abnormality (Compressor start-up failure protection)	12-time flash 2.5 seconds OFF	Waveform of compressor current is distorted.	•Reconnect compressor connector. •Refer to 10-5. ④ "How to check inverter/compressor".	—	○
5-time flash 2.5 seconds OFF	Discharge temperature	—	Temperature of discharge temperature thermistor exceeds 241°F (116°C), compressor stops. Compressor can restart if discharge temperature thermistor reads 212°F (100°C) or less 3 minutes later.	•Check refrigerant circuit and refrigerant amount. •Refer to 10-5. ⑧ "Check of LEV".	—	○
6-time flash 2.5 seconds OFF	High pressure	—	Temperature indoor coil thermistor exceeds 158°F (70°C) in HEAT mode. Temperature defrost thermistor exceeds 158°F (70°C) in COOL mode.	•Check refrigerant circuit and refrigerant amount. •Check stop valve.	—	○
7-time flash 2.5 seconds OFF	Fin temperature/ P.C. board temperature	7-time flash 2.5 seconds OFF	Temperature of the fin temperature thermistor on the inverter P.C. board exceeds 167 ~ 187°F (75 ~ 86°C) (FH09/12)/167 ~ 176°F (75 ~ 80°C) (FH15), or temperature of P.C. board temperature thermistor on the inverter P.C. board exceeds 162 ~ 185°F (72 ~ 85°C) (FH09/12)/158 ~ 167°F (70 ~ 75 °C) (FH15).	•Check around outdoor unit. •Check outdoor unit air passage. •Refer to 10-5. ① "Check of outdoor fan motor".	—	○
8-time flash 2.5 seconds OFF	Outdoor fan motor	—	Outdoor fan has stopped 3 times in a row within 30 seconds after outdoor fan start-up.	•Refer to 10-5. ① "Check of outdoor fan motor". Refer to 10-5. ① "Check of inverter P.C. board".	—	○
9-time flash 2.5 seconds OFF	Nonvolatile memory data	5-time flash 2.5 seconds OFF	Nonvolatile memory data cannot be read properly.	•Replace the inverter P.C. board.	○	○
	Power module (IC700) (FH09/12) IGBT module (IC700) (FH15)	6-time flash 2.5 seconds OFF	The interface short circuit occurs in the output of the power module (IC700) (FH09/12)/IGBT module (IC700) (FH15). The compressor winding shorts circuit.	•Refer to 10-5. ⑥ "How to check inverter/compressor".		

NOTE: Blinking patterns of this mode differ from the ones of TROUBLESHOOTING CHECK TABLE (10-3.).



The left lamp of the OPERATION INDICATOR lamp (Indoor unit)	Abnormal point (Failure mode/protection)	LED indication (Outdoor P.C. board)	Condition	Remedy	Indoor/outdoor unit failure mode recall function	Outdoor unit failure mode recall function
10-time flash 2.5 seconds OFF	Discharge temperature	—	Temperature of discharge temperature thermistor has been 122°F (50°C) or less for 20 minutes.	•Refer to 10-5.Ⓒ"Check of LEV". •Check refrigerant circuit and refrigerant amount.	—	○
11-time flash 2.5 seconds OFF	DC voltage	8-time flash 2.5 seconds OFF	DC voltage of inverter cannot be detected normally.	•Refer to 10-5.Ⓐ"How to check inverter/compressor".	—	○
	Each phase current of compressor	9-time flash 2.5 seconds OFF	Each phase current of compressor cannot be detected normally.			
14-time flash or more 2.5 seconds OFF	Stop valve (Closed valve)	14-time flash 2.5 seconds OFF	Closed valve is detected by compressor current.	•Check stop valve.	○	○
	4-way valve/ Pipe temperature	16-time flash 2.5 seconds OFF	The 4-way valve does not work properly. The indoor coil thermistor detects an abnormal temperature.	•Check the 4-way valve. •Replace the inverter P.C. board.		
	Outdoor refrigerant system abnormality	17-time flash 2.5 seconds OFF	A closed valve and air trapped in the refrigerant circuit are detected based on the temperature sensed by the indoor and outdoor thermistors and the current of the compressor.	•Check for a gas leak in a connecting piping etc. •Check the stop valve. •Refer to 10-5. Ⓓ "Check of outdoor refrigerant circuit".	○	○

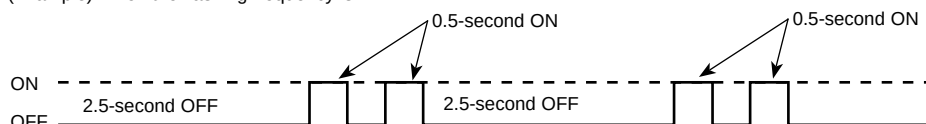
NOTE: Blinking patterns of this mode differ from the ones of TROUBLESHOOTING CHECK TABLE (10-3.).

10-3. TROUBLESHOOTING CHECK TABLE

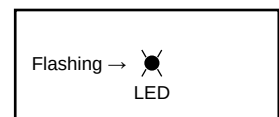
No.	Symptom	LED indication	Abnormal point/ Condition	Condition	Remedy
1	Outdoor unit does not operate.	1-time flash every 2.5 seconds	Outdoor power system	Overcurrent protection cut-out operates 3 consecutive times within 1 minute after the compressor gets started.	•Reconnect connector of compressor. •Refer to 10-5.④ "How to check inverter/compressor". •Check stop valve.
2			Outdoor thermistors	Discharge temperature thermistor, fin temperature thermistor, defrost thermistor, P.C. board temperature thermistor, outdoor heat exchanger temperature thermistor or ambient temperature thermistor shorts or opens during compressor running.	•Refer to 10-5.⑤ "Check of outdoor thermistors".
3			Outdoor control system	Nonvolatile memory data cannot be read properly. (The left lamp of the OPERATION INDICATOR lamp on the indoor unit lights up or flashes 7-time.)	•Replace inverter P.C. board.
4		6-time flash 2.5 seconds OFF	Serial signal	The communication fails between the indoor and outdoor unit for 3 minutes.	•Check connection between the inverter P.C. board and the relay P.C. board. (FH15) •Refer to 10-5.⑥ "How to check miswiring and serial signal error."
5		11-time flash 2.5 seconds OFF	Stop valve/ Closed valve	Closed valve is detected by compressor current.	•Check stop valve.
6		14-time flash 2.5 seconds OFF	Outdoor unit (Other abnormality)	Outdoor unit is defective.	•Refer to 10-2.2. "Flow chart of the detailed outdoor unit failure mode recall function".
7		16-time flash 2.5 seconds OFF	4-way valve/ Pipe temperature	The 4-way valve does not work properly. The indoor coil thermistor detects an abnormal temperature.	•Refer to 10-5.⑦ "Check of R.V. coil". •Replace the inverter P.C. board.
8		17-time flash 2.5 seconds OFF	Outdoor refrigerant system abnormality	A closed valve and air trapped in the refrigerant circuit are detected based on the temperature sensed by the indoor and outdoor thermistors and the current of the compressor.	•Check for a gas leak in a connecting piping etc. •Check the stop valve. •Refer to 10-5.⑧ "Check of outdoor refrigerant circuit".
9	'Outdoor unit stops and restarts 3 minutes later' is repeated.	2-time flash 2.5 seconds OFF	Overcurrent protection	Large current flows into the power module (IC700) (FH09/12)/IGBT module (IC700) (FH15).	•Reconnect connector of compressor. •Refer to 10-5.④ "How to check inverter/compressor". •Check stop valve.
10		3-time flash 2.5 seconds OFF	Discharge temperature overheat protection	Temperature of discharge temperature thermistor exceeds 241°F (116°C), compressor stops. Compressor can restart if discharge temperature thermistor reads 212°F (100°C) or less 3 minutes later.	•Check refrigerant circuit and refrigerant amount. •Refer to 10-5.⑨ "Check of LEV".
11		4-time flash 2.5 seconds OFF	Fin temperature /P.C. board temperature overheat protection	Temperature of the fin temperature thermistor on the heat sink exceeds 167 ~ 187°F (75 ~ 86°C) (FH09/12)/167 ~ 176°F (75 ~ 80°C) (FH15) or temperature of P.C. board temperature thermistor on the inverter P.C. board exceeds 162 ~ 185°F (72 ~ 85°C) (FH09/12)/158 ~ 167°F (70 ~ 75°C) (FH15).	•Check around outdoor unit. •Check outdoor unit air passage. •Refer to 10-5.① "Check of outdoor fan motor".
12		5-time flash 2.5 seconds OFF	High pressure protection	Indoor coil thermistor exceeds 158°F (70°C) in HEAT mode. Defrost thermistor exceeds 158°F (70°C) in COOL mode.	•Check refrigerant circuit and refrigerant amount. •Check stop valve.
13		8-time flash 2.5 seconds OFF	Compressor synchronous abnormality	The waveform of compressor current is distorted.	•Reconnect connector of compressor. •Refer to 10-5.④ "How to check inverter/compressor".
14		10-time flash 2.5 seconds OFF	Outdoor fan motor	Outdoor fan has stopped 3 times in a row within 30 seconds after outdoor fan start-up.	•Refer to 10-5.① "Check of outdoor fan motor." •Refer to 10-5.② "Check of inverter P.C. board."
15		12-time flash 2.5 seconds OFF	Each phase current of compressor	Each phase current of compressor cannot be detected normally.	•Refer to 10-5.④ "How to check inverter/compressor".
16		13-time flash 2.5 seconds OFF	DC voltage	DC voltage of inverter cannot be detected normally.	•It occurs with following case. Instantaneous power voltage drop. (Short time power failure) (FH15) •Refer to 10-5.③ "Check of power supply". (FH15) •Refer to 10-5.④ "How to check inverter/compressor".

NOTE: 1. The location of LED is illustrated at the right figure. Refer to 10-6.1.
2. LED is lighted during normal operation.

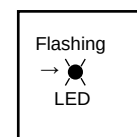
The flashing frequency shows the number of times the LED blinks after every 2.5-second OFF.
(Example) When the flashing frequency is "2".



Inverter P.C. board
MUZ-FH09/12NA(H)



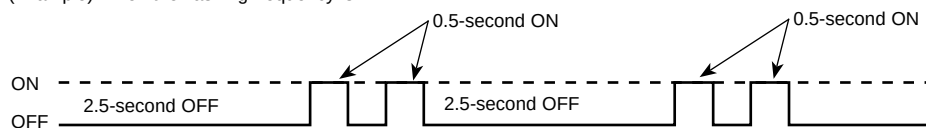
MUZ-FH15NA(H)



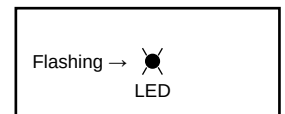
No.	Symptom	LED indication	Abnormal point/ Condition	Condition		Remedy
17	Outdoor unit operates.	1-time flash 2.5 seconds OFF	Frequency drop by current protection	FH09/12	When the input current exceeds approximately 10A (FH09)/10.5A (FH12), compressor frequency lowers.	The unit is normal, but check the following. •Check if indoor filters are clogged. •Check if refrigerant is short. •Check if indoor/outdoor unit air circulation is short cycled.
				FH15	Current from power outlet is nearing breaker capacity.	
18		3-time flash 2.5 seconds OFF	Frequency drop by high pressure protection	Temperature of indoor coil thermistor exceeds 131 °F (55°C) in HEAT mode, compressor frequency lowers.		
			Frequency drop by defrosting in COOL mode	Indoor coil thermistor reads 46°F (8°C) or less in COOL mode, compressor frequency lowers.		
19		4-time flash 2.5 seconds OFF	Frequency drop by discharge temperature protection	Temperature of discharge temperature thermistor exceeds 232°F (111°C), compressor frequency lowers.		
20		MUZ-FH09/12 5-time flash 2.5 seconds OFF	Outside temperature thermistor protection	When the outside temperature thermistor shorts or opens, protective operation without that thermistor is performed.		•Refer to 10-5. Ⓢ Check of outdoor thermistors.
21	Outdoor unit operates.	7-time flash 2.5 seconds OFF	Low discharge temperature protection	Temperature of discharge temperature thermistor has been 122°F (50°C) or less for 20 minutes.		•Refer to 10-5.Ⓢ "Check of LEV". •Check refrigerant circuit and refrigerant amount.
22		8-time flash 2.5 seconds OFF	MUZ-FH09/12 PAM protection PAM: Pulse Amplitude Modulation	The overcurrent flows into PFC (Power factor correction :IC820) or the DC voltage reaches 394 V or more, PAM stops and restarts.		This is not malfunction. PAM protection will be activated in the following cases: 1 Instantaneous power voltage drop. (Short time power failure) 2 When the power supply voltage is high.
			MUZ-FH15 Zero cross detecting circuit	Zero cross signal cannot be detected.		•It occurs with following cases. 1 Instantaneous power voltage drop. (Short time power failure) 2 Distortion of primary voltage •Refer to 10-5. Ⓢ "Check of power supply".
23		9-time flash 2.5 seconds OFF	Inverter check mode	The connector of compressor is disconnected, inverter check mode starts.		•Check if the connector of the compressor is correctly connected. Refer to 10-5.Ⓢ "How to check inverter/compressor".

NOTE: 1. The location of LED is illustrated at the right figure. Refer to 10-6.1.
2. LED is lighted during normal operation.

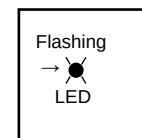
The flashing frequency shows the number of times the LED blinks after every 2.5-second OFF.
(Example) When the flashing frequency is "2".



Inverter P.C. board
MUZ-FH09/12NA(H)

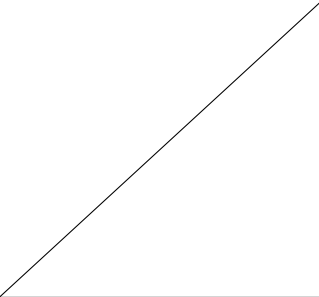
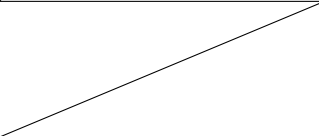
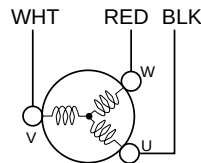
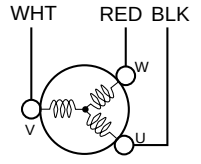
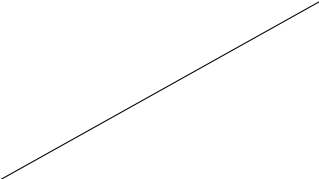
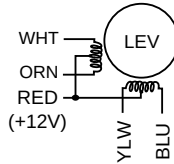
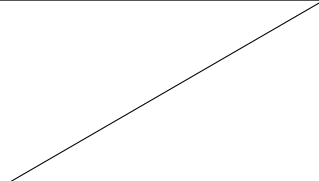


MUZ-FH15NA(H)



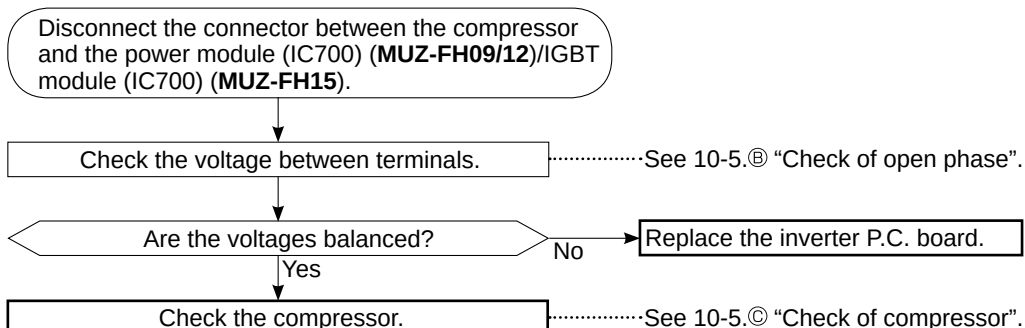
10-4. TROUBLE CRITERION OF MAIN PARTS

MUZ-FH09NA MUZ-FH09NAH
MUZ-FH12NA MUZ-FH12NAH
MUZ-FH15NA MUZ-FH15NAH

Part name	Check method and criterion	Figure														
Defrost thermistor (RT61)	Measure the resistance with a tester. Refer to 10-6. "Test point diagram and voltage", 1. "Inverter P.C. board", for the chart of thermistor.															
Fin temperature thermistor (RT64)																
Ambient temperature thermistor (RT65)																
Outdoor heat exchanger temperature thermistor (RT68)																
Discharge temperature thermistor (RT62)	Measure the resistance with a tester. Before measurement, hold the thermistor with your hands to warm it up. Refer to 10-6. "Test point diagram and voltage", 1. "Inverter P.C. board", for the chart of thermistor.															
Compressor	Measure the resistance between terminals using a tester. [Temperature: 14 ~ 104°F (-10 ~ 40°C)] <table border="1"><thead><tr><th></th><th colspan="3">Normal (Ω)</th></tr><tr><th></th><th>MUZ-FH09</th><th>MUZ-FH12</th><th>MUZ-FH15</th></tr></thead><tbody><tr><td>U-V</td><td rowspan="3">1.60 ~ 2.17</td><td rowspan="3">1.66 ~ 2.26</td><td rowspan="3">0.87 ~ 1.18</td></tr><tr><td>U-W</td></tr><tr><td>V-W</td></tr></tbody></table>		Normal (Ω)				MUZ-FH09	MUZ-FH12	MUZ-FH15	U-V	1.60 ~ 2.17	1.66 ~ 2.26	0.87 ~ 1.18	U-W	V-W	
	Normal (Ω)															
	MUZ-FH09	MUZ-FH12	MUZ-FH15													
U-V	1.60 ~ 2.17	1.66 ~ 2.26	0.87 ~ 1.18													
U-W																
V-W																
Outdoor fan motor	Measure the resistance between lead wires using a tester. [Temperature: 14 ~ 104°F (-10 ~ 40°C)] <table border="1"><thead><tr><th rowspan="2">Color of lead wire</th><th colspan="2">Normal (Ω)</th></tr><tr><th>MUZ-FH09/12</th><th>MUZ-FH15</th></tr></thead><tbody><tr><td>RED – BLK BLK – WHT WHT – RED</td><td>29 ~ 40</td><td>12 ~ 16</td></tr></tbody></table>	Color of lead wire	Normal (Ω)		MUZ-FH09/12	MUZ-FH15	RED – BLK BLK – WHT WHT – RED	29 ~ 40	12 ~ 16							
Color of lead wire	Normal (Ω)															
	MUZ-FH09/12	MUZ-FH15														
RED – BLK BLK – WHT WHT – RED	29 ~ 40	12 ~ 16														
R. V. coil (21S4)	Measure the resistance using a tester. [Temperature: 14 ~ 104°F (-10 ~ 40°C)] <table border="1"><thead><tr><th>Normal (kΩ)</th></tr></thead><tbody><tr><td>0.97 ~ 1.38</td></tr></tbody></table>	Normal (kΩ)	0.97 ~ 1.38													
Normal (kΩ)																
0.97 ~ 1.38																
Expansion valve coil (LEV)	Measure the resistance using a tester. [Temperature: 14 ~ 104°F (-10 ~ 40°C)] <table border="1"><thead><tr><th>Color of lead wire</th><th>Normal (Ω)</th></tr></thead><tbody><tr><td>RED – ORN</td><td rowspan="5">37 ~ 54</td></tr><tr><td>RED – WHT</td></tr><tr><td>RED – BLU</td></tr><tr><td>RED – YLW</td></tr><tr><td>RED – YLW</td></tr></tbody></table>	Color of lead wire	Normal (Ω)	RED – ORN	37 ~ 54	RED – WHT	RED – BLU	RED – YLW	RED – YLW							
Color of lead wire	Normal (Ω)															
RED – ORN	37 ~ 54															
RED – WHT																
RED – BLU																
RED – YLW																
RED – YLW																
Defrost heater	Measure the resistance using a tester. [Temperature: 14 ~ 104°F (-10 ~ 40°C)] <table border="1"><thead><tr><th colspan="2">Normal (Ω)</th></tr><tr><th>MUZ-FH09/12NAH</th><th>MUZ-FH15NAH</th></tr></thead><tbody><tr><td>349 ~ 428</td><td>376 ~ 461</td></tr></tbody></table>	Normal (Ω)		MUZ-FH09/12NAH	MUZ-FH15NAH	349 ~ 428	376 ~ 461									
Normal (Ω)																
MUZ-FH09/12NAH	MUZ-FH15NAH															
349 ~ 428	376 ~ 461															

10-5. TROUBLESHOOTING FLOW

Ⓐ How to check inverter/compressor



Ⓑ Check of open phase

- With the connector between the compressor and the power module (IC700) (MUZ-FH09/12)/IGBT module (IC700) (MUZ-FH15) disconnected, activate the inverter and check if the inverter is normal by measuring **the voltage balance** between the terminals.

Output voltage is 50 - 130 V. (The voltage may differ according to the tester.)

<< Operation method>>

Start cooling or heating operation by pressing EMERGENCY OPERATION switch on the indoor unit. (TEST RUN OPERATION: Refer to 7-6.)

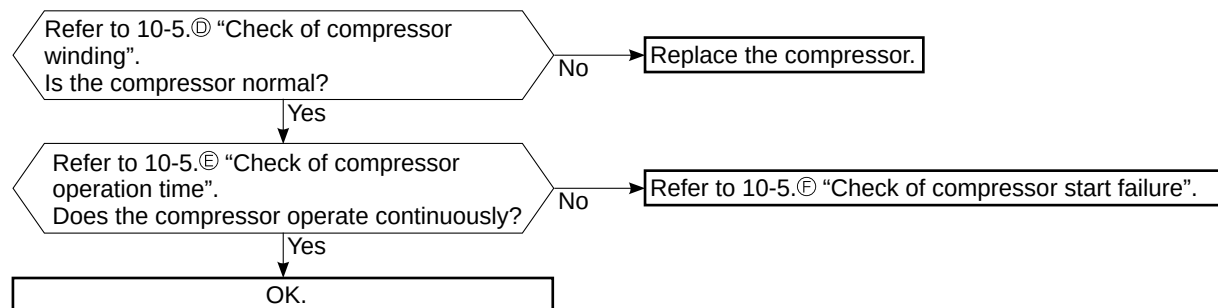
<<Measurement point>>

At 3 points ※ Measure AC voltage between the lead wires at 3 points.

BLK (U)-WHT (V)
BLK (U)-RED (W)
WHT(V)-RED (W)

- NOTE:** 1. Output voltage varies according to power supply voltage.
2. Measure the voltage by analog type tester.
3. During this check, LED of the inverter P.C. board flashes 9 times. (Refer to 10-6.1.)

Ⓒ Check of compressor



D Check of compressor winding

- Disconnect the connector between the compressor and the power module (IC700) (**MUZ-FH09/12**)/IGBT module (IC700) (**MUZ-FH15**), and measure the resistance between the compressor terminals.

<<Measurement point>>

At 3 points

BLK-WHT

BLK-RED

WHT-RED

※ Measure the resistance between the lead wires at 3 points.

<<Judgement>>

Refer to 10-4.

0 [Ω]Abnormal [short]

Infinite [Ω]Abnormal [open]

NOTE: Be sure to zero the ohmmeter before measurement.

E Check of compressor operation time

- Connect the compressor and activate the inverter. Then measure the time until the inverter stops due to over current.

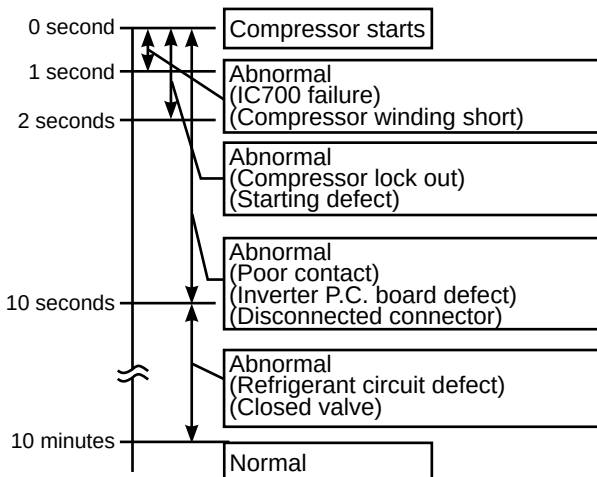
<<Operation method>>

Start heating or cooling operation by pressing EMERGENCY OPERATION switch on the indoor unit. (TEST RUN OPERATION: Refer to 7-6.)

<<Measurement>>

Measure the time from the start of compressor to the stop of compressor due to overcurrent.

<<Judgement>>



F Check of compressor start failure

Confirm that ①~④ is normal.

•Electrical circuit check

①. Contact of the compressor connector

②. Output voltage of inverter P.C. board and balance of them (See 10-5.③)

③. Direct current voltage between DB61(+) and (-) (**MUZ-FH09/12**)/JP715(+) and JP30(-) (**MUZ-FH15**) on the inverter P.C. board

④. Voltage between outdoor terminal block S1-S2

Does the compressor run for 10 seconds or more after it starts?

Yes

Check the refrigerant circuit.
Check the stop valve.

No

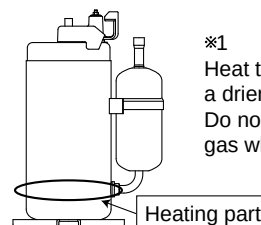
After the compressor is heated with a drier, does the compressor start? ※1

No

Replace the compressor.

Yes

Compressor start failure. Activate pre-heat control.
(Refer to 9-2. "PRE-HEAT CONTROL SETTING")

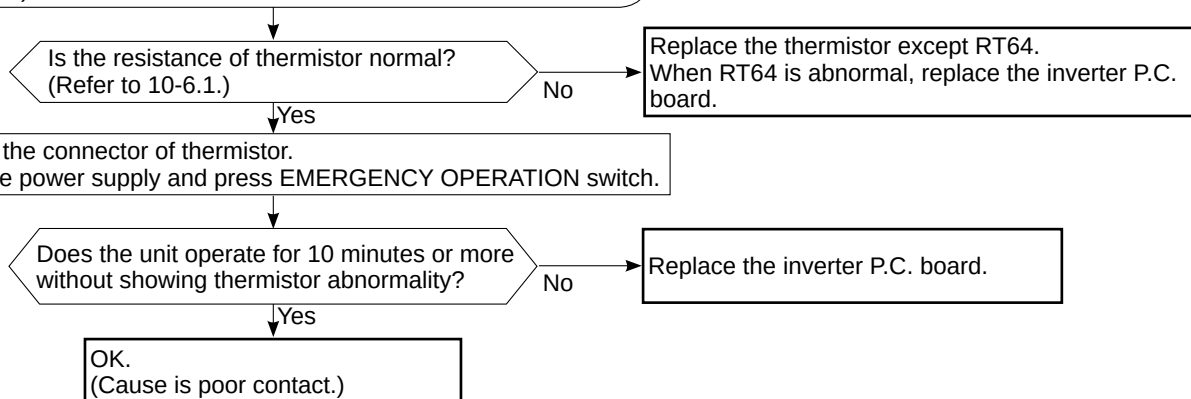


※1

Heat the compressor with a drier for about 20 minutes. Do not recover refrigerant gas while heating.

③ Check of outdoor thermistors

Disconnect the connector of thermistor in the inverter P.C. board (see below table), and measure the resistance of thermistor.



MUZ-FH09/12

Thermistor	Symbol	Connector, Pin No.	Board
Defrost	RT61	Between CN641 pin1 and pin2	Inverter P.C. board
Discharge temperature	RT62	Between CN641 pin3 and pin4	
Fin temperature	RT64	Between CN642 pin1 and pin2	
Ambient temperature	RT65	Between CN643 pin1 and pin2	
Outdoor heat exchanger temperature	RT68	Between CN644 pin1 and pin3	

MUZ-FH15

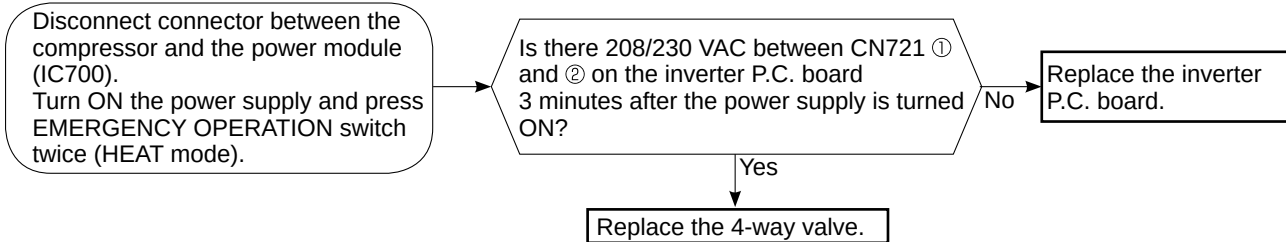
Thermistor	Symbol	Connector, Pin No.	Board
Defrost	RT61	Between CN671 pin1 and pin2	Inverter P.C. board
Discharge temperature	RT62	Between CN671 pin3 and pin4	
Fin temperature	RT64	Between CN673 pin1 and pin2	
Ambient temperature	RT65	Between CN672 pin1 and pin2	
Outdoor heat exchanger temperature	RT68	Between CN671 pin5 and pin6	

H Check of R.V. coil

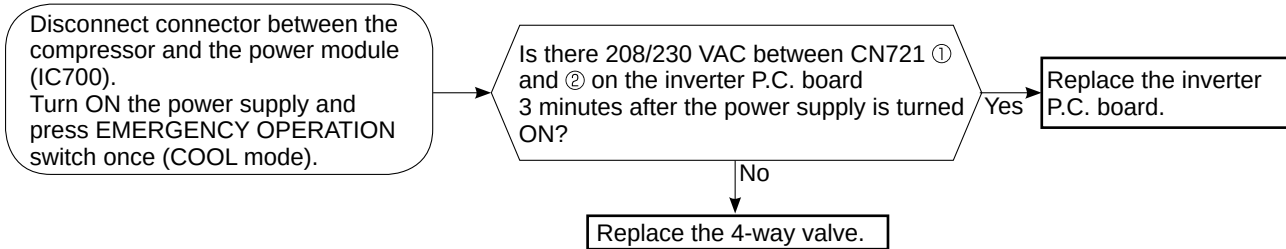
MUZ-FH09/12

- * First of all, measure the resistance of R.V. coil to check if the coil is defective. Refer to 10-4.
- * In case CN721 is disconnected or R.V. coil is open, voltage is generated between the terminal pins of the connector although no signal is being transmitted to R.V. coil.
Check if CN721 is connected.

Unit operates COOL mode even if it is set to HEAT mode.



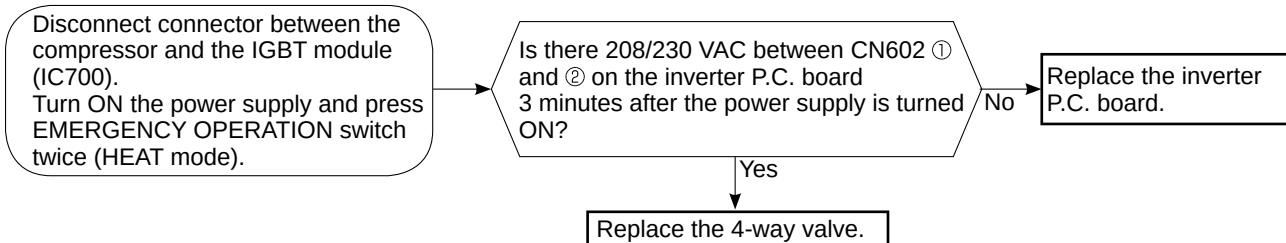
Unit operates HEAT mode even if it is set to COOL mode.



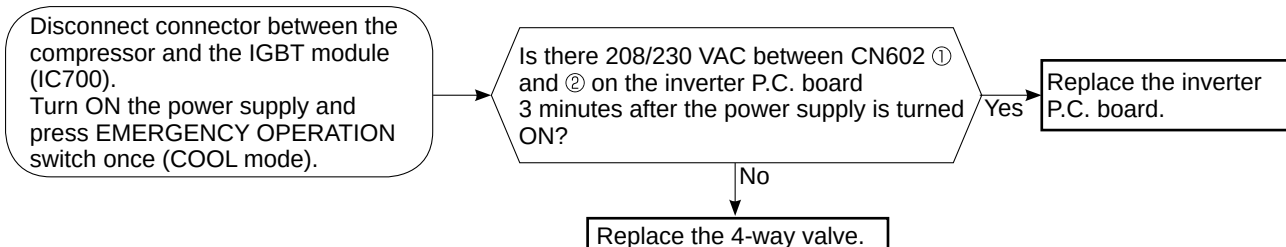
MUZ-FH15

- * First of all, measure the resistance of R.V. coil to check if the coil is defective. Refer to 10-4.
- * In case CN602 is disconnected or R.V. coil is open, voltage is generated between the terminal pins of the connector although no signal is being transmitted to R.V. coil.
Check if CN602 is connected.

Unit operates COOL mode even if it is set to HEAT mode.



Unit operates HEAT mode even if it is set to COOL mode.



① Check of outdoor fan motor

Disconnect the connectors CN931 and CN932 from the inverter P.C. board.
Check the connection between the connector CN931 and CN932.

Is the resistance between each terminal of outdoor fan motor normal?
(Refer to 10-4.)

Yes

Disconnect CN932 from the inverter P.C. board, and turn on the power supply.

Rotate the outdoor fan motor manually and measure the voltage of CN931.
Between 1(+) and 5(-)
Between 2(+) and 5(-)
Between 3(+) and 5(-)

(Fixed to either 5 or 0 VDC)

No

Does the voltage between each terminal become 5 and 0 VDC repeatedly?

Yes

No

Does the outdoor fan motor rotate smoothly?

Yes

Replace the outdoor fan motor.

Replace the inverter P.C. board.

J Check of power supply

Disconnect the connector between the compressor and the power module (IC700) (**MUZ-FH09/12**)/IGBT module (IC700) (**MUZ-FH15**).
Turn ON power supply and press EMERGENCY OPERATION switch.

Does the left lamp of the OPERATION INDICATOR lamp on the indoor unit light up?

No

Is there voltage 208/230 VAC between the indoor terminal block S1 and S2?

Yes

Replace the indoor electronic control P.C. board.

Rectify indoor/outdoor connecting wire.

Yes

Is there DC voltage 260 - 370 VDC between DB61 (+) and DB61 (-) (**MUZ-FH09/12**)/294 - 370 VDC between JP715 (+) and JP30 (-) (**MUZ-FH15**) on the inverter P.C. board? (Refer to 10-6.1.)

Yes

Does LED on the inverter P.C. board light up or flash? (Refer to 10-6.1.)

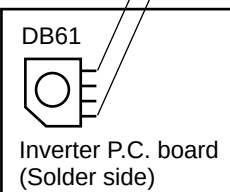
Replace the inverter P.C. board.

260 - 370 VDC

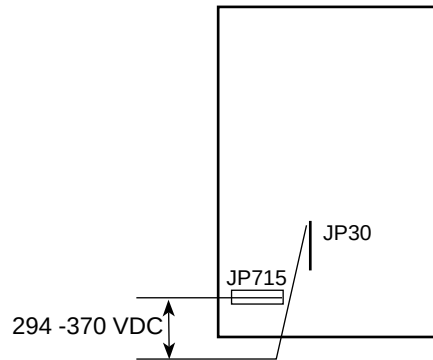
No

Check the electric parts in main circuit.

If light up, OK.
If flash, refer to 10-3.



MUZ-FH09/12



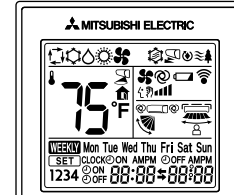
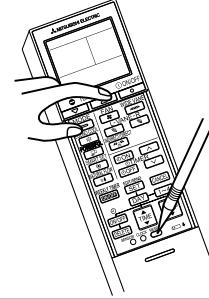
MUZ-FH15

K Check of LEV (Expansion valve)

Turn ON the power supply.

<Preparation of the remote controller>

- ① While pressing both OPERATION SELECT button and TEMP $\oplus$ button on the remote controller at the same time, press RESET button.
- ② First, release RESET button.
Hold down the other two buttons for another 3 seconds. Make sure that the indicators on the LCD screen shown in the right figure are all displayed. Then release the buttons.



Press OPERATE/STOP (ON/OFF) button of the remote controller (the set temperature is displayed) with the remote controller headed towards the indoor unit. ※1

Expansion valve operates in full-opening direction.

Do you hear the expansion valve "click, click....." ?
Do you feel the expansion valve vibrate on touching it ?

Yes

OK

No

Is LEV coil properly fixed to the expansion valve?

No

Properly fix the LEV coil to the expansion valve.

Yes

Does the resistance of LEV coil have the characteristics? (Refer to 10-4.)

Yes

Measure each voltage between connector pins of CN724 on the inverter P.C. board.
1. Pin③(-) — Pin①(+)
2. Pin④(-) — Pin①(+)
3. Pin⑤(-) — Pin①(+)
4. Pin⑥(-) — Pin①(+)
Is there about 3 - 5 VAC between each?
NOTE: Measure the voltage by an analog tester.

Yes

Replace the expansion valve.

No

Replace the inverter P.C. board.

No

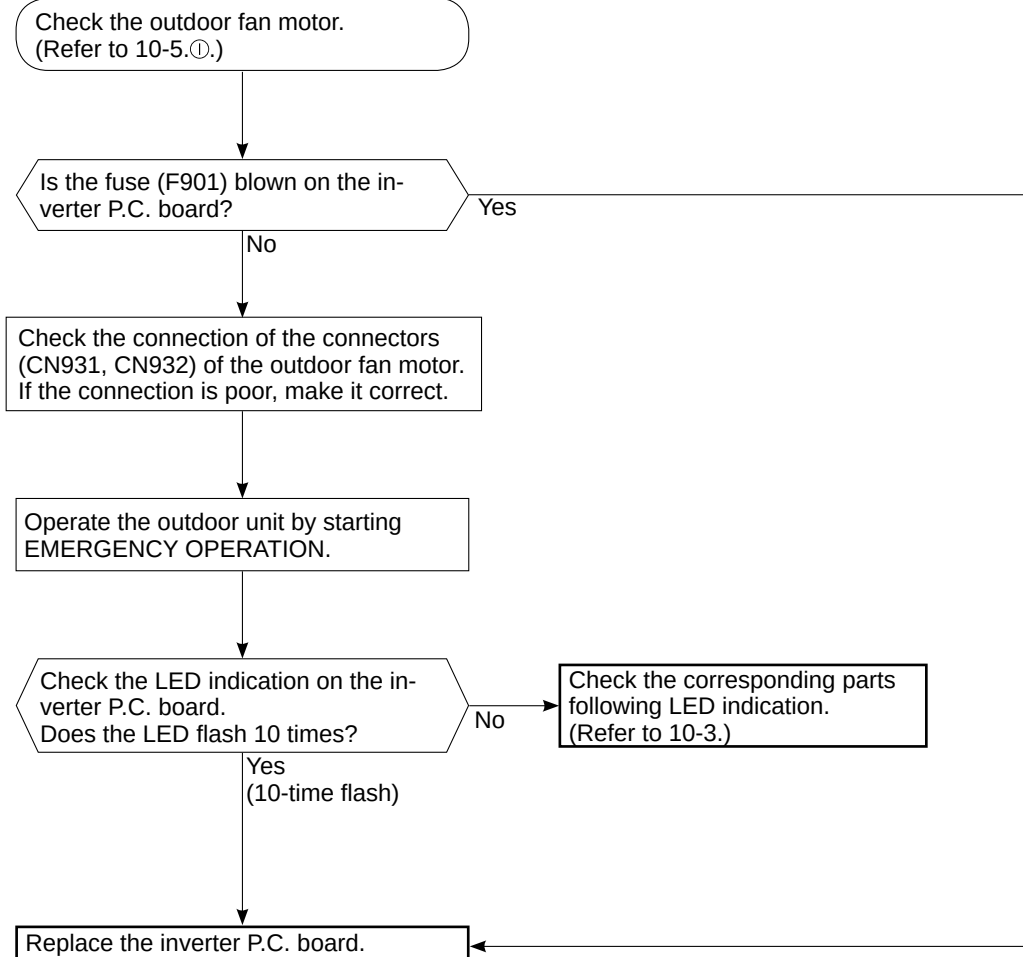
Replace the LEV coil.

NOTE: After check of LEV, do the undermentioned operations.

1. Turn OFF the power supply and turn it ON again.
2. Press RESET button on the remote controller.

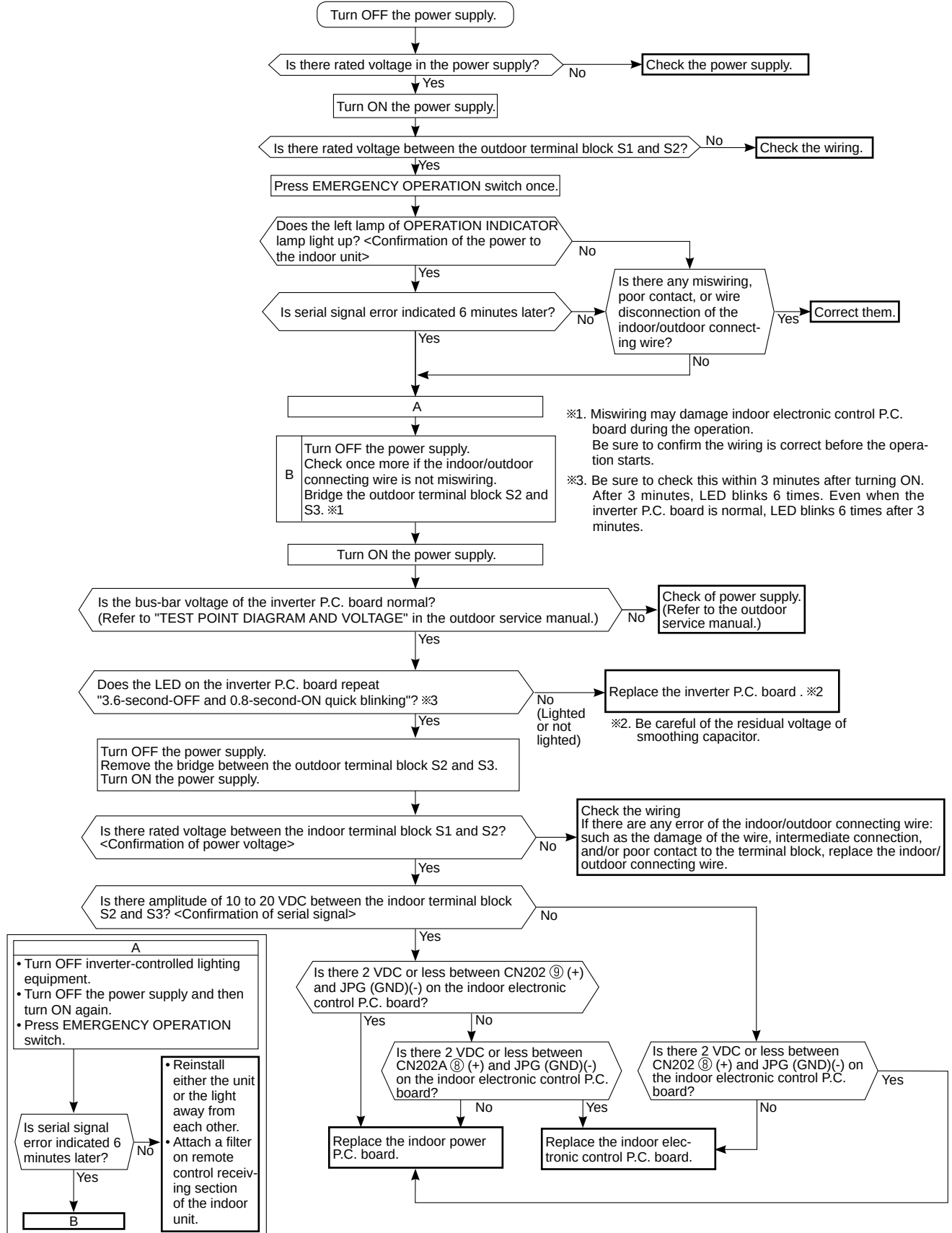
※1. Regardless of normal or abnormal condition, a short beep is emitted once the signal is received.

L Check of inverter P.C. board



M How to check miswiring and serial signal error

NOTE: Refer to the indoor unit service manual.



N Check of defrost heater

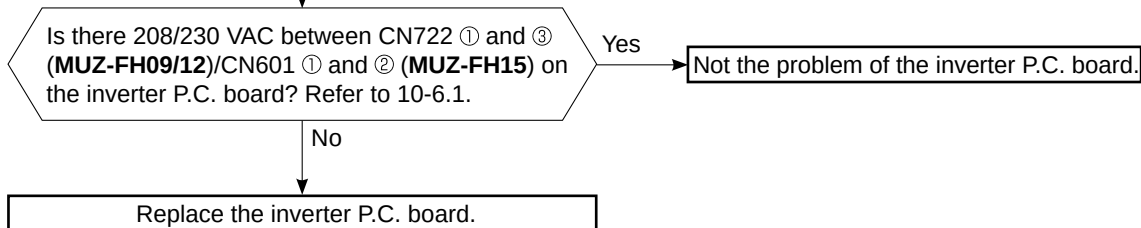
MUZ-FH09NAH MUZ-FH12NAH MUZ-FH15NAH

Check the following points before checking electric continuity.

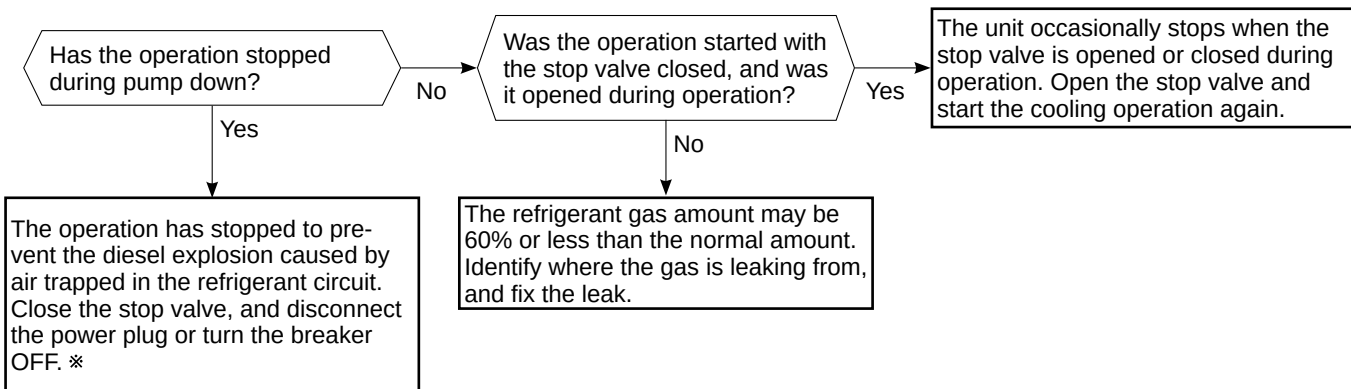
1. Does the resistance of ambient temperature thermistor have the characteristics? Refer to 10-6.1.
2. Is the resistance of defrost heater normal? Refer to 10-4.
3. Does the heater protector remain conducted (not open)?
4. Are both ambient temperature thermistor and circuit of defrost heater securely connected to connectors?

In HEAT mode, for more than 5 minutes, let the ambient temperature thermistor continue to read 32°F (0°C) or below, and let the defrost thermistor continue to read 30°F (-1°C) or below.

NOTE: In case both thermistors are more than the above temperature, cool them with cold water etc...

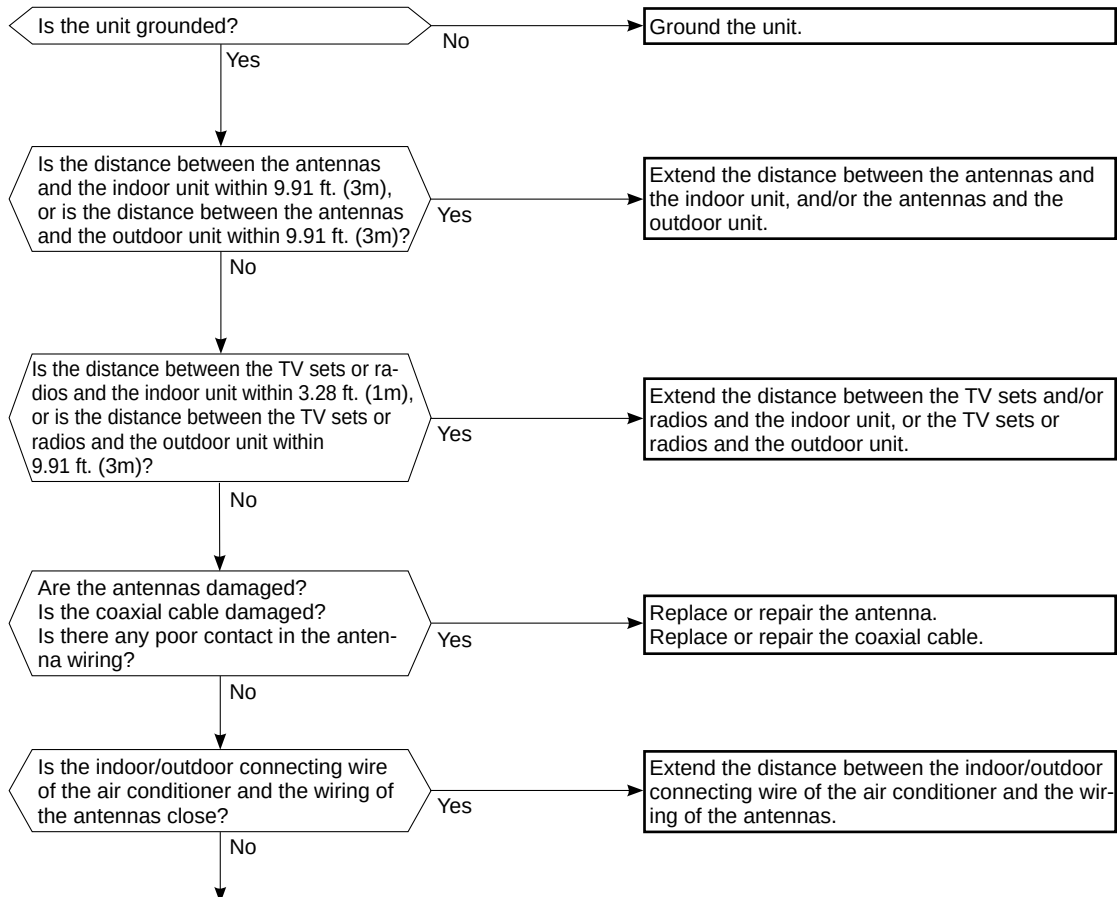


O Check of outdoor refrigerant circuit



※ **CAUTION** : Do not start the operation again to prevent hazards.

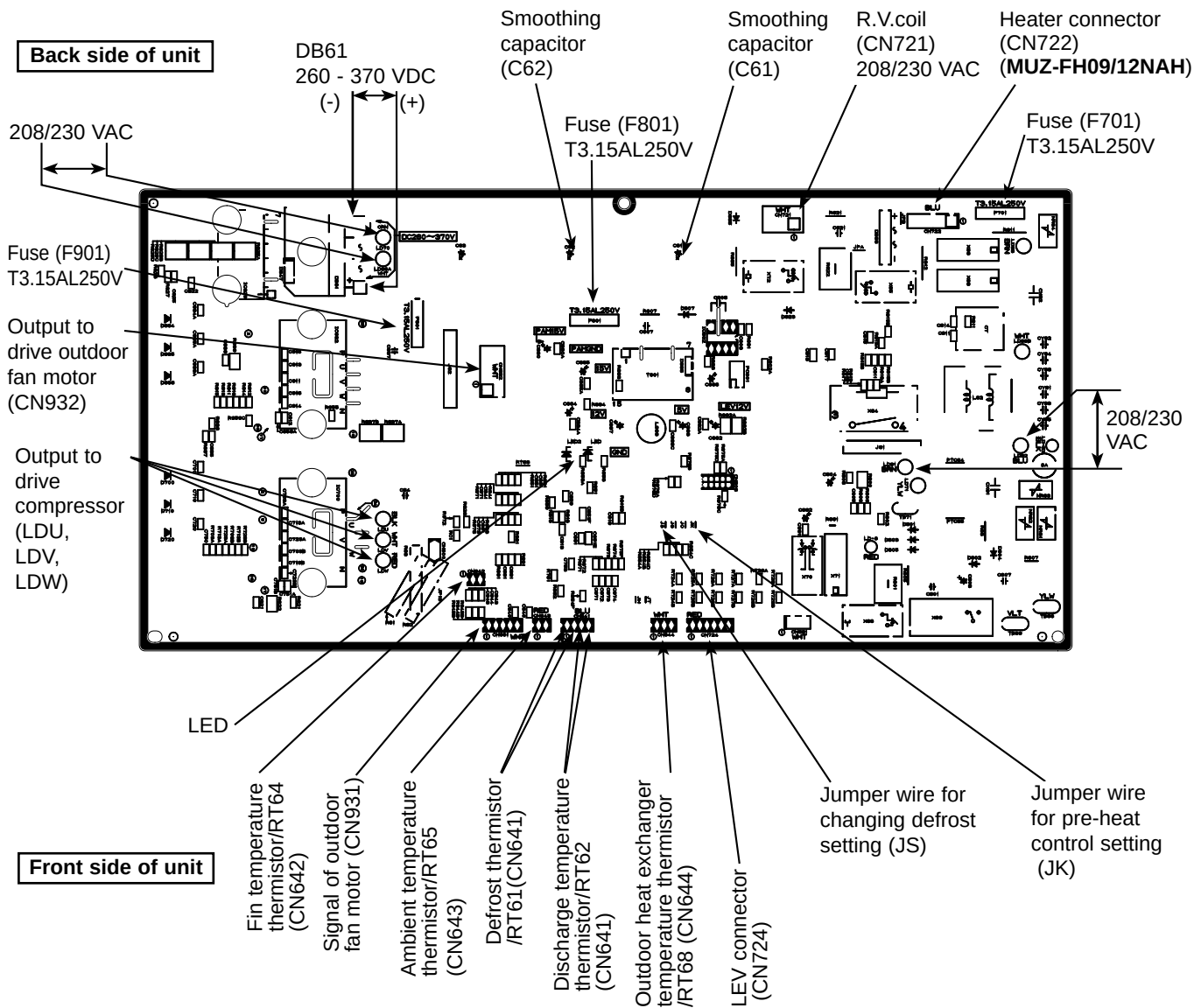
P Electromagnetic noise enters into TV sets or radios



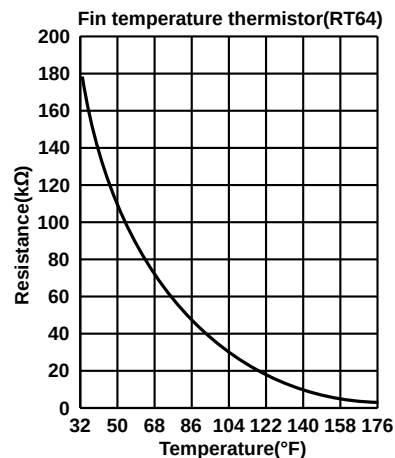
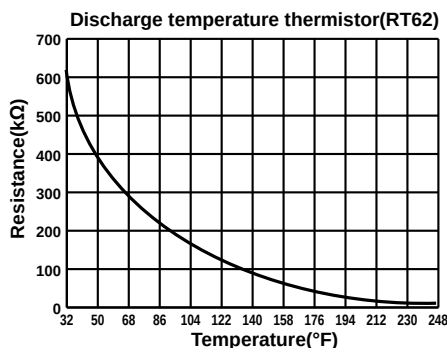
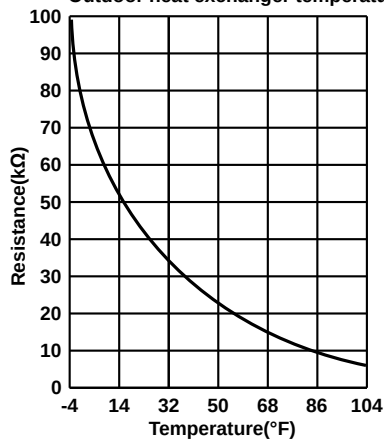
10-6. TEST POINT DIAGRAM AND VOLTAGE

1. Inverter P.C. board

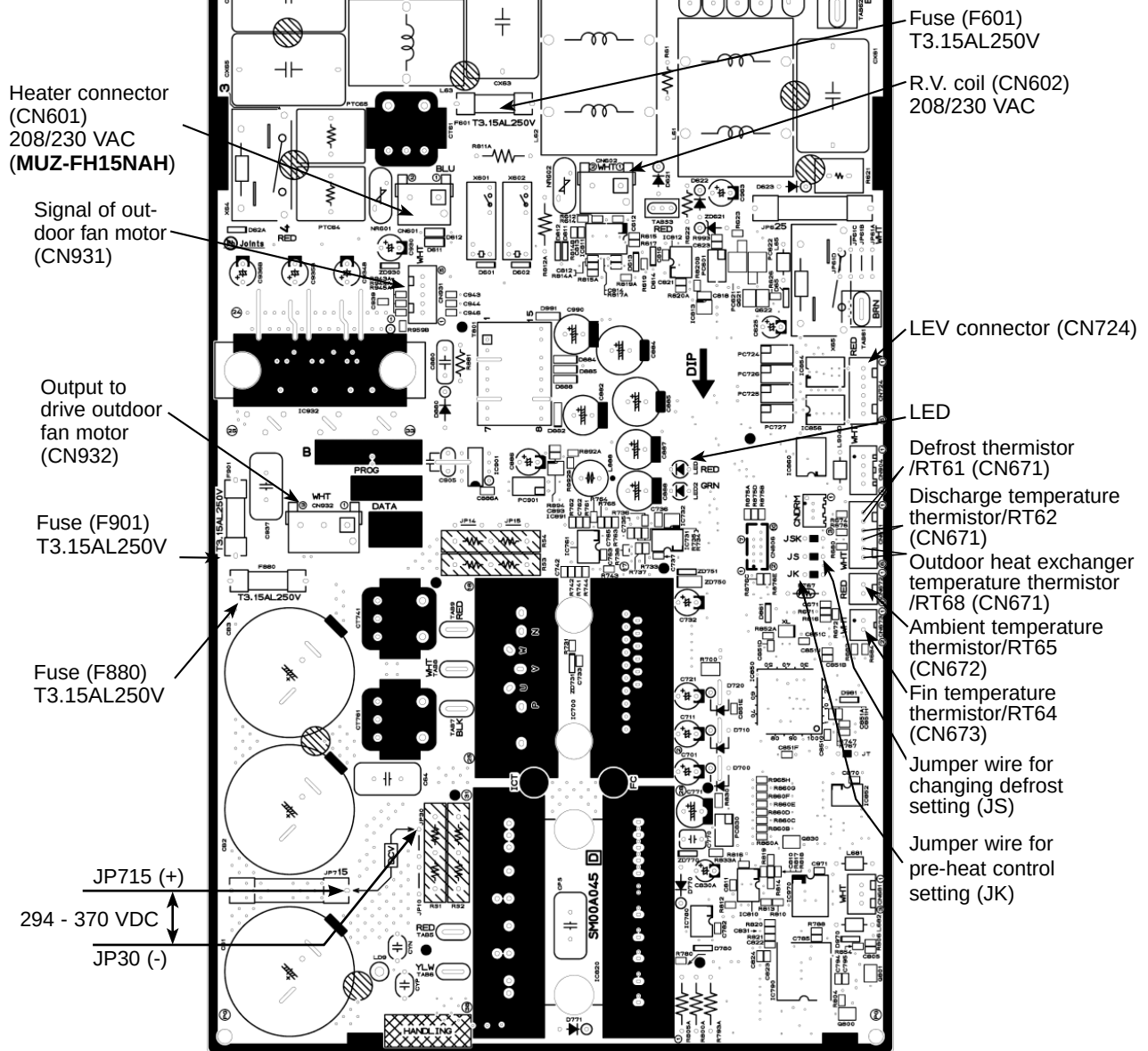
MUZ-FH09NA MUZ-FH09NAH
MUZ-FH12NA MUZ-FH12NAH



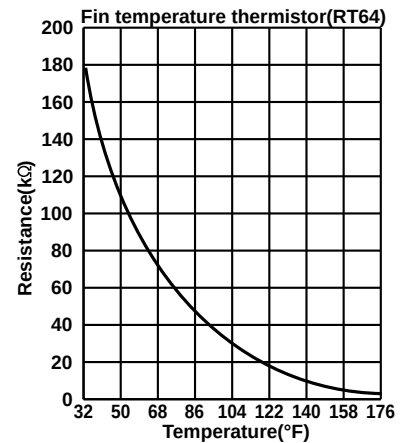
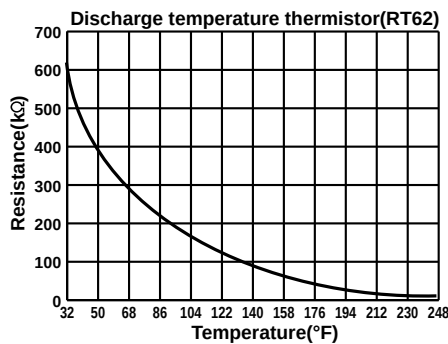
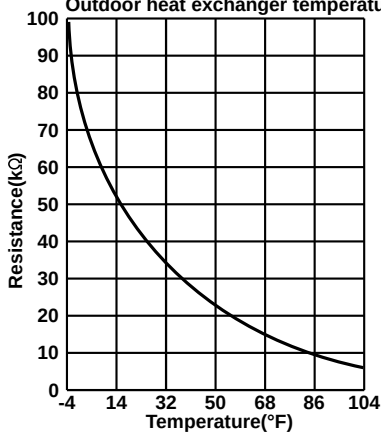
Defrost thermistor(RT61)
 Ambient temperature thermistor(RT65)
 Outdoor heat exchanger temperature thermistor(RT68)



MUZ-FH15NA MUZ-FH15NAH



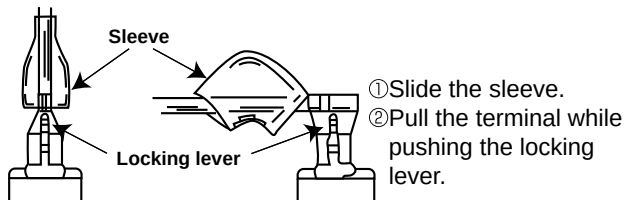
Defrost thermistor(RT61)
Ambient temperature thermistor(RT65)
Outdoor heat exchanger temperature thermistor(RT68)



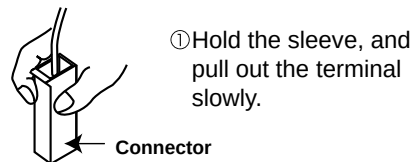
<"Terminal with locking mechanism" Detaching points>

The terminal which has the locking mechanism can be detached as shown below.
There are two types (refer to (1) and (2)) of the terminal with locking mechanism.
The terminal without locking mechanism can be detached by pulling it out.
Check the shape of the terminal before detaching.

(1) Slide the sleeve and check if there is a locking lever or not.



(2) The terminal with this connector has the locking mechanism.



11-1. MUZ-FH09NA MUZ-FH09NAH MUZ-FH12NA MUZ-FH12NAH

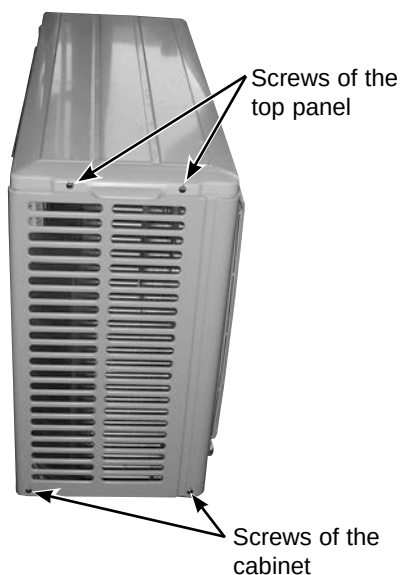
NOTE: Turn OFF power supply before disassembly.

OPERATING PROCEDURE

1. Removing the cabinet

- (1) Remove the screw fixing the service panel.
- (2) Pull down the service panel and remove it.
- (3) Remove the screws fixing the conduit cover.
- (4) Remove the conduit cover. (Photo 4)
- (5) Remove the screw fixing the conduit plate. (Photo 5)
- (6) Remove the conduit plate.
- (7) Disconnect the power supply wire and indoor/outdoor connecting wire.
- (8) Remove the screws fixing the top panel.
- (9) Remove the top panel.
- (10) Remove the screws fixing the cabinet.
- (11) Remove the cabinet.
- (12) Remove the screws fixing the back panel.
- (13) Remove the back panel.

Photo 2



PHOTOS

Photo 1

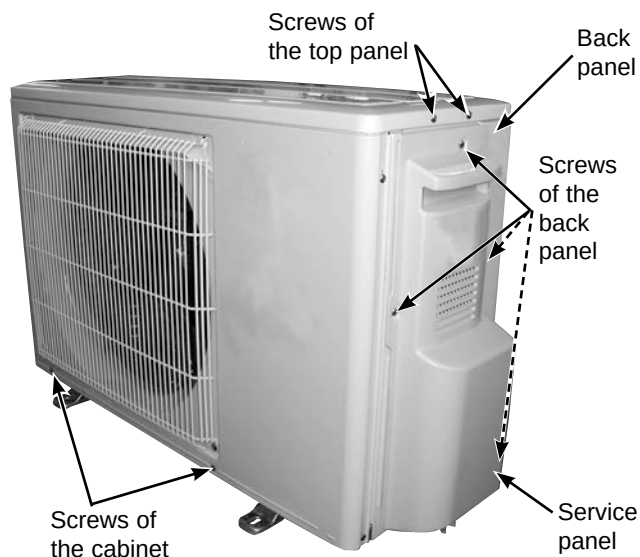
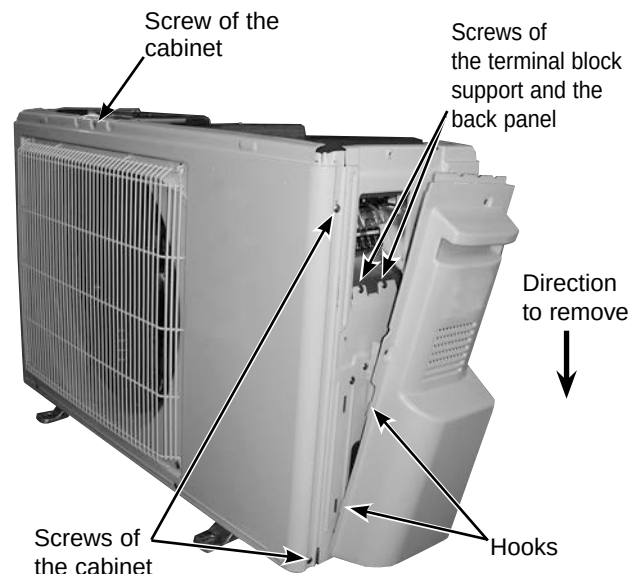
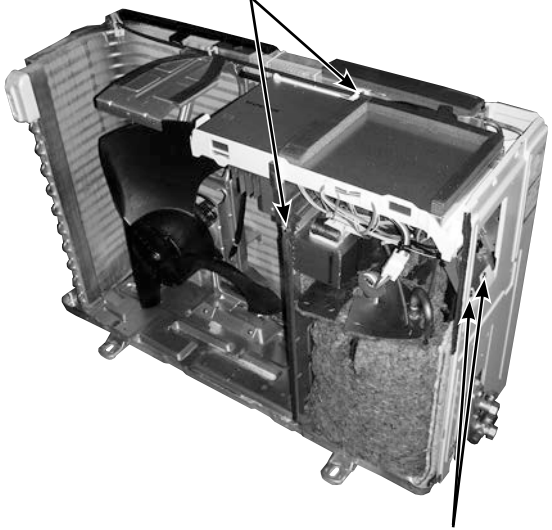
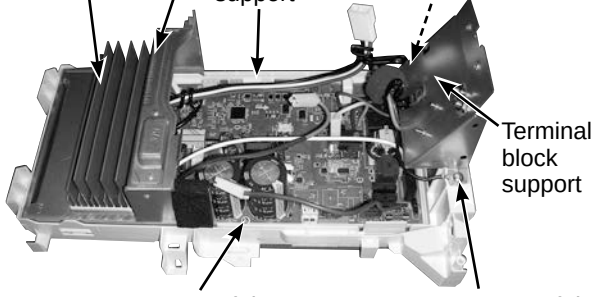


Photo 3





OPERATING PROCEDURE	PHOTOS
Photo 4  Screws of the conduit cover	Photo 5  Screw of the conduit plate
2. Removing the inverter assembly, inverter P.C. board (1) Remove the cabinet and panels. (Refer to 1.) (2) Disconnect the lead wire to the reactor and the following connectors: <Inverter P.C. board> CN721 (R.V. coil) CN722 (Defrost heater and heater protector) (MUZ-FH09/12NAH) CN931, CN932 (Fan motor) CN641 (Defrost thermistor and discharge temperature thermistor) CN643 (Ambient temperature thermistor) CN644 (Outdoor heat exchanger temperature thermistor) CN724 (LEV) (3) Remove the compressor connector (CN61). (4) Remove the screws fixing the heat sink support and the separator. (5) Remove the fixing screws of the terminal block support and the back panel. (6) Remove the inverter assembly. (7) Remove the screw of the ground wire and screw of the terminal block support. (8) Remove the heat sink support from the P.C. board support. (9) Remove the screw of the inverter P.C. board and remove the inverter P.C. board from the P.C. board support.	Photo 6  Screws of the heat sink support and the separator Screws of the terminal block support and the back panel
3. Removing R.V. coil (1) Remove the cabinet and panels. (Refer to 1.) (2) Disconnect the following connectors: <Inverter P.C. board> CN721 (R.V. coil) (3) Remove the R.V. coil.	Photo 7  Heat sink Heat sink support P.C. board support Screw of the inverter P.C. board Screw of the ground wire Screw of the Terminal block support Terminal block support

OPERATING PROCEDURE

4. Removing the discharge temperature thermistor, defrost thermistor, outdoor heat exchanger temperature thermistor and ambient temperature thermistor

- (1) Remove the cabinet and panels. (Refer to 1.)
- (2) Disconnect the lead wire to the reactor and the following connectors:
 - <Inverter P.C. board>
 - CN641 (Defrost thermistor and discharge temperature thermistor)
 - CN643 (Ambient temperature thermistor)
 - CN644 (Outdoor heat exchanger temperature thermistor)
- (3) Pull out the discharge temperature thermistor from its holder.
- (4) Pull out the defrost thermistor from its holder. (Photo 6)
- (5) Pull out the outdoor heat exchanger temperature thermistor from its holder. (Photo 6)
- (6) Pull out the ambient temperature thermistor from its holder.

PHOTOS

Photo 8

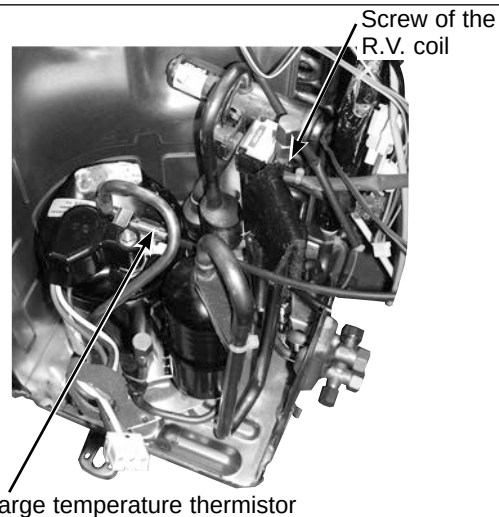


Photo 9

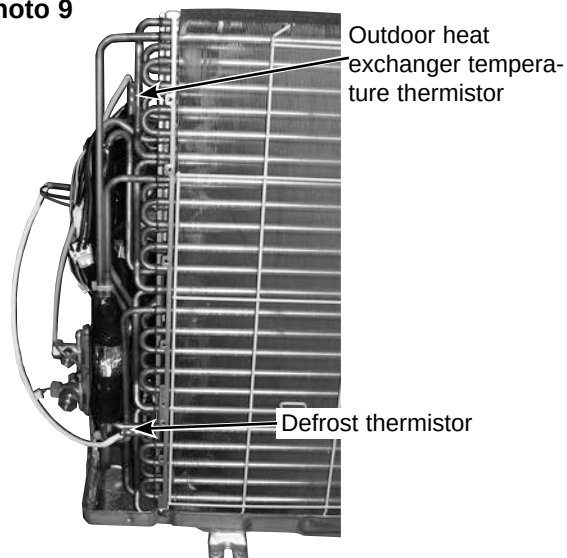
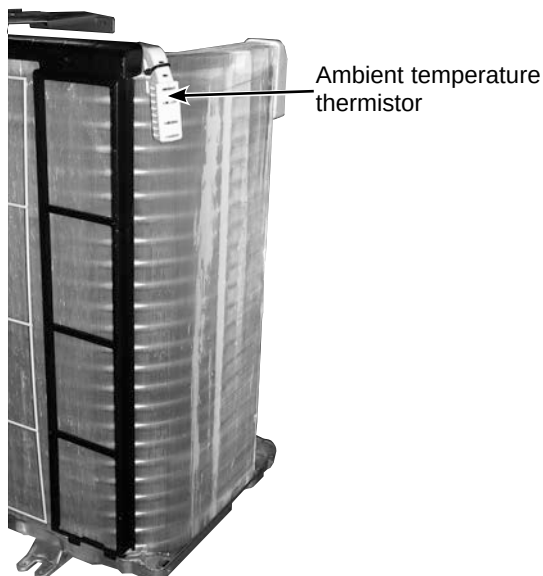
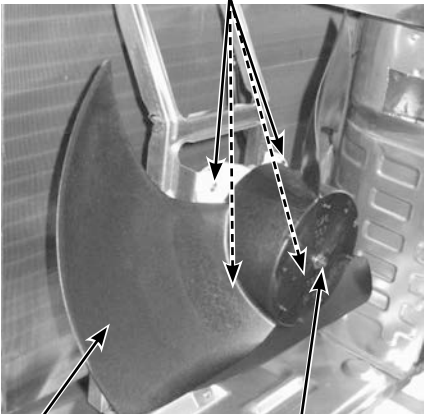
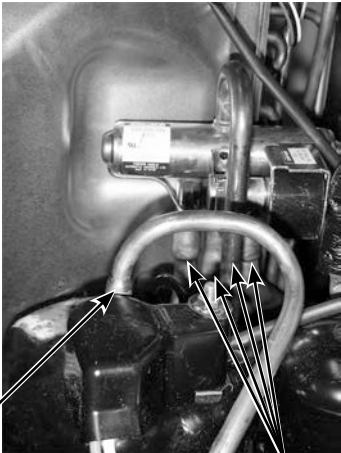
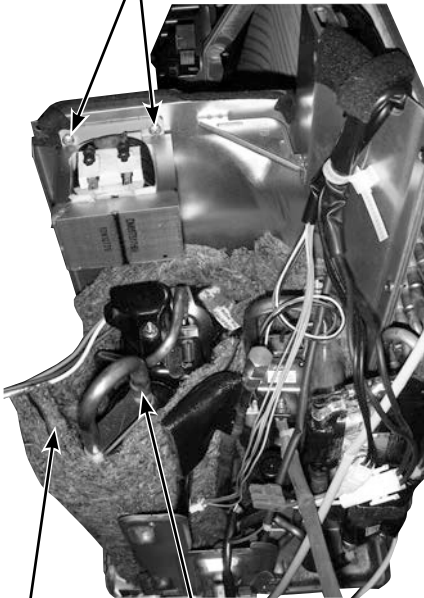


Photo 10



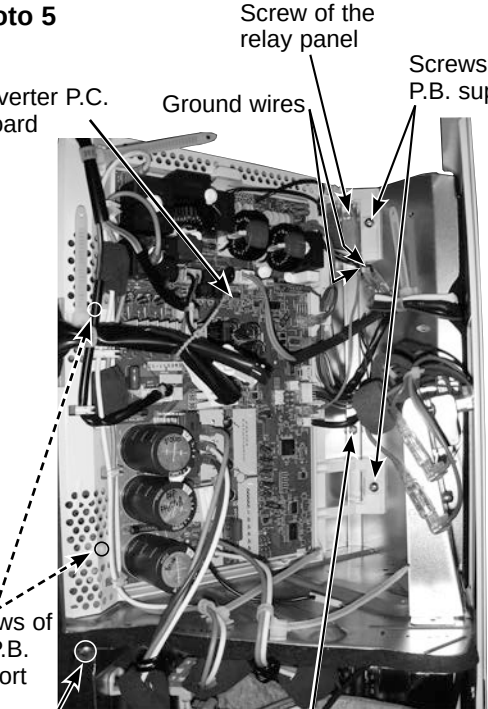
OPERATING PROCEDURE	PHOTOS
5. Removing outdoor fan motor (1) Remove the cabinet and panels. (Refer to 1.) (2) Disconnect the following connectors: <Inverter P.C. board> CN931, CN932 (Fan motor) (3) Remove the propeller nut. (4) Remove the propeller. (5) Remove the screws fixing the fan motor. (6) Remove the fan motor.	Photo 11 Screws of the outdoor fan motor  Propeller Propeller nut
6. Removing the compressor and 4-way valve (1) Remove the cabinet and panels. (Refer to 1.) (2) Remove the inverter assembly. (Refer to 2.) (3) Remove the screws fixing the reactor. (4) Remove the reactor. (5) Remove the soundproof felt. (6) Recover gas from the refrigerant circuit. NOTE: Recover gas from the pipes until the pressure gauge shows 0 PSIG. (7) Detach the brazed part of the suction and the discharge pipe connected with compressor. (8) Remove the nuts fixing the compressor. (9) Remove the compressor. (10) Detach the brazed part of pipes connected with 4-way valve. Photo 13  Discharge pipe brazed part Brazed parts of 4-way valve	Photo 12 Screws of the reactor  Soundproof felt Suction pipe brazed part

11-2. MUZ-FH15NA MUZ-FH15NAH

NOTE: Turn OFF power supply before disassembly.

OPERATING PROCEDURE	PHOTOS
1. Removing the cabinet (1) Remove the screws of the service panel. (2) Remove the screws of the top panel. (3) Remove the screw of the valve cover. (4) Remove the service panel. (5) Remove the screws fixing the conduit cover. (6) Remove the conduit cover. (7) Remove the screw of fixing the conduit plate. (8) Remove the conduit plate. (9) Remove the top panel. (10) Remove the valve cover. (11) Disconnect the power supply and indoor/outdoor connecting wire. (12) Remove the screws of the cabinet. (13) Remove the cabinet. (14) Remove the screws of the back panel. (15) Remove the back panel. Photo 2	Photo 1 Photo 3 Photo 4



OPERATING PROCEDURE	PHOTOS
2. Removing the inverter assembly, inverter P.C. board and relay P.C. board (1) Remove the cabinet and panels. (Refer to 1.) (2) Disconnect the lead wire to the reactor and the following connectors: <Inverter P.C. board> CN602 (R.V. coil) CN931, CN932 (Fan motor) CN671 (Defrost thermistor, discharge temperature thermistor and outdoor heat exchanger temperature thermistor) CN672 (Ambient temperature thermistor) CN724 (LEV) CN601 (Defrost heater and heater protector) (MUZ-FH15NAH) (3) Remove the compressor connector. (4) Remove the screws fixing the relay panel. (5) Remove the relay panel. (6) Remove the ground wires and the lead wires of the inverter P.C. board. (7) Remove the screws of the P.B. support. (8) Remove the inverter P.C. board from the P.B. support.	Photo 5  Labels in Photo 5: - Screw of the relay panel - Screws of the P.B. support - Ground wires - Inverter P.C. board - Screws of the P.B. support - Screw of the relay panel
3. Removing R.V. coil (1) Remove the cabinet and panels. (Refer to 1.) (2) Disconnect the following connector: <Inverter P.C. board> CN602 (R.V. coil) (3) Remove the R.V. coil.	Photo 6  Labels in Photo 6: - Screw of the R.V. coil - Brazed parts of 4-way valve

OPERATING PROCEDURE

4. Removing the discharge temperature thermistor, defrost thermistor, outdoor heat exchanger temperature thermistor and ambient temperature thermistor

- (1) Remove the cabinet and panels. (Refer to 1.)
- (2) Disconnect the lead wire to the reactor and the following connectors:
 <Inverter P.C. board>
 CN671 (Defrost thermistor, discharge temperature thermistor and outdoor heat exchanger temperature thermistor)
 CN672 (Ambient temperature thermistor)
- (3) Pull out the discharge temperature thermistor from its holder.
- (4) Pull out the defrost thermistor from its holder.
- (5) Pull out the outdoor heat exchanger temperature thermistor from its holder.
- (6) Pull out the ambient temperature thermistor from its holder.

5. Removing outdoor fan motor

- (1) Remove the top panel, cabinet and service panel. (Refer to 1.)
- (2) Disconnect the following connectors:
 <Inverter P.C. board>
 CN931 and CN932 (Fan motor)
- (3) Remove the propeller.
- (4) Remove the screws fixing the fan motor.
- (5) Remove the fan motor.

6. Removing the compressor and 4-way valve

- (1) Remove the top panel, cabinet and service panel. (Refer to 1.)
 - (2) Remove the back panel. (Refer to 1.)
 - (3) Remove the inverter assembly. (Refer to 2.)
 - (4) Remove the soundproof felt.
 - (5) Recover gas from the refrigerant circuit.
- NOTE:** Recover gas from the pipes until the pressure gauge shows 0 PSIG.
- (6) Detach the brazed part of the suction and the discharge pipe connected with compressor.
 - (7) Remove the nuts fixing the compressor.
 - (8) Remove the compressor.
 - (9) Detach the brazed parts of 4-way valve and pipe. (Photo 4)

PHOTOS

Photo 7

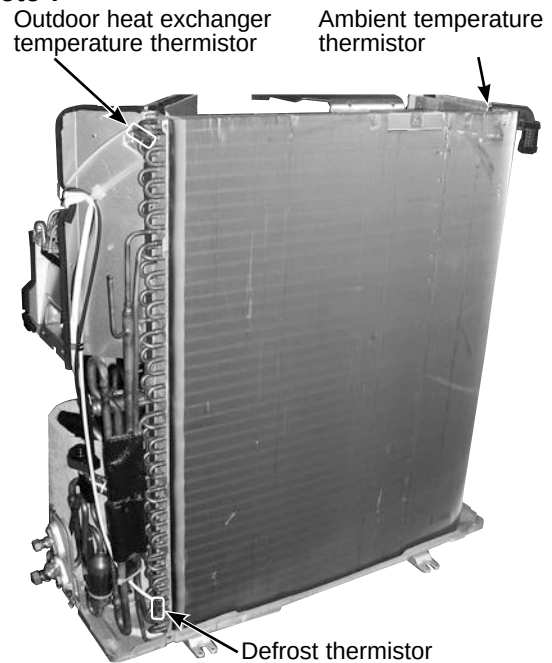


Photo 8

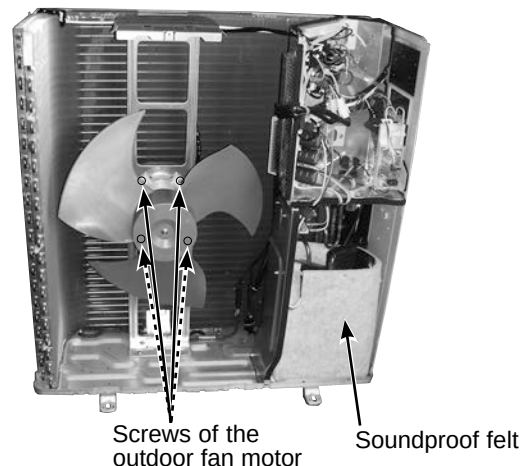
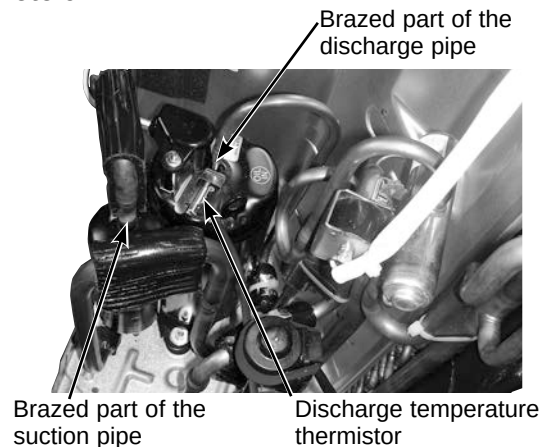


Photo 9



mitsubishi electric corporation

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

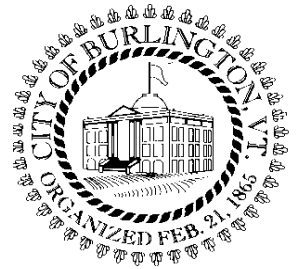
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Made in Japan

New publication, effective Apr. 2014
Specifications are subject to change without notice.

Department of Permitting and Inspections

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William Ward, Director
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Garret King, Associate Planner
Joseph Cava, Planning Technician
Ted Boylan, Permit Administrator
Steven Cormier, Zoning Compliance Officer



MEMORANDUM

To: The Design Advisory Board
From: Mary O'Neil, AICP, Principal Planner
RE: ZP-24-23
Location: 23 Catherine Street
Date: March 12, 2024

File: ZP-24-23

Location: 23 Catherine Street

Zone: RL **Ward:** 5

Parking District: Neighborhood

Date application accepted: January 24, 2024

Applicant/ Owner: Maple Hill Construction / David Barron and Ericka Houskeeper

Request: Demo and remove existing one story, 12'x19', single bay garage and construct a 12' x 19' habitable space as an expansion of the existing single family home. Installation of a stone patio 12' x 15' and 2' x 6' area.



Background:

- **Zoning Permit 22-574;** convert existing garage into expanded living space associated with the existing single family home. Proposed removal of overhead door and installation of new windows. Remove existing back deck and stair and replace with a stone patio and stair from house to patio. December 2022. Permit expired.
- **Zoning Permit ZPF-22-13;** replace existing picket fence on eastern side of property. April 2022.

The programs and services of the City of Burlington are accessible to people with disabilities. For accessibility information call 865-7188 (for TTY users 865-7142).

- **Zoning Permit 15-0960FC/ ZP-15-170**; replace and extend fence along western side of property. May, 2015.
- **Zoning Permit 11-0709CA**; remove chimney. April 2011.
- **Zoning Permit 10-1122CA**; expand 30 sf. of living space into front porch by aligning wall. July 2010.
- **Non-Applicability of Zoning Permit Requirements 10-1126NA**; replacing existing porch with the same material and same design while waiting for zoning approval on 30 sf. (enclosing.) June 2010.
- **Zoning Permit 06-733CA**; Finish 840 sf. of basement area into living space. May 2006.
- **Zoning Permit 08-567HO**; specialty food distribution (Vt. Cheese Club) home occupation. April 2008.
- **Zoning Permit 89-262**; install two skylights on south side of existing garage. Insulate and install heating to be used as workshop. No change in use and no commercial use/business. June 1989.

Overview:

23 Catherine Street is an existing single family home on a 3,375 sf. lot constructed in 1917 on the corner of Catherine and Charlotte Streets in the Five Sisters neighborhood. In 2022 a permit was issued to convert the garage to an ADU; however structural concerns about the existing garage halted the project. The applicant now proposes demolition and rebuild of the structure on the same footprint to expand habitable space of the existing home. No new units are proposed. As the house and garage are included within the Historic Sites and Structures Survey of the Five Sisters neighborhood, Section 5.4.8 of the standards apply, and building removal is subject to DAB recommendation and DRB Conditional Use review.

Part 1: Land Division Design Standards

Not applicable.

Part 2: Site Plan Design Standards

Sec. 6.2.2 Review Standards

(a)Protection of Important Natural Features:

None identified.

(b) Topographical Alterations:

No change in topography is included within this application.

(c)Protection of Important Public Views:

Not applicable.

(d) Protection of Important Cultural Resources:

Burlington's architectural and cultural heritage shall be protected through sensitive and respectful redevelopment, rehabilitation, and infill. Archeological sites likely to yield information important to the city's or the region's pre-history or history shall be evaluated,

documented, and avoided whenever feasible. Where the proposed development involves sites listed or eligible for listing on a state or national register of historic places, the applicant shall meet the applicable development and design standards pursuant to Sec. 5.4.8(b).

See Section 5.4.8, below.

(e) Supporting the Use of Renewable Energy Resources:

Any new construction after January 1, 2024 must comply with the Thermal Energy Ordinance. The applicant has been given contact information to BED to better coordinate that effort.

(f) Brownfield Sites:

Not applicable.

(g) Provide for nature's events:

Special attention shall be accorded to stormwater runoff so that neighboring properties and/or the public stormwater drainage system are not adversely affected. All development and site disturbance shall follow applicable city and state erosion and stormwater management guidelines in accordance with the requirements of Art 5, Sec 5.5.3.

With the new patio (14' x 13') and the replacement detached structure (12' x 19' 4") new disturbed area exceeds 400 sf, and will require an Erosion Prevention and Sediment Control Plan. The applicant has been provided a link to apply online.

Design features which address the effects of rain, snow, and ice at building entrances, and to provisions for snow and ice removal or storage from circulation areas shall also be incorporated.

Other than a minor eave line, there is no canopy over the entrance to the new unit.

As the site is already so tightly constrained, snow storage will likely replicate conditions already in place.

(h) Building Location and Orientation:

The introduction of new buildings and additions shall be consistent with the intent of the district. New buildings and additions should be aligned with the front façade of neighboring buildings to reinforce the existing "street-edge," or where necessary, located in such a way that complements existing natural features and landscapes. Buildings placed in mixed-use areas where high volume of pedestrian traffic are desired should seek to provide sufficient space (optimally 12-15 feet) between the curb line and the building face to facilitate the flow of pedestrian traffic. In such areas, architectural recesses and articulations at the street-level are particularly important, and can be used as an alternative to a complete building setback in order to maintain the existing street wall.

Existing garage, east facing

Proposed living structure, east facing

Windows to match house in style and size

Siding to match house in size and color

Permeable groundcover/ crushed rock to replace 3' of driveway

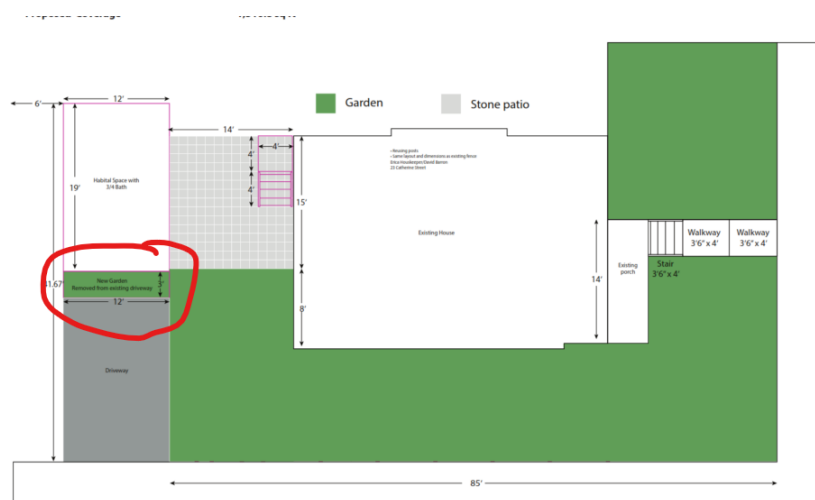
The existing driveway is entered from Charlotte Street. No change is proposed.

Part of the driveway will need to be identified as a pedestrian path to the new residential unit.

This is not a requirement for single family residences. ADA access is under the jurisdiction of the building official.

No change is proposed to parking or circulation. One small parking space is provided on-site.

No landscaping plan has been provided. There are fences on both the west of the lot, and the east of the parcel. A small garden area is identified in the Site Plan Mock-up.



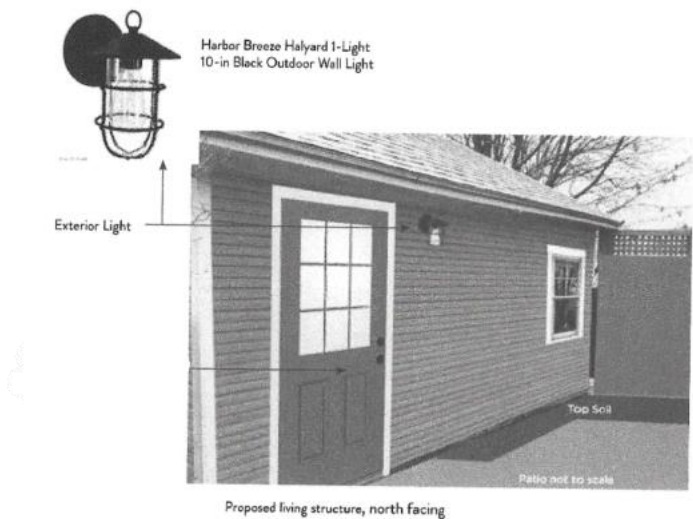
(n) Public Plazas and Open Space:

Not applicable.

(o) Outdoor Lighting:

Where exterior lighting is proposed the applicant shall meet the lighting performance standards as per Sec 5.5.2.

A small residential scale exterior light is proposed outside the entry door.



(p) Integrate infrastructure into the design:

Exterior storage areas, machinery and equipment installations, service and loading areas, utility meters and structures, mailboxes, and similar accessory structures shall utilize setbacks, plantings, enclosures and other mitigation or screening methods to minimize their auditory and visual impact on the public street and neighboring properties to the extent practicable.

Utility and service enclosures and screening shall be coordinated with the design of the principal building, and should be grouped in a service court away from public view. On-site utilities shall be placed underground whenever practicable. Trash and recycling bins and dumpsters shall be located, within preferably, or behind buildings, enclosed on all four (4) sides to prevent blowing trash, and screened from public view.

Any development involving the installation of machinery or equipment which emits heat, vapor, fumes, vibration, or noise shall minimize, insofar as practicable, any adverse impact on neighboring properties and the environment pursuant to the requirements of Article 5, Part 4 Performance Standards.

There is no indication within the submission where trash, recycling and compost will be stored (with the loss of the garage); nor where any HVAC/mechanical units are proposed. The latter will likely be determined after consultation with BED.

Part 3: Architectural Design Standards

Sec. 6.3.2 Review Standards

(a) Relate development to its environment:

Proposed buildings and additions shall be appropriately scaled and proportioned for their function and with respect to the purpose of the zoning district. They should integrate harmoniously into the topography, and to the use, scale, and architectural details of existing buildings in the vicinity; however such consideration shall not require building height to be more

limited than otherwise allowed within an applicable zoning district or overlay zone per Article 4.
[Revised per Neighborhood Code warned amendment.]

The proposed building will be clad in a wood product, and constructed to a height similar to what is existing.

1. Massing, Height and Scale:

While architectural styles or materials may vary within a streetscape, proposed development should maintain an overall scale similar to that of surroundings buildings, or provide a sensitive transition where appropriate to development of a dissimilar scale.

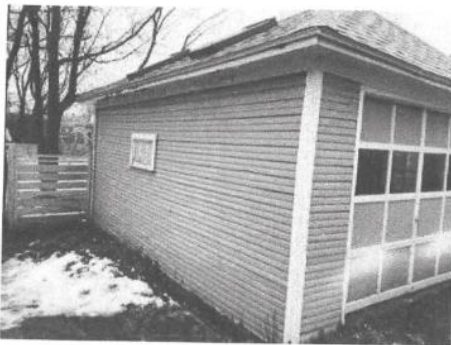
In low and medium residential districts, the height and massing of existing residential buildings should be carefully considered when evaluating the compatibility of additions and infill development; however no modifications by the DRB shall be made to projects which otherwise limit the allowable Principal Structure footprint, height and number of units per building otherwise permitted by Tables 4.4.5-1 and 4.4.5-2.

[Revised per Neighborhood Code warned amendment.]

No new units are proposed. The intent is to create additional living space for the single family home. The replacement building is intended to match the dimensions of the existing garage.

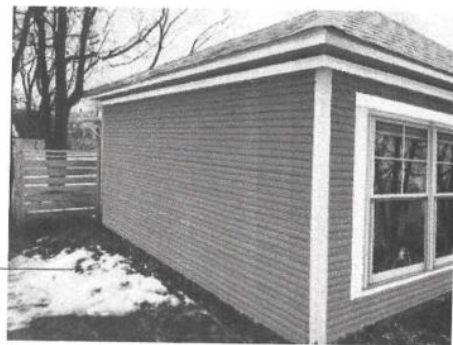
2. Roofs and Rooflines.

While no building elevations have been submitted, illustrations indicate replication of the existing roof.



Existing garage, south facing

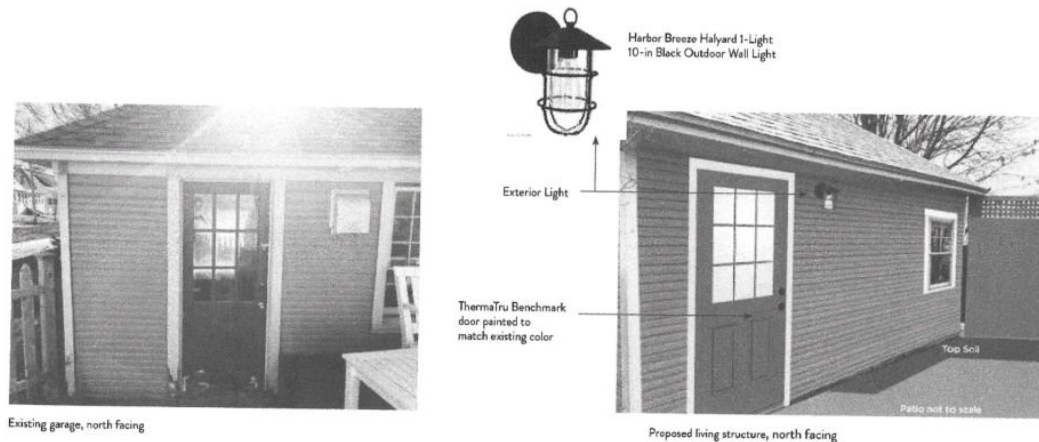
Match to existing
groundcover



Proposed living structure, south facing

3. Building Openings

Building openings closely replicate existing conditions: A door and window on the north elevation, no openings on the south and west. The marked change is replacement of the garage door with a triple-ganged set of double hung windows.



(b) Protection of Important Architectural Resources:

Burlington's architectural and cultural heritage shall be protected through sensitive and respectful redevelopment, rehabilitation, and infill. Where the proposed development involves buildings listed or eligible for listing on a state or national register of historic places, the applicant shall meet the applicable development and design standards pursuant to Sec. 5.4.8. The introduction of new buildings to a historic district listed on a state or national register of historic places shall make every effort to be compatible with nearby historic buildings.

See Section 5.4.8.

(c) Protection of Important Public Views:

Not applicable.

(d) Provide an active and inviting street edge:

In scale and proportion, the replacement window will duplicate the existing detached garage. The large window arrangement will provide a cheery appearance to the structure.

(e) Quality of materials:

All development shall maximize the use of highly durable building materials that extend the life cycle of the building, and reduce maintenance, waste, and environmental impacts. Such materials are particularly important in certain highly trafficked locations such as along major streets, sidewalks, loading areas, and driveways. Efforts to incorporate the use of recycled content materials and building materials and products that are extracted and/or manufactured within the region are highly encouraged.

Owners of historic structures are encouraged to consult with an architectural historian in order to determine the most appropriate repair, restoration or replacement of historic building materials as outlined by the requirements of Art 5, Sec. 5.4.8.

Siding is proposed to be 4” shiplap, intended to match the reveal of the existing structure. Roofing will be asphalt shingle. Both are considered of sufficient durability for new construction.

(f) Reduce energy utilization:

The 2024 Thermal Energy Ordinance will apply. Compliance is subject to review by Burlington Electric and the building official.

(g) Make advertising features complementary to the site:

Not applicable.

(h) Integrate infrastructure into the building design:

See Section 6.2.2. (p), above.

(i) Make spaces secure and safe:

Development is subject to all building and life safety code as defined by the building official.

Sec. 5.4.8 Historic Buildings and Sites

The City seeks to preserve, maintain, and enhance those aspects of the city having historical, architectural, archaeological, and cultural merit. Specifically, these regulations seek to achieve the following goals:

To preserve, maintain and enhance Burlington’s historic character, scale, architectural integrity, and cultural resources;

To foster the preservation of Burlington’s historic and cultural resources as part of an attractive, vibrant, and livable community in which to live, work and visit;

To promote a sense of community based on understanding the city’s historic growth and development, and maintaining the city’s sense of place by protecting its historic and cultural resources; and,

To promote the adaptive re-use of historic buildings and sites.

(a) Applicability:

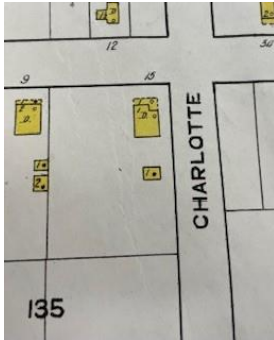
These regulations shall apply to all buildings and sites in the city that are listed, or eligible for listing, on the State or National Register of Historic Places.

(b) Standards and Guidelines:

The following development standards, following the Secretary of the Interior’s Standards for the Treatment of Historic Properties, shall be used in the review of all applications involving historic buildings and sites subject to the provisions of this section and the requirements for Design Review in Art 3, Part 4. The Secretary of the Interior’s Standards are basic principles created to help preserve the distinctive character of a historic building and its site. They are a series of concepts about maintaining, repairing and replacing historic features, as well as designing new additions or making alterations. These Standards are intended to be applied in a reasonable manner, taking into consideration economic and technical feasibility.

1. *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.*

The original single family home constructed in 1917 will remain. The 1919 Sanborn Fire Insurance Map illustrates the garage on-site; a very early arrival for an “automotive shed”.



This proposal will replace a detached garage in a state of structural deterioration with additional living space; within a new structure of the same dimension.

2. *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.*

While the building itself is proposed for replacement, in massing, scale and materials it will closely resemble the original garage structure.

3. *Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.*

No conjectural features are proposed.

4. *Changes to a property that have acquired historic significance in their own right will be retained and preserved.*

None identified.

5. *Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.*

In size, location, proportion, and materials, the structure will closely resemble the original garage. It is a secondary, detached structure on the site; and the primary residence will not be altered.

6. *Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials recognizing that new technologies may provide an appropriate alternative in order to adapt to ever changing conditions and provide for an efficient contemporary use. Replacement of missing features will be substantiated by documentary and physical evidence.*

The applicant has provided an engineer’s assessment of the existing structure which notes the material failure and conditions incongruous for redeveloping into residential space. (See attached report from Peter Zelonis of Artisan Engineers.)

7. *Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*

Demolition is always the most significant of physical treatments. With a replacement building of matching dimensions and similar finishes, the loss of this secondary building is somewhat ameliorated with new habitable space.

8. *Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.*

No archaeological resources have been identified as this site. Not applicable.

9. *New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale, and proportion, and massing to protect the integrity of the property and its environment.*

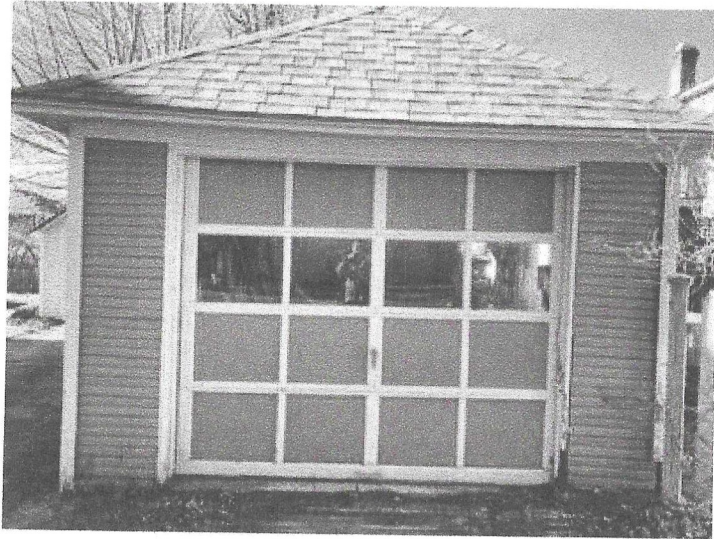
The replacement of the automotive shed with a detached structure of similar size, dimension, location and materials will retain those characteristics associated with the property.

10. *New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

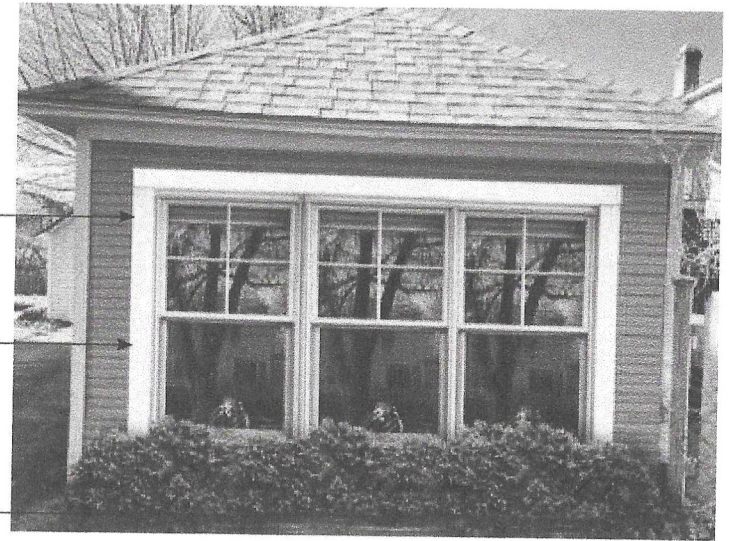
While demolition removes the potential of “reversibility”, the detached nature of the existing garage and the replication in scale with another secondary building somewhat preserves the context of the original site. The primary structure will remain as existing.

Items for the Board’s consideration:

- An EPSC will be required for review and approval by the Stormwater Engineer.
- Part of the driveway will need to be identified as a pedestrian path to the new residential unit.
- Some form of canopy over the unit entrance is recommended to protect residents from inclement weather.
- The location of trash/recycling/compost and any HVAC equipment will need to be identified on the plan.



Existing garage, east facing

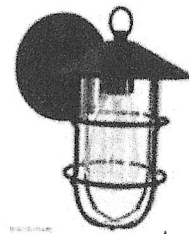


Windows to match house
in style and size

Siding to match house in
size and color

Permeable groundcover/
crushed rock to replace
3' of driveway

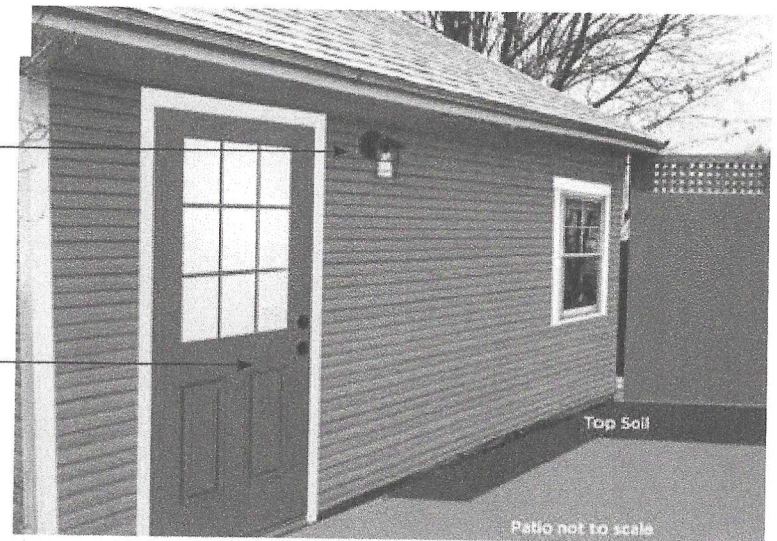
Proposed living structure, east facing



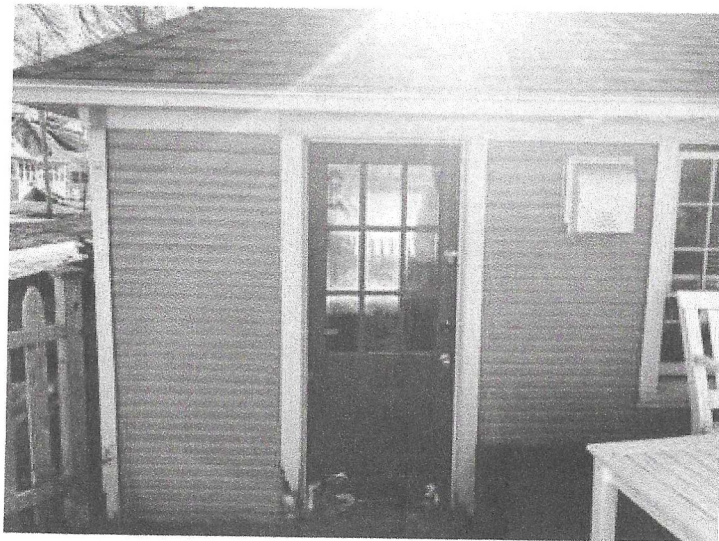
Harbor Breeze Halyard 1-Light
10-in Black Outdoor Wall Light

Exterior Light

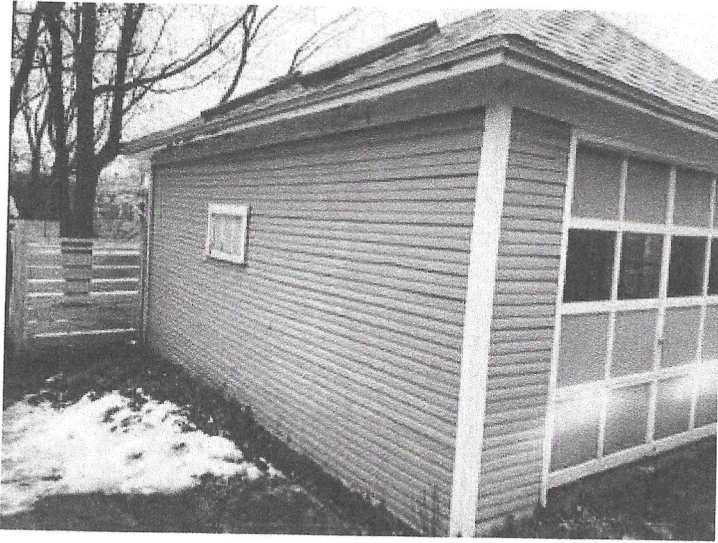
ThermaTru Benchmark
door painted to
match existing color



Proposed living structure, north facing

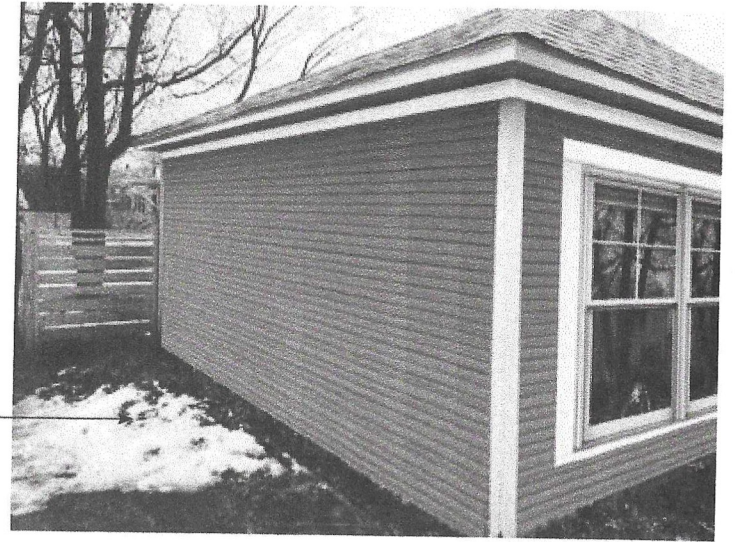


Existing garage, north facing

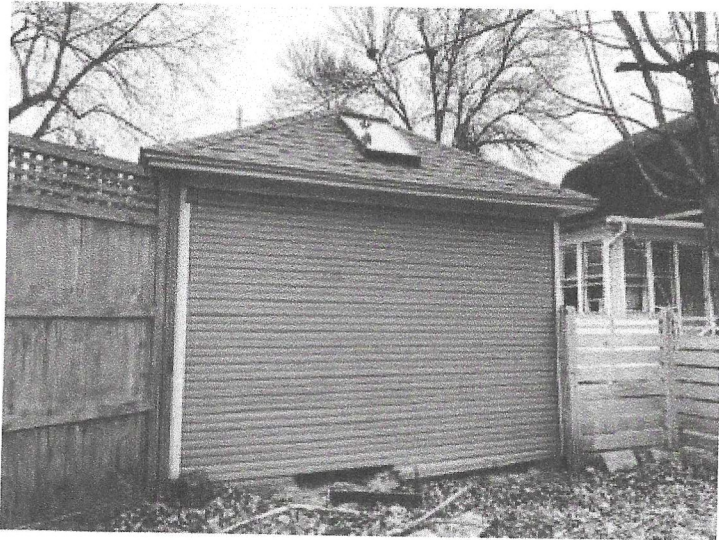


Existing garage, south facing

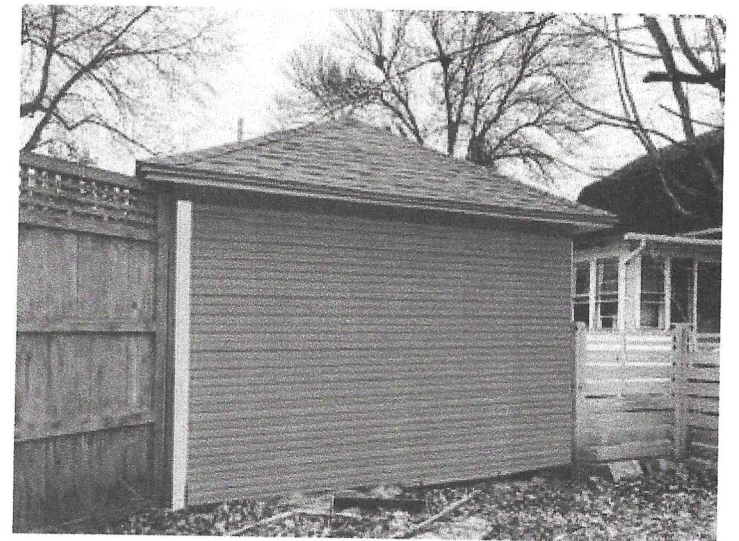
Match to existing
groundcover



Proposed living structure, south facing



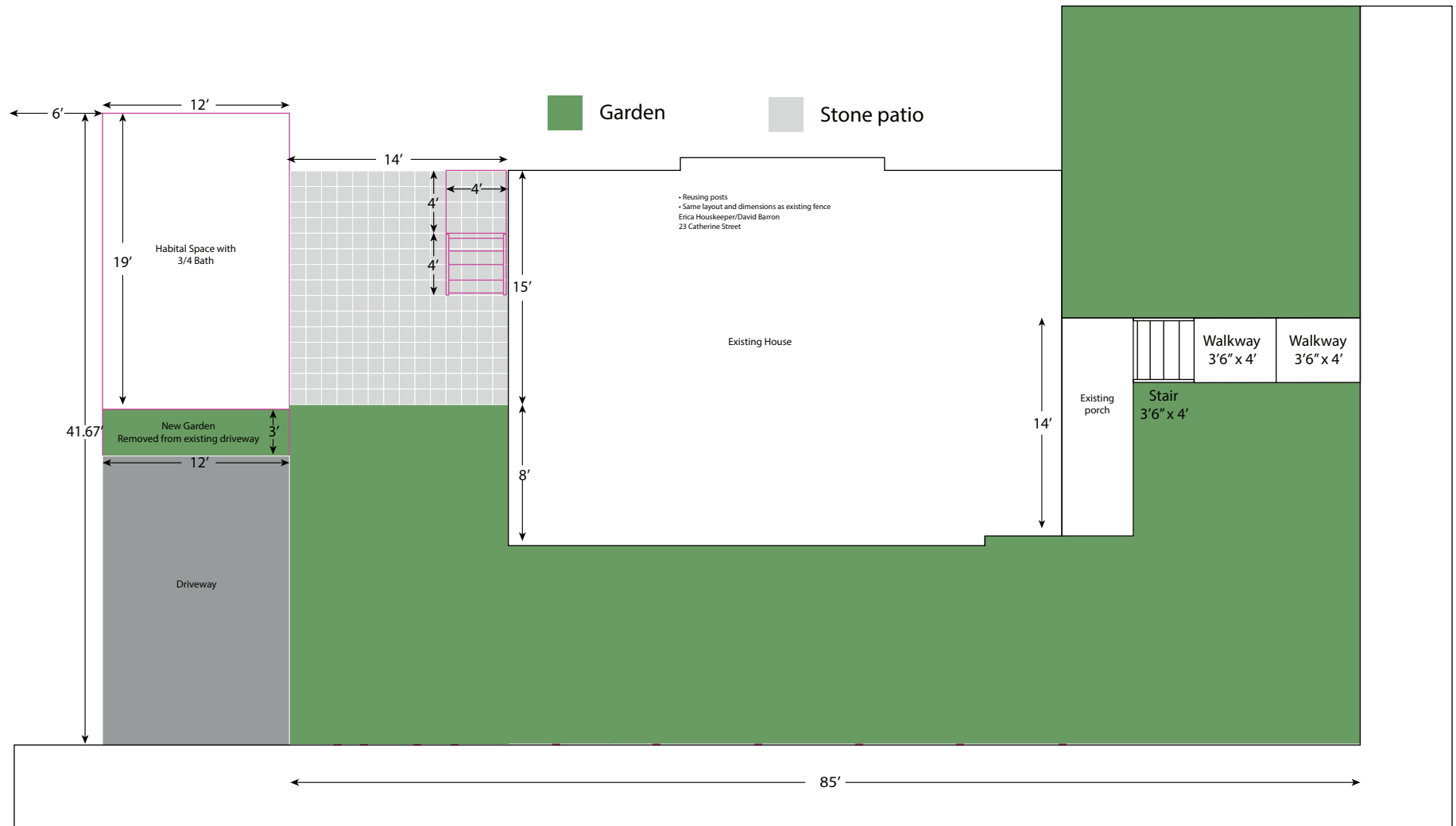
Existing garage, east facing



Proposed living structure, east facing

House	823
Proposed New Detached Building 12'x 19'	228
Driveway 8'x18'-6"	148.8
Open Front Porch	70
Front Stair	14
Front Walkway	17
Proposed Stone Patio	210
Proposed Coverage	1,510.8 sq ft

Lot: 3,375 sq ft
Proposed Coverage (1510.8/3375) = 44.7%





Existing garage, east facing

Windows to match house in style and size

Siding to match house in size and color

Permeable groundcover/ crushed rock to replace 3' of driveway



Proposed living structure, east facing



Existing garage, north facing

ThermaTru Benchmark door painted to match existing color



Proposed living structure, north facing



Existing garage, south facing

Match to existing
groundcover



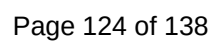
Proposed living structure, south facing



Existing garage, east facing



Proposed living structure, east facing



Maple Hill Construction, Inc.

“Building Relationships, One Project at a Time”

23 Catherine St., Burlington, VT

Siding to be 4” shiplap to match existing garage

Roofing to be architectural shingle – color and manufacturer to be determined

**62 Chittenden Dr., Burlington, VT 05401
(802) 448-0430**

MEMORANDUM

Date: February 6, 2024 Artisan Project # 24042

To: Dixie O'Connor
Maple Hill Construcion

From: Peter J. Zelonis, PE

Subject: 23 Catherine Street Garage Evaluation

At your request, we performed a site visit to 23 Catherine Street, Burlington, Vermont on February 1st, 2024. The purpose of the site visit was to review the existing conditions of the detached garage structure. It was noted the owner's intent is to develop the footprint of the garage into conditioned living space. Our observations and recommendations are limited to those portions of the building accessible.

The garage structure is approximately 12 feet wide by 19'-4" long, wood framed with a vaulted hip roof structure.

The building is sitting at ground level with wood in contact with the surrounding soil. A thin 3"-4" "rat slab" is present and at grade. However, the slab does not have frost walls and has been undermined by animals, particularly in the rear of the structure. It appears that the slab was poured as a retrofit, and not part of the original construction. As viewed from the interior, there is evidence of the walls settling/rotting into the earth around the slab.

As a result of the existing slab and sill conditions, the base of the wood framed walls have rotted considerably, as well as the siding. Rotted wood was noted at the windows and door frames.

Orientated strand board (OSB) was used to sheath the interior walls and ceilings of the structure. It was noted there was a previous roof leak near one of the skylights, causing rot and mold on the OSB.

Given the lack of a proper foundation, and considerable rot present, we do not believe it prudent to renovate the existing building into conditioned living space. We recommend removing the structure and slab and replacing it with an insulated frost protected foundation (frost walls) and slab. A new wood framed building could then be constructed.

Please see the attached photographs for reference.

If you have question or require further clarifications, please contact our office.



Figure 1 - Detached garage structure



Figure 2 - Undermined slab and wood rot on north wall



Figure 3 – Note base of wall sitting and below grade on north wall



Figure 4 - Note base of wall sitting and below grade on south wall



Figure 5 – East wall with garage door



Figure 6 – Rotted framing and siding at entry door



Figure 7 – Rotted window at north wall



Figure 8 – South west corner of wall and wood framing below grade



Figure 9 – West wall – note undermined slab



Figure 10 – Closeup of burrow undermined slab on west wall



Figure 11 – Northeast corner from the interior – note how the walls have settled / rotted down around the slab

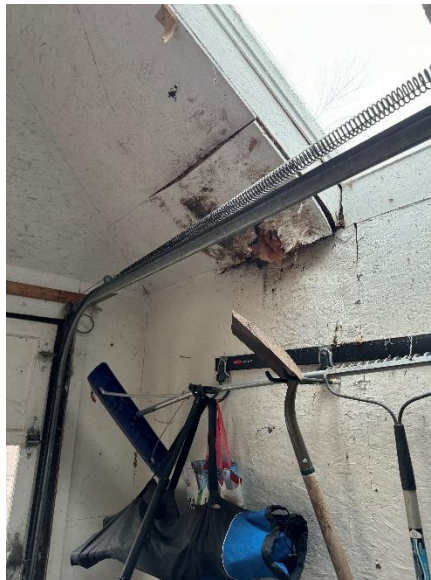


Figure 12 – Roof leak at skylight

STATE OF VERMONT Division for Historic Preservation Montpelier, VT 05602 HISTORIC SITES & STRUCTURES SURVEY Individual Structure Survey Form		SURVEY NUMBER: 0402-5	
COUNTY: Chittenden		Part of: ☒ District _____ ☐ Complex _____ Contributing ☒ Non-Contributing ☐	
TOWN: Burlington VILLAGE:		Listed on: State Register of Historic Places ☐ N National Register of Historic Places ☒ N	
LOCATION: 23 Katherine Street		CRITERIA: A ☐ B ☐ C ☐ D ☐	
PROPERTY TYPE: House		NEGATIVE FILE NUMBER:	
OWNER: Maria Stern ADDRESS:		COORDINATES: UTM (ZONE 18) E 0 N 0 VSP (NAD 83) E 443339.70315 N 218679.07805 E911 E N	
ACCESSIBILITY TO PUBLIC: Yes ☐ No ☒ Restricted ☐		PRESENT FORMAL NAME: Stern House	
HISTORIC CONTEXT: Physical Patterns of Communities		COMMON NAME: Stern House	
SIGNIFICANCE: Architectural ☒ Historic ☒ Archeological ☐ Engineering ☐		ORIGINAL FORMAL NAME: --	
LEVEL OF SIGNIFICANCE: Local ☒ State ☐ National ☐		PRESENT USE: House	
PHYSICAL CONDITION OF STRUCTURE: Excellent ☒ Good ☐ Fair ☐ Poor ☐		ORIGINAL USE: House	
		ARCHITECT/ENGINEER:	
		BUILDER/CONTRACTOR:	
		STYLE: Prairie	
		PLAN:	
		DATE BUILT: 1917	
GENERAL DESCRIPTION: 1. Foundation: Stone ☐ Brick ☐ Concrete ☐ Concrete Block ☒ 2. Wall Structure: a. Wood Frame: Post & Beam ☐ Balloon ☒ b. Load Bearing Masonry: Brick ☐ Stone ☐ Concrete ☐ Concrete Block ☒ Bonding Pattern: c. Iron ☐ Steel ☐ e. Other: 3. Wall Covering: Clapboard ☒ Board & Batten ☐ Wood Shingle ☐ Shiplap ☐ Novelty ☐ Asbestos Shingle ☐ Sheet Metal ☐ Aluminum & Asphal Siding ☐ Brick Veneer ☐ Stone Veneer ☐ Bonding Pattern: Other: 4. Roof Structure: a. Truss: Wood ☒ Iron ☐ Steel ☐ Concrete ☐ b. Other: 5. Roof Covering: Slate ☐ Wood Shingle ☐ Asphalt Shingle ☐ Sheet Metal ☐ Built Up ☐ Rolled ☐ Tile ☐ Other: 6. Engineering Structure: 7. Other: 8. Appendages: Porches ☒ Towers ☐ Cupolas ☐ Dormers ☐ Chimneys ☒ Shed ☐ Ells ☐ Wings ☐ Bay Window ☐ Other: 9. Roof Styles: Gable ☐ Hip ☒ Shed ☐ Flat ☐ Mansard ☐ Gambrel ☐ Jerkinhead ☐ Saw Tooth ☐ With Monitor ☐ With Bellcast ☐ With Parapet ☐ With False Front ☐ Other: Number of Stories: 1 Entrance Location: center Number of Bays: 3 x 3 Approximate Dimensions: 24x36			

ADDITIONAL ARCHITECTURAL OR STRUCTURAL DESCRIPTION:**Additional Features:**

recessed porch;

Additional Description:**RELATED STRUCTURES:**

Garage - One-bay Garage;

STATEMENT OF SIGNIFICANCE:

This house occupies Lot #75 as shown on the 1898 Buell plan. Batchelder & Brown sold the lot to Willis S. Phelps in 1914, and the first Burlington City Directory listing appears in 1917, when the house was "vacant". It is an early and rare example of Prairie Style architecture, in which the overall form and massing emphasize the horizontality of the structure. The exterior remains in original condition, with no additions or major alterations. This house was originally listed as #15 Katherine Street, and changed to #23 in the 1920s.

REFERENCES:

MAP: (Indicate North in Circle)

SURROUNDING ENVIRONMENT:Open ☐Woodland ☐Scattered Buildings ☐Moderately Built Up ☐Densely Built Up ☒Residential ☒Commercial ☐Agricultural ☐Industrial ☐Roadside Strip Development ☐Designed Landscape Features ☐

Other:

RECORDED BY:

Devin Colman

ORGANIZATION:

City of Burlington

DATE RECORDED:

09/26/2007

LAST UPDATED:

10/12/2008

23 Catherine St., Burlington, Existing Lot Coverage:
Lot – 41.67x81 – 3,375

House per Assessors Data Base	823 sf
Detached Garage 12x19	228 sf
Driveway – 8’x21.5”	172 sf
Open Porch – 14’ x 5’	70 sf
Front Stair - 3’x4.5’	14 sf
Front Walkway – 3.5’ x 4’-11”	<u>17 sf</u>
Note Back Deck, 15’x6’ & 3’x9’, was Removed under Zoning Permit #22-574	
Total Existing Coverage	1,324 sf

Existing Coverage (1324/3375) = 39.2%

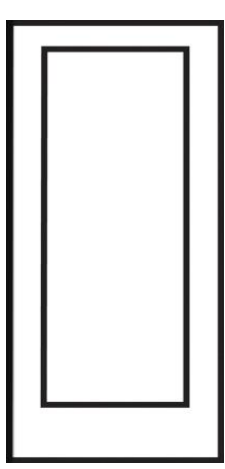
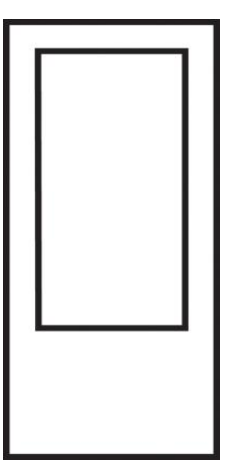
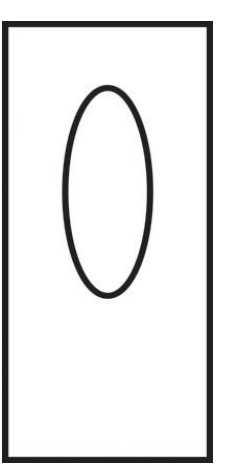
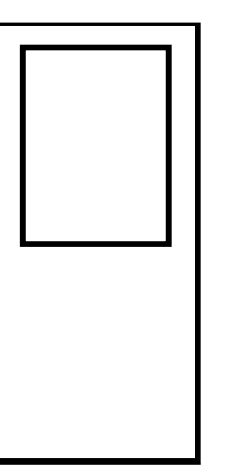
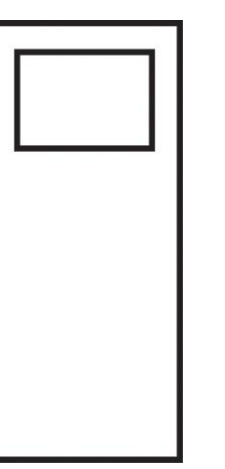
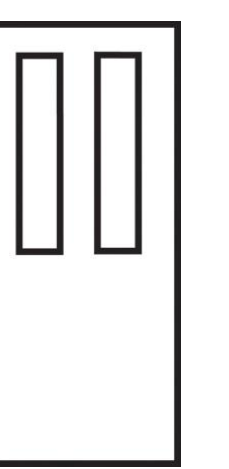
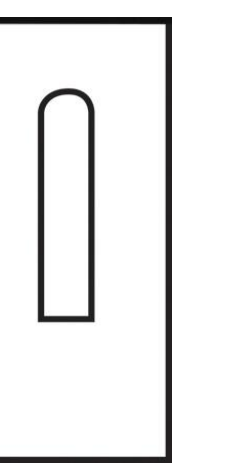
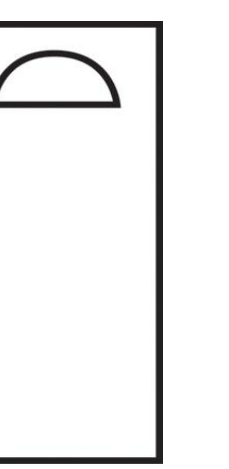
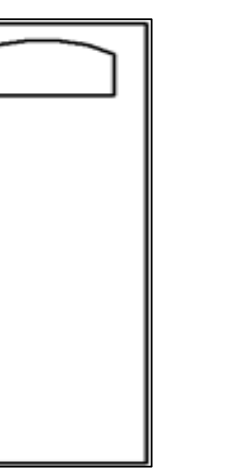
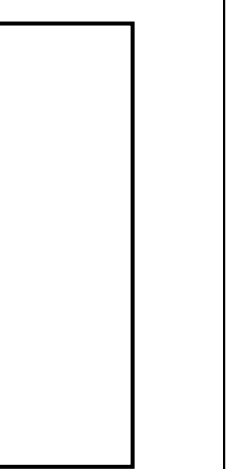
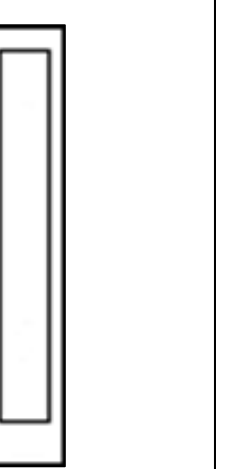
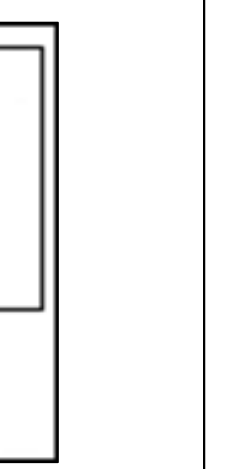
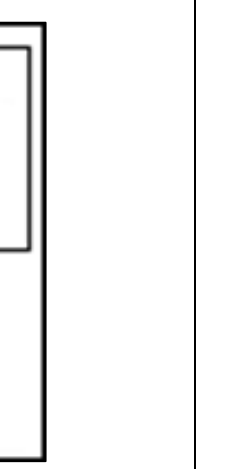
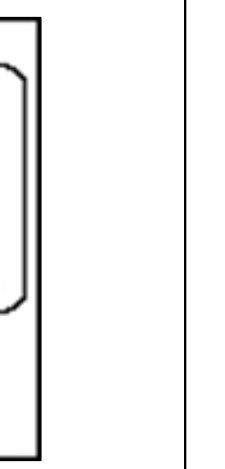
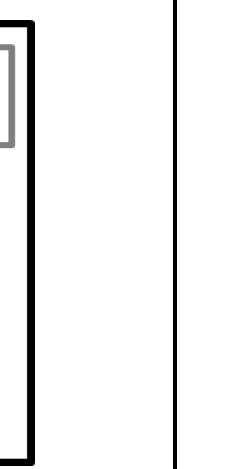
23 Catherine St., Burlington, Proposed Lot Coverage

House:	823 sf
Proposed New Detached Building 12’x 19’	228 sf
Driveway 8’x18’-6”	148.8 sf
Open Front Porch	70 sf
Front Stair	14 sf
Front Walkway	17 sf
Proposed Stone Patio – 14’x15’	<u>210 sf</u>
Proposed Coverage	1,510.8 sf

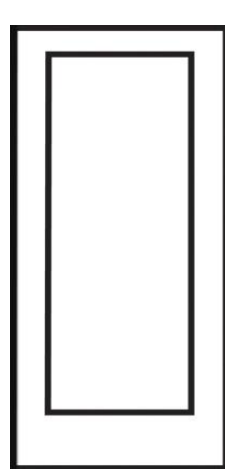
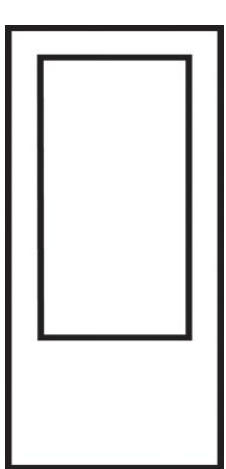
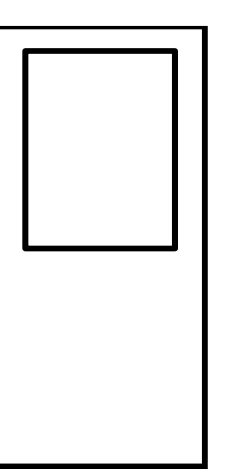
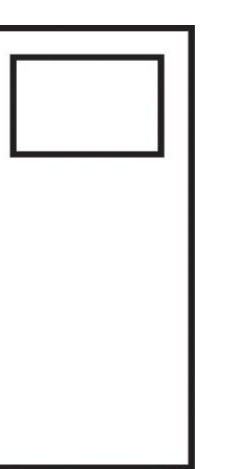
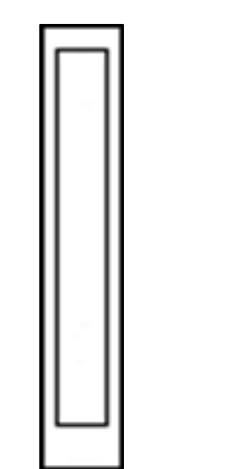
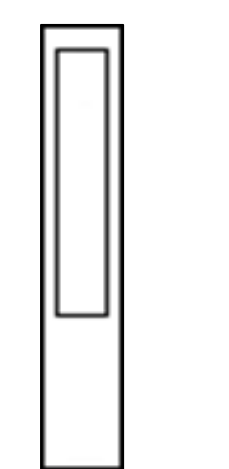
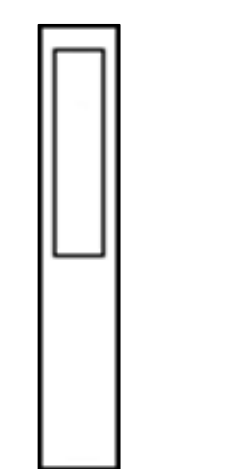
Proposed Coverage (1526.8/3375) = 44.7%

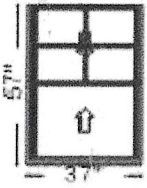
2020 ENERGY STAR® Qualification Chart
Mahogany Collection™, Oak Collection™ and Smooth Surface Collection™

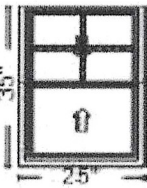


Glass Designs															
Entry Doors - 6'8															
Delano™	.26 / .27		.21 / .15	.21 / .15			.18 / .08		.18 / .08		.18 / .08				
Emerson™	.26 / .27	.23 / .20		.21 / .15	.18 / .08				.18 / .08		.18 / .08	.18 / .08	.18 / .08		
Florentino™	.30 / .25	.26 / .18	.23 / .14	.23 / .14			.19 / .07		.19 / .07		.19 / .07	.19 / .07			
Montebello	.30 / .25	.26 / .18	.23 / .14	.23 / .14	.19 / .07		.19 / .07		.19 / .07		.19 / .07	.19 / .07	.19 / .07		
Parson®	.26 / .27	.23 / .20		.21 / .15					.18 / .08		.18 / .08	.18 / .08	.18 / .08	.18 / .08	
Privacy	.26 / .27	.23 / .20		.21 / .15	.18 / .08				.18 / .08		.18 / .08	.18 / .08	.18 / .08		
Privacy with External Grilles (same as privacy)	.26 / .27	.23 / .20		.21 / .15	.18 / .08				.18 / .08		.18 / .08	.18 / .08	.18 / .08		
Shaker with Privacy	.30 / .28				.21 / .08						.21 / .08				.21 / .08
Shaker with Privacy, External Grilles	.30 / .28				.21 / .08						.21 / .08				.21 / .08
Star	.26 / .27	.23 / .20	.21 / .15	.21 / .15		.21 / .15					.18 / .08		.18 / .08		
TerraCourt®	.26 / .27	.23 / .20	.21 / .15	.21 / .15		.21 / .15	.18 / .08	.18 / .08	.18 / .08		.18 / .08		.18 / .08	.18 / .08	
Varissa®	.26 / .27	.23 / .20	.21 / .15	.21 / .15		.21 / .15	.18 / .08	.18 / .08			.18 / .08		.18 / .08	.18 / .08	
WickerPark	.26 / .27	.23 / .20		.21 / .15	.18 / .08						.18 / .08	.18 / .08	.18 / .08		
WillowBrook®	.26 / .27	.23 / .20	.21 / .15	.21 / .15		.21 / .15	.18 / .08	.18 / .08			.18 / .08		.18 / .08	.18 / .08	
Clear	.34 / .30			.25 / .17	.20 / .09						.20 / .09				
Clear with Internal Grilles															
Clear with External Grilles	.34 / .30			.25 / .17							.20 / .09		.20 / .09		
Clear with Low-E	.29 / .17			.22 / .09	.18 / .07						.19 / .07				
Shaker Clear with Low-E	.28 / .26				.20 / .07						.20 / .07				.20 / .07
Clear with Low-E, Internal Grilles	.29 / .15										.19 / .04				
Clear with Low-E, External Grilles	.29 / .17			.22 / .09	.18 / .07						.19 / .07				
Shaker Clear with Low-E, External Grilles	.28 / .26				.20 / .07						.20 / .07				.20 / .07
Internal Blinds - Clear	.36 / .25	.30 / .18		.26 / .14							.21 / .07	.21 / .07	.21 / .07		
Internal Blinds - Clear with Low-E	.31 / .21	.27 / .15		.24 / .12							.20 / .06	.20 / .06	.20 / .06		
Solid Panel (includes all paneling designs)										.14 / .01					
Shaker Solid Panel										.17 / .01					
Entry Doors - 8'0															
Delano™															
Emerson™	.26 / .27	.23 / .20										.18 / .08			
Florentino™	.30 / .25	.26 / .18										.19 / .07	.19 / .07		
Montebello	.30 / .25	.26 / .18										.19 / .07	.19 / .07		
Parson®	.26 / .27	.23 / .20										.18 / .08			
Privacy	.26 / .27	.23 / .20			.18 / .08							.21 / .15	.18 / .08		
Privacy with External Grilles	.26 / .27	.23 / .20			.18 / .08							.21 / .15	.18 / .08		
Shaker with Privacy					.21 / .08										.21 / .08
Shaker with Privacy, External Grilles					.21 / .08										.21 / .08
Star	.26 / .27	.23 / .20										.18 / .08			
TerraCourt®	.26 / .27	.23 / .20										.18 / .08			
Varissa®	.26 / .27	.23 / .20										.18 / .08			
WickerPark™	.26 / .27	.23 / .20			.18 / .08							.18 / .08			
WillowBrook®	.26 / .27	.23 / .20										.18 / .08			
Clear											.26 / .19				
Clear with External Grilles											.26 / .19				
Clear with Low-E	.30 / .28	.26 / .18			.19 / .08							.19 / .08			
Shaker Clear with Low-E					.20 / .07										.20 / .07
Clear with Low-E, External Grilles					.19 / .08							.19 / .08			
Shaker with Low-E, External Grilles					.20 / .07										.20 / .07
Solid Panel (includes all paneling designs)										.14 / .01					
Shaker Solid Panel										.17 / .01					
Patio Doors															
Clear	.34 / .30										.20 / .09				
Clear with Internal Grilles															
Clear with External Grilles	.34 / .30										.20 / .09				
Clear with Low-E	.29 / .17										.19 / .07				
Shaker Clear with Low-E	.28 / .26										.20 / .07				
Clear with Low-E, Internal Grilles	.29 / .15										.19 / .04				
Clear with Low-E, External Grilles	.29 / .17										.19 / .07				
Shaker with Low-E, External Grilles	.28 / .26										.20 / .07				
Internal Blinds - Clear	.36 / .25										.21 / .07				
Internal Blinds - Clear with Low-E	.31 / .21										.20 / .06				

2020 ENERGY STAR® Qualification Chart
Impact-Rated Doors

Glass Designs							
Entry Doors - 6'8							
Emerson™	.28 / .26	.24 / .19	.22 / .14	.18 / .07	.18 / .07		
Florentino™	.30 / .25	.28 / .20	.25 / .15		.20 / .08	.20 / .08	
Clear	.30 / .28	.26 / .18	.23 / .16	.19 / .08	.19 / .08		.19 / .07
Clear with Internal Dividers	.31 / .25		.23 / .14	.23 / .14	.19 / .07		
Clear with Low-E	.24 / .16	.21 / .12	.20 / .09	.17 / .05	.19 / .07		
Clear with Low-E, Internal Dividers	.25 / .14		.20 / .08		.19 / .06		.19 / .06
Entry Doors - 8'0							
Emerson™	.28 / .26	.24 / .19		.18 / .07		.18 / .07	

Line #	Location:	Attributes			Item Price	Qty	Ext'd Price
10	None Assigned	Lifestyle, Double Hung, 37 X 57, Without HGP, White					
		Garage Face					
		 Viewed From Exterior Rough Opening: 37 - 3/4" X 57 - 3/4"					
	PK # 2120	1: 3757 Double Hung, Equal Frame Size: 37 X 57 General Information: No Package, Without Hinged Glass Panel, Clad, Pine, 5", 3 11/16", Jambliner Color: Gray Exterior Color / Finish: Standard Enduraclad, White Interior Color / Finish: Bright White Paint Interior Glass: Insulated Low-E Advanced Low-E Insulating Glass Argon Non High Altitude Hardware Options: Cam-Action Lock, White, No Limited Opening Hardware, No Sash Lift, No Integrated Sensor Screen: Full Screen, White, InView™ Performance Information: U-Factor 0.30, SHGC 0.27, VLT 0.50, CPD PEL-N-35-00426-00003, Performance Class LC, PG 35, Calculated Positive DP Rating 35, Calculated Negative DP Rating 35, Year Rated 08/11, Clear Opening Width 33.812, Clear Opening Height 25.25, Clear Opening Area 5.92884, Egress Meets Typical 5.7 sqft (E) (United States Only) Grille: SDL w/Spacer, No Custom Grille, 7/8", Traditional (2W2H / 0W0H) Wrapping Information: Foldout Fins, Factory Applied, No Exterior Trim, 6 9/16", 7 7/8", Standard Four Sided Jamb Extension, Factory Applied, Pella Recommended Clearance, Perimeter Length = 188".					

Line #	Location:	Attributes			Item Price	Qty	Ext'd Price
15	None Assigned	Lifestyle, Double Hung, 25 X 35, Without HGP, White					
		Garage Sidewall					
		 Viewed From Exterior Rough Opening: 25 - 3/4" X 35 - 3/4"					
	PK # 2120	1: 2535 Double Hung, Equal Frame Size: 25 X 35 General Information: No Package, Without Hinged Glass Panel, Clad, Pine, 5", 3 11/16", Jambliner Color: Gray Exterior Color / Finish: Standard Enduraclad, White Interior Color / Finish: Bright White Paint Interior Glass: Insulated Low-E Advanced Low-E Insulating Glass Argon Non High Altitude Hardware Options: Cam-Action Lock, White, No Limited Opening Hardware, No Sash Lift, No Integrated Sensor Screen: Full Screen, White, InView™ Performance Information: U-Factor 0.30, SHGC 0.27, VLT 0.50, CPD PEL-N-35-00426-00003, Performance Class LC, PG 50, Calculated Positive DP Rating 50, Calculated Negative DP Rating 50, Year Rated 08/11, Clear Opening Width 21.812, Clear Opening Height 14.25, Clear Opening Area 2.158479, Egress Does not meet typical United States egress, but may comply with local code requirements Grille: SDL w/Spacer, No Custom Grille, 7/8", Traditional (2W2H / 0W0H) Wrapping Information: Foldout Fins, Factory Applied, No Exterior Trim, 6 9/16", 7 7/8", Standard Four Sided Jamb Extension, Factory Applied, Pella Recommended Clearance, Perimeter Length = 120".					