

Burlington Development Review Board

Department of Permitting & Inspections

645 Pine Street

Burlington, VT 05401

www.burlingtonvt.gov/DPI/DRB

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Miles Waite

Marina Campbell, (Alternate)

Evan Gould, (Alternate)



Development Review Board

Tuesday, December 17, 2024, 5:00 PM

645 Pine Street, Front Conference Room or Remote on Zoom:

Please click the link below to join the webinar:

Zoom: <https://us02web.zoom.us/j/83225696227?pwd=SGQ0bTdnS000Wkc3c2J4WWw1dzMxUT09>

Webinar ID: 832 2569 6227

Passcode: 969186

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

1. Agenda

2. Communications

3. Minutes

4. Public Hearing

4.1.

ZAP-24-14; 1835 North Avenue (RL, Ward 4) Hoang Nguyen / Quyet Pham / Alina Mills

Appeal of administrative approval, ZPF-24-74, to increase existing fence from six-foot-high to eight-foot-high. (Project Manager, Scott Gustin)

4.2.

**ZP-24-467; 365 South Winooski Avenue (RM, Ward 6) Robert Viskup / Lewis Creek Builders
Continued review of proposed variance request to replace the existing slate roof with a standing seam metal roof to accommodate solar installation.
(Project Manager, Garret King)**

5. Certificate of Appropriateness

5.1.

**ZP-24-253; 93-97 North Street (NMU, Ward 3) 3G, LLC / Michael Alvanos
Proposed demolition and reconstruction of rear addition, adding seven new**

residential units, with associated site improvements. (Project Manager, Scott Gustin)

6. Other Business

6.1. Review and approve 2025 meeting schedule

7. Adjournment

8. Informational and Non-Discrimination Statements

8.1.

Plans may be viewed upon request by contacting the Department of Permitting & Inspections between the hours of 8:00 a.m. and 4:30 p.m. Participation in the DRB proceeding is a prerequisite to the right to take any subsequent appeal. Please note that ANYTHING submitted to the Zoning office is considered public and cannot be kept confidential. This may not be the final order in which items will be heard. Please view final Agenda, at www.burlingtonvt.gov/dpi/drb/agendas or the office notice board, one week before the hearing for the order in which items will be heard.

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 & Inspections

Zoning Division
645 Pine Street
Burlington, VT 05401
Telephone:(802) 865-7188

William Ward, Director
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Garret King, Associate Planner
Joseph Cava, Permit Technician
Steve Cormier, Code Compliance Officer
Ted Boylan, Permitting & Inspections Administrator



TO: Development Review Board
FROM: Scott Gustin
DATE: December 17, 2024
RE: ZAP-24-14; 1835 North Avenue

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Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: RL Ward: 4

Owner/Appellant: Hoang Nguyen & Quyet Pham / Alina Mills

Request: Appeal of administrative approval of zoning permit ZPF-24-74 to increase existing fence from 6’ high to 8’ high.

Overview:

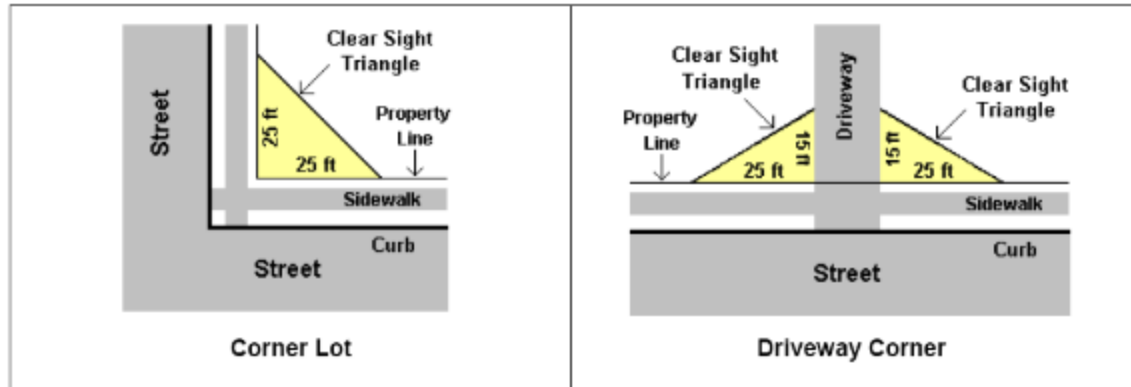
The appellant is appealing the administrative approval of a zoning permit (ZPF-24-74) to increase the height of a previously permitted fence from 6’ tall to 8’ tall. The appellant is a neighbor, living north of the property with the fence. The applicant for the subject fence is a tenant residing at the subject property (1835 North Avenue). The fence as presently installed is 8’ tall.

Recommendation: Uphold administrative approval as per the following findings.

I. Findings

In August 2024, the resident of the subject property, applied for, and obtained, a zoning permit to install a 6’ tall wooden stockade fence along the northerly side yard boundary. Shortly following approval of the 6’ tall fence, the resident sought a new zoning permit to increase the height of the fence to 8.’ The application was filed October 8, 2024 and approved October 25, 2024 subject to the following conditions:

1. Fences may be placed within the required setback along a property line, but shall be setback sufficiently to provide for the maintenance of both sides of the fence without entering onto the adjacent property and shall present a finished side to the adjoining property and public street. Fences placed within a clear sight triangle shall adhere to the standards of Sec. 5.2.6 (c).
2. **Section 5.2.6 (c) Clear Sight Triangle**
Fences placed within a clear sight triangle along driveways and at street intersections, or between an existing building and the front property line, whichever is less, shall be limited to 3-feet in height above the curb in order to provide safe sight distances for pedestrians and vehicles.



Appeal of the permit approval was filed on November 2, 2024 – within the 15-day appeal period.

The appeal asserts that the original fence permit did not disclose the subsequent increase in height and also points to a number of design standards in Article 6, *Development Review Standards*, of the Comprehensive Development Ordinance (CDO) and argues the fence is inconsistent with those standards.

There is no requirement for the original fence permit for a 6' fence to incorporate or contemplate a subsequent modification. The applicant expressed a desire to increase the permitted fence height after approval had been granted to the original fence application. As doing so would be a material change to the project, the applicant was instructed by zoning staff to apply for a new permit to increase the height. Such application was filed, notice was posted, and it was approved.

The subject property contains a single family home and is located within the Residential – Low Intensity zone. As such, the standards of Article 6 do not apply. See the Design Review Overlay District Map. The fence is subject to dimensional limitations and the clear sight triangle. As with all fence permits, there is a condition that the “finished side” face outward towards neighboring property. As installed, the horizontal boards holding the fence panels together face inward; however, the fence posts are visible to the neighboring property. The term “finished side” is not defined in the CDO. The horizontal boards and related hardware would reasonably be construed as part of the “unfinished side” and should face inward towards the applicant’s property. Such is the case here. Fence posts are commonly visible on one, or both sides, of the fence, depending on the style of fence and how the panels are installed between them. As installed, the fence posts are visible to the neighboring property but are not inconsistent with the permit condition.

Approval of the zoning permit to increase the fence height from 6' to 8' tall is consistent with applicable standards in the CDO.

II. Recommended Motion

Uphold the administrative permit approval.



City of
Burlington, Vermont
645 Pine Street

Zoning Permit – Conditions of Approval

ZPF #: 24-59

Tax ID: 023-3-037-000

Issue Date: October 25, 2024

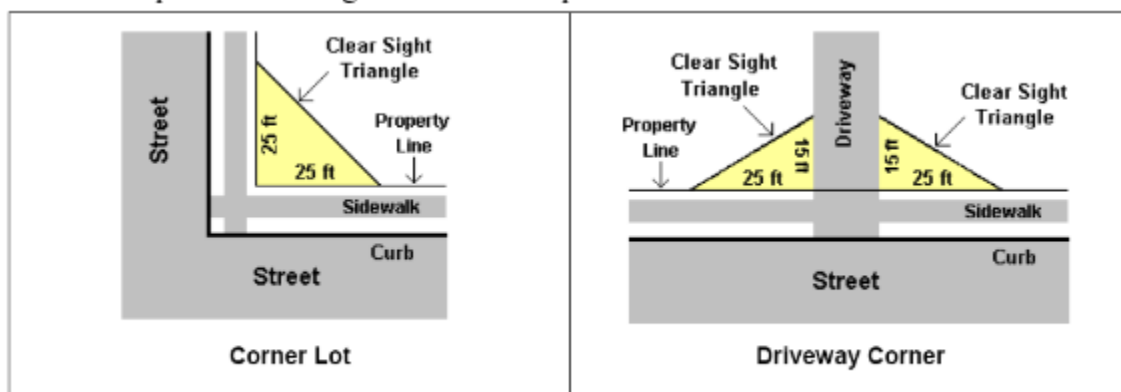
Decision: Approved

Property Address: 1835 North Avenue

Description: Amendment to ZPF-24-59 to increase the previous fence from six-foot-high to eight-foot-high.

Project Permit Conditions:

1. Fences may be placed within the required setback along a property line, but shall be setback sufficiently to provide for the maintenance of both sides of the fence without entering onto the adjacent property and shall present a finished side to the adjoining property and public street. Fences placed within a clear sight triangle shall adhere to the standards of Sec. 5.2.6 (c).
2. **Section 5.2.6 (c) Clear Sight Triangle**
Fences placed within a clear sight triangle along driveways and at street intersections, or between an existing building and the front property line, whichever is less, shall be limited to 3-feet in height above the curb in order to provide safe sight distances for pedestrians and vehicles.



Standard Permit Conditions:

1. **Other City, State or Federal Permits.** The owner is solely responsible for obtaining all other required City, state and federal approvals. Failure to do so may invalidate this Zoning Permit and result in enforcement actions. Wastewater permits are issued by the State and are frequently required as a result of expansion or change in use.

Note: All projects receiving a Zoning Permit also require a Construction Permit or written confirmation that a Construction Permit is not required from the Department of Permitting & Inspections Trades Division. All construction permits must be closed out by way of approved inspections by Trades before issuance of a Zoning Certificate of Occupancy (ZCO) by the Zoning

Division as per Condition 3, below. **Note: All projects involving earth disturbance of 400 square feet or more require a reviewed and approved erosion prevention and sediment control (EPSC) permit prior to the start of construction. This review is closed out by way of a completed EPSC Permit and an inspection by Stormwater Program staff or their designee before issuance of a ZCO as noted above.**

2. **Time Limits.** This zoning permit shall become invalid unless work or action authorized by the permit is commenced within 1 year of approval. The owner shall complete the approved project and obtain a ZCO (combined Zoning and Building certificates of occupancy, still applicable even if a zoning or building permit was not required) within 3 years or be subject to enforcement actions.

These time limits are binding upon the owner unless one of the following apply: a) longer or shorter time limits are specifically imposed by a condition of approval; or b) the time limits are tolled by additional state or federal permitting for the project or by an appeal; or c) an extension of time has been granted. An extension of time must be requested in writing PRIOR to the expiration of the permit. If the owner has enacted the permit and it lapses, the owner may be responsible to obtain a new zoning permit, if required, which shall be subject to the current Comprehensive Development Ordinance (CDO).

3. **Zoning Certificate of Occupancy (ZCO):** It shall be unlawful to use or occupy (or allow the use or occupancy of) any land or structure or part thereof which has been created, changed, converted, or wholly or partly altered or enlarged in its use or structure without a ZCO.

If the project is partially completed, meets “prior to issuance of a ZCO” conditions of approval, meets all life and safety standards, and all municipal fees for the project are paid, a Temporary Zoning CO may be requested and issued. **Upon completion of the project**, applicant shall request and obtain a Final ZCO from the Zoning Division (located at 645 Pine Street). Additional information on how to request and obtain this ZCO is available at this office. **Failure to obtain a Zoning certificate of occupancy** places the property in violation of the CDO and is subject to enforcement.

In addition, **Failure to obtain a ZCO within the time limits above is subject to** “after the fact” fees ranging from \$75 - \$1500.

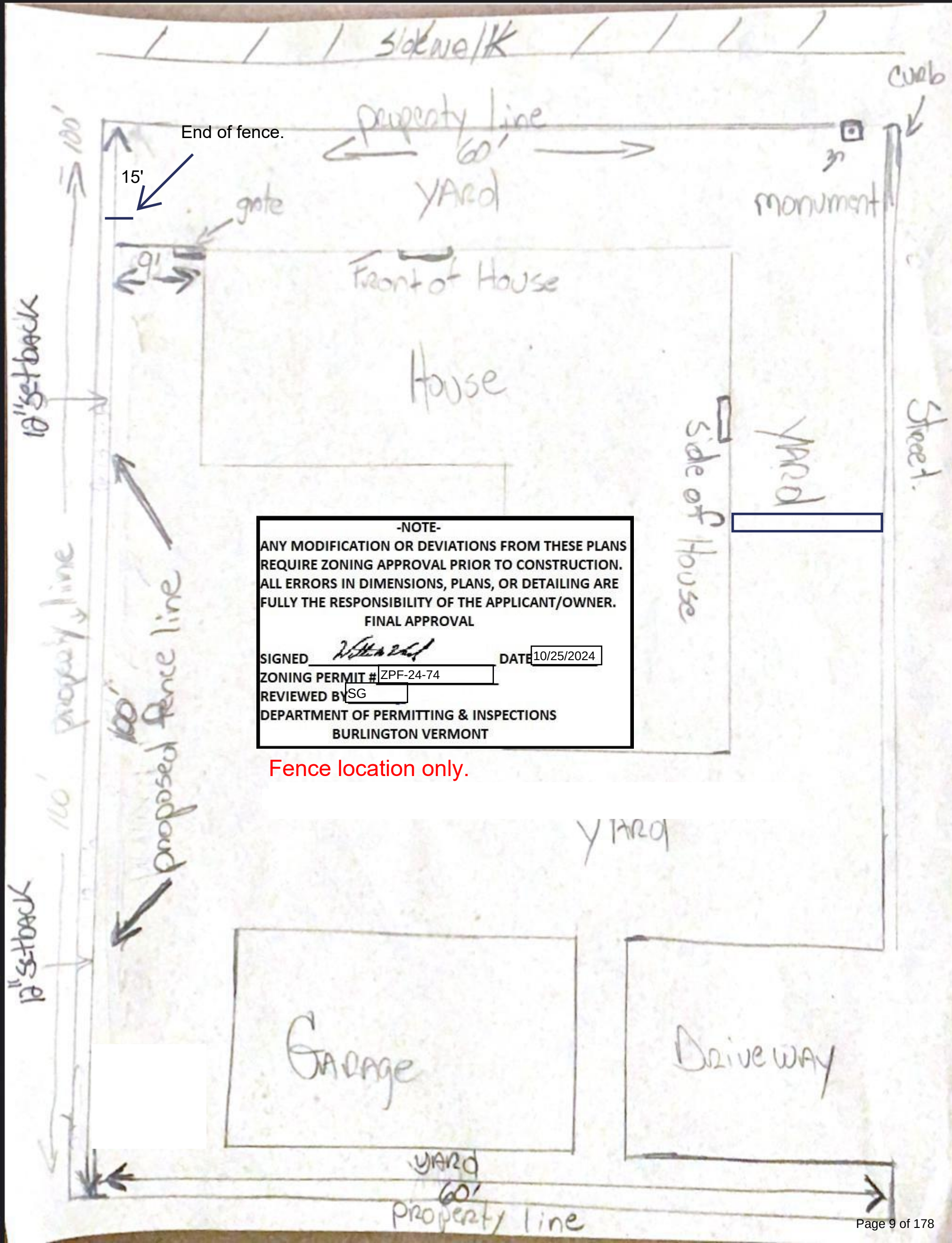
4. **Project Modifications.** The project shall be completed, operated, and maintained in accordance with: (a) the conditions of this permit and (b) the permit application, plans (which have been stamped “approved” and dated by the administrative officer), and exhibits on file with the Board or administrative officer and other material representations. In the event of any conflict, the terms and conditions of this permit shall supersede the approved plans and exhibits. The project shall not deviate from the approved plans or conditions of approval without prior written approval from the administrative officer.
5. **Property Inspection.** By acceptance of this permit, the owner authorizes City Officials and/or their authorized representatives, access to the subject property for the purpose of observing work in progress, inspecting and/or measuring the property or improvements until such time the project has been issued a Final ZCO.
6. **Completion and Maintenance of Improvements and Landscaping.** Owner or successor in interest is responsible for completing all improvements shown on approved plans. By acceptance of this permit, Owner agrees to maintain all improvements in a satisfactory condition. Any

landscaping installed according to the approved plan which becomes diseased or dies shall be replaced by similar species and size no later than the first available planting season.

7. **Off-Site Drainage.** Issuance of this permit does not authorize the discharge of stormwater runoff or other surface drainage from the subject premises onto adjoining property or properties including but not limited to the public Right of Way.
8. **Errors.** The owner is solely responsible for the accuracy of all information contained in the Zoning Permit application. Any errors contained therein may invalidate the Zoning Permit and may result in enforcement action by the City.
9. **Transfer of Ownership. All zoning permits run with the land.** In the event of a transfer of ownership, partial or whole, of the subject premises, the transferee shall become permittee and subject to compliance with the terms and conditions of this permit.
10. **Violations/Penalties.** A violation of any of the conditions of this permit or of any provision of the CDO may result in enforcement actions, including but not limited to a penalty of up to two hundred dollars (\$200) per day, municipal tickets, and/or additional permitting fees.
11. **Incorporation and Reference of All Plans Presented.** This approval incorporates by reference all plans and drawings presented and all verbal representations by the applicant on the subject application to the extent that they are not in conflict with other stated conditions or regulations.
12. **For Properties Involved in Boundary Disputes.** Boundary disputes are not within the jurisdiction of the administrative officer or the Development Review Board. When an application is submitted and the boundary of the subject property is called into question, the boundary will be determined based upon the best evidence available, for instance a survey or other official document. If a permit is issued and contrary evidence is presented to the City after the fact, such as a survey or Superior Court ruling with respect to the boundary lines, the permit may be amended or revoked by the City.
If the permit is amended or revoked, owner shall bear all costs to remedy the situation, including removal of the structure(s) if necessary, that is if the structure(s) is/are unable to meet the requirements of the CDO and receive an amended permit in light of the actual boundary line.
13. **Damage to City Property.** The Owner is responsible for any damage to the City of Burlington's property, including but not limited to its right-of-way, sewer/water lines, etcetera, that occurs during the site improvements authorized by this permit. If damage occurs, the Owner shall restore the property to a condition equal to or better than the condition of the property prior to such damage.
14. **City Rights-of-Way and Ownership.** Permit approval does NOT authorize any work to be undertaken within the public ROW. Any work in the ROW can only occur with prior authorization by DPW and/or City Council, as required. Any work or improvements that are taken within the City's right of way does not diminish the City's ownership or authority regarding said right of way.
15. **Liquor License Required.** An approval of any use that includes the sale of alcoholic beverages is contingent upon the receipt of a liquor license from the City of Burlington or the State of Vermont, whichever is applicable.

An interested person may appeal a decision of the Zoning Administrator to the Development Review Board within 15 days after the decision date per Sec. 12.2.2, *Appeals of Administrative Officer Decisions*.

Appeals may be filed online at burlingtonvt.viewpointcloud.com/categories/1098 or in-person at 645 Pine Street, Burlington, Vermont. <https://www.burlingtonvt.gov/DPI/Appealing-a-Zoning-Decision>



-NOTE-
 ANY MODIFICATION OR DEVIATIONS FROM THESE PLANS
 REQUIRE ZONING APPROVAL PRIOR TO CONSTRUCTION.
 ALL ERRORS IN DIMENSIONS, PLANS, OR DETAILING ARE
 FULLY THE RESPONSIBILITY OF THE APPLICANT/OWNER.

FINAL APPROVAL

SIGNED William A. 2nd DATE 10/25/2024
 ZONING PERMIT # ZPF-24-74
 REVIEWED BY SG
 DEPARTMENT OF PERMITTING & INSPECTIONS
 BURLINGTON VERMONT

Fence location only.

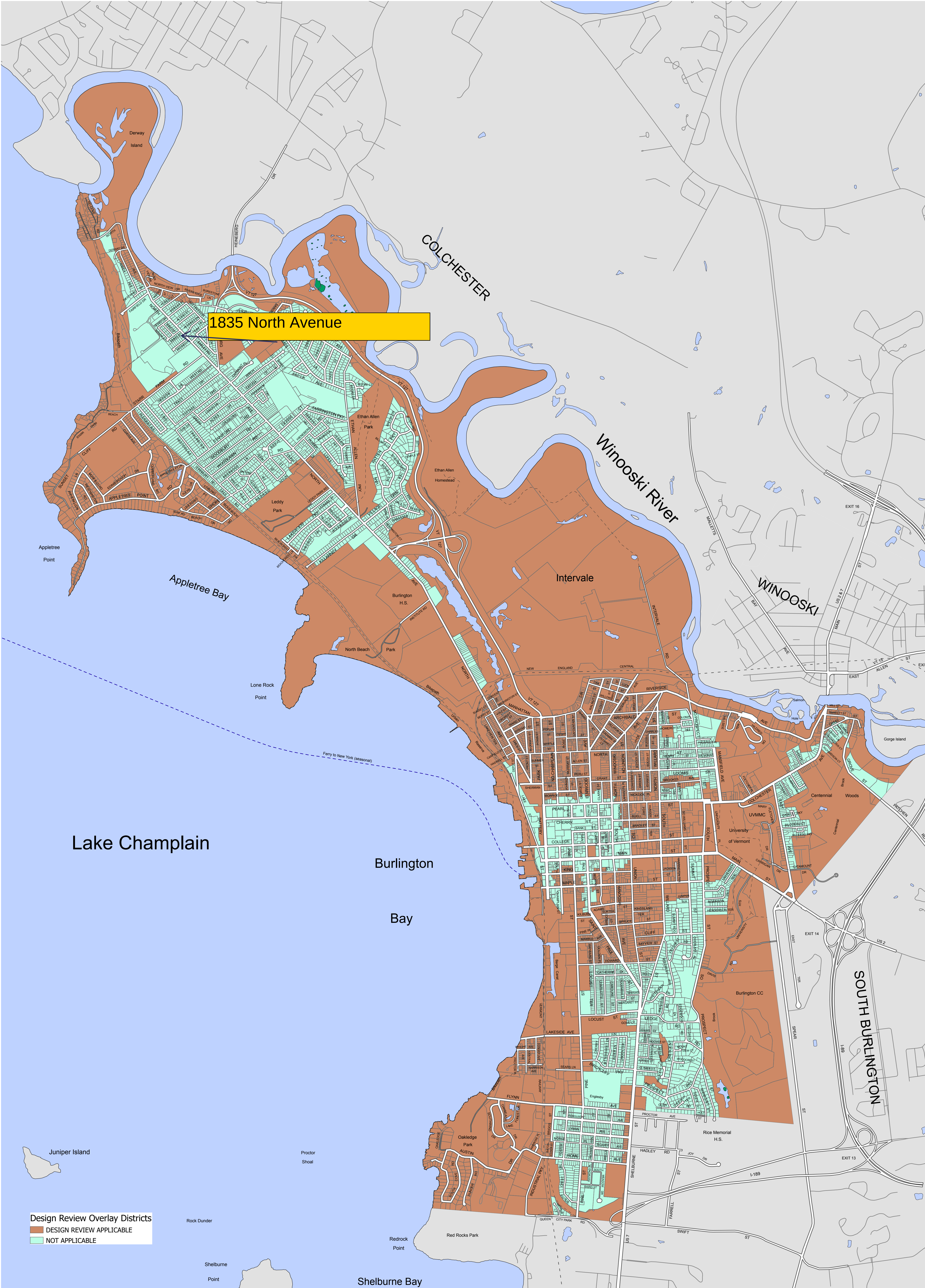
Proposed Fence Panel



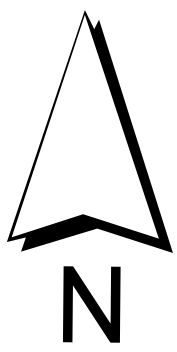


Example 8' tall section





CITY OF
BURLINGTON



Design Review Overlay Districts Map

Burlington Comprehensive Development Ordinance, Map 4.5.1-1
Districts effective Jan. 30, 2008 with amendments effective 06-02-2021(ZA-21-03)







To: The Development Review Board
Date of Appeal: November 2, 2024

1) Appellant: Alina Mills, 1841 North Ave., Burlington VT. 05408
(802) 338-7941, jalinamills@gmail.com

2) Description of the property of the permit that is under appeal:

The permit applicant is my adjacent neighbor. Our single-story houses are in Ward 4, Zone RL. The shared property line runs between our respective front and backyards. My neighbor initially submitted a request for permit ZPF-24-59, in which he stated he would build a 6'x8' fence. He presented a photo of Lowe's Picket Fence Panels in his application that were 6"H x 8'W, made of Spruce Pine Fir vertical wood panels. I accepted this 6' height and design. He did not disclose, in his initial permit application, that he was planning to build an 8-foot tall fence, with an additional 2 feet of 5-inch wide horizontal planks of a different type of wood, above the 6-foot tall vertical Lowe's panels.

My neighbor is currently requesting to do the following, through a second permit ZPF-24-74, created on 10/8/2024. The appeal window is from 10/25/2024-11/10/2024.

- Install an additional 2 feet of height with 5-inch-wide horizontal planks of a non-matching type of wood above the approved 6'H vertical fence panels, thereby reaching a total height of 8-feet tall.
- Extend the 8-ft fence an additional 10 feet into the front yard, beyond the front plane of his house.

3) Regulatory provisions applicable to the appeal

- I. **CDO Section 3.2.2 (b) 2** - Application Types and Submission Requirements -
"Submission requirements for all fence applications shall include ... A Site plan including the style, materials, and dimensions of the proposed fence." The applicant did not disclose in his initial permit application *SPF-24-59* what the final design plan would be for the fence. Specifically, he did not disclose the final height or complete list of materials to be used.
- II. **CDO Section 3.4.4** - Review Criteria -
"Approval of an application for a zoning permit may be granted by the DRB, or the administrative officer where applicable, only after it has been determined that the proposed development satisfies the applicable development review principles and standards contained in Article 6 - Development Review Standards." The completed increased height, design, and materials of the final design of the fence were not initially disclosed, thereby not adhering to Design Review Standards in Article 6.
- III. **CDO Sec. 5.2.6 c** - Styles, Materials, and Dimensions of the Fence -
"Styles, materials, and dimensions of the proposed fence shall be compatible with the context of the neighborhood and the use of the property." The proposed fence design is inconsistent with the aforementioned values mentioned, as described in

the city's Design Review Guide.

<https://www.burlingtonvt.gov/DocumentCenter/View/3160/DG-Fences>

IV. **CDO Section Sec. 6.0.1** - Intent and Citywide Development Principles -

As quoted below, city regulations require that the fence be compatible with its setting, the character of the neighborhood and its historical patterns. The proposed fence does not adhere to these standards.

f) Compliment Burlington's architectural and cultural heritage by conserving and or reflecting dominant design elements and characteristics of neighborhoods, and maintaining neighborhood proportions of mass and scale.

h) Ensure that public buildings, structures and spaces, be designed and constructed to the highest standards in order to reflect community values, inspire future development, foster civic pride, and serve as a model to others,

j) Ensure the scale, massing, and dominant architectural elements contribute to the overall composition and developing character of the surrounding area.

m) Unify architectural elements, details, and materials of a building, such that all components appear integral to the whole.

V. **CDO Section 6.0.1** - Impact of Design on the Environment and Health -

"Development shall consider the impact of designs on the environment and health" in order "to create healthier, more productive, and more sustainable places to work and live." Please refer to information provided below about how this 8' fence will impact my health by reducing light and airflow in and around my property.

VI. **Sec. 6.2.2 Review Standards (a)** - Protection of Important Natural Features -

"Site plans shall provide suitable buffers from any proposed site improvements, and maintain continuity and contiguousness of greenspace while allowing reasonable development in support of the overall intent of the zoning district." The extension of a tall privacy fence into the front yard will obstruct the continuity of the greenspace between the houses and the street.

VII. **Section 6.2.2 Review Standards (n)** - Public Plazas and Open Space -

"New structures and additions to existing structures shall be shaped to reduce shadows on public plazas and publicly accessible spaces. In determining the impact of shadow, the following factors shall be taken into account: the mass of area shaded, the duration of shading, and the importance of sunlight to the utility of the type of open space being shadowed." The 8' fence casts excessive shade over the majority of my property for most of the day.

IX. **Condition #1 in the standard "Zoning Permit - Conditions of Approval"**

In the standard Permit Conditions, issued by the Permit Office for fence permits, it is stated that *the finished side faces the adjacent property owner*. The “finished side” of all existing fences in the neighborhood have the fence panels and also the fence posts on the back unfinished side of the fence.

4) Relief requested:

1. I am requesting that the Development Review Board deny the fence application ZPF-24-74 for an 8' fence (2' extended height over the approved 6' fence) anywhere between the permit applicant's property and my property.
2. I am requesting that the Development Review Board deny the fence application ZPF-24-74 for an extension of a tall privacy fence (higher than 3-4') into the front yard, beyond the front plane of the applicant's house.
3. I am requesting that the following conditions be applied to the applicant's fence permit:
 - a. The privacy fence height will not exceed more than 6' in height from the front plane of the neighbor's house through the backyard.
 - b. If the fence is extended into the front yard beyond the front plane of the permit applicant's house, it will not exceed 3'-4' in height, in order to maintain greenspace, line of sight along the street/sidewalk, and consistency with other front yard fences in the neighborhood.
 - c. The permit applicant will move the fence posts to his side of the fence.
 - d. The residents of 1835 North Avenue will not resume the use of outdoor commercial meat smokers, regardless of the presence of a fence. The applicant will not claim that a fence renders the smoke indiscernible.

5) Alleged grounds why such requested relief is believed proper under the circumstances:

1. An 8-ft fence is excessively high for this setting. It is nearly as high as the roof eaves of our single-story homes.
2. The property value of my home is negatively impacted by the height of the fence. It is too tall in comparison with neighborhood standards and is unsightly. It does not contribute to quality urban design and a cohesive neighborhood.
3. The fence has a substandard aesthetic design, which is not compatible with the setting and character of the neighborhood. It has horizontal planks of contrasting materials and sizes above the 6'H thin vertical fence panels. The 5" wide horizontal planks do not match the thinner vertically aligned slats comprising the Lowe's fence panels. The unprofessional design does not have a consistent and coherent look in how it is put together and is visually unappealing in its asymmetry.
4. The 8-ft high fence blocks southern exposure sunlight and creates dark shadows across most of my yard, affecting plants and vegetation.

5. The extension of a fence higher than 3'-4' in the front yard will obstruct the view and reduce the natural light through my living room window because the houses are situated close together. If a fence higher than 3'-4' is extended into the front yard, it will darken the interior of my home.
6. An 8-ft tall fence significantly reduces airflow in the narrow and constricted space between it and my house. Less air circulation into and around my house adversely affects the quality of the air I breathe.
7. The 8' fence is an anomaly that is not compatible with the character of the neighborhood, in terms of height and style. There are more than 75 fences within two miles of 1841 North Ave, and none are built higher than 6'3" as a division between residences. The proximal privacy fences all have cohesive design patterns with wood aligned in one direction, with the exception of some having decorative lattice at the top (included in the 6' height dimensions).
8. The 8' fence is taller and therefore more vulnerable to wind and weather conditions, thereby posing a higher risk of potential damage to my property.
9. In the front yard, the greenspace and sight lines of the neighborhood will be interrupted with a fence taller than 3'-4'. The extension of a tall privacy fence in the front yard will obstruct the visibility and interrupt the continuity of the greenspace along the street/sidewalk grid and the homes facing North Ave.

Appendices:

- A. Information on the dimensions and materials of the fence provided by the applicant in his original permit application in August, 2024.
- B. Photograph of the fence as currently constructed, showing that the fence is nearly as tall as our houses. It is excessively tall for this setting and has a substandard appearance.
- C. Photograph showing how the southern exposure sunlight across my property is obstructed and significantly reduced by the 8' tall fence.
- D. List of 75 residential fences within 2 miles of the permit applicant's house. (All other fences in the neighborhood are less than 6'3" and present an aesthetically pleasing style compatible with the character of the neighborhood.)

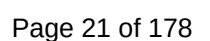
 City of Burlington, VT

ZPF-24-59

Location
1835 North Avenue
Burlington, VT 05408
[View location details](#)

Expires
Sep 16, 2027

Proposed Fence *
6'x8' picket fence



Appendix B. Photo showing the excessive height and nonconformity of the 8' foot fence.



Appendix C: Photo indicating how light is blocked across most of my property for the majority of the day by the 8' fence. It also shows the fence having an unfinished look with the posts on my side of the fence.



Appendix D: A list of the 75 residential privacy fences between neighboring houses along North Avenue. They do not exceed approximately 6' in height.

- 1) 1847 North Ave., height 6'2" wooden slats with lattice at the top
- 2) 1860 North Ave. height 6'1" wooden slats all vertical
- 3) 1867 North Ave. height approximately 6' wooden
- 4) 1880 North Ave. height approximately 6'
- 5) 1885 North Ave. height approximately 6' wood
- 6) 1896 North Ave. height approximately 6'
- 7) 1899 North Ave. height approximately 6' wood
- 8) 1936 North Ave. height approximately 6'
- 9) 1960 North Ave. height approximately 6'
- 10) 1968 North Ave. height approximately 6' wood
- 11) 1976 North Ave. height approximately 6' green chain
- 12) 1984 North Ave height approximately 6' wood
- 13) 2007 North Ave. height approximately 6' chain link
- 14) 2021 North Ave. height approximately 6' vinyl/wooden
- 15) 2024 North Ave. height approximately 6' wooden
- 16) 2041 North Ave. height approximately 6' wooden
- 17) 2047 North Ave. height approximately 6' wooden picket
- 18) 2048 North Ave. height approximately 6' wooden
- 19) 2060 North Ave. height approximately 6' wooden picket
- 20) 2061 North Ave. height approximately 6' wooden picket
- 21) 2055 North Ave. height approximately 6' wooden picket
- 22) 2070 North Ave. height approximately 6' wooden picket
- 23) 2083 North Ave. height approximately 6' wooden picket
- 24) 2089 North Ave. height approximately 6' wooden/vinyl with lattice
- 25) 2097 North Ave. height approximately 6' wooden picket
- 26) 2107 North Ave. height approximately 6' wooden picket
- 27) 2117 North Ave. height approximately 5'9" wooden stockade
- 28) 2127 North Ave. height approximately 5'9" wooden stockade
- 29) 3051 North Ave. height approximately 6' wooden/vinyl stockade
- 30) 3065 North Ave. height approximately 6' wooden picket
- 31) 1827 North Ave. height approximately 6' wooden with a woven pattern
- 32) 1813 North Ave. height approximately 6' wooden/vinyl
- 33) 1700 North Ave. height approximately 6' wooden
- 34) 1694 North Ave. height approximately 6' wooden/vinyl with privacy lattice at the top
- 35) 1685 North Ave. height approximately 6' wooden picket
- 36) 1658 North Ave. height approximately 6' wooden/vinyl white
- 37) 1652 North Ave. height approximately 6' wooden picket
- 38) Nursing home on Starr Farm with one side on North Avenue- height 6'3", white metal with lattice at top
- 39) 1634 North Ave. height approximately 6' metal chain with green filler
- 40) 1603 North Ave. height 6'1" wooden stockade

- 41) 1604 North Ave. height approximately 5' to 6' wooden
- 42) 1592 North Ave. height approximately 6' wooden picket
- 43) 1580 North Ave. height 5' wooden stockade
- 44) 1571 North Ave. height approximately 6' wooden stockade, painted
- 45) 1558 North Ave. height approximately 5' wooden/vinyl white
- 46) 1531 North Ave. height approximately 6' wooden picket
- 47) 1516 North Ave. height approximately 6' wooden with brown stain
- 48) 1501 North Ave. height approximately 6' wooden picket
- 49) 1504 North Ave. height approximately 6' wooden
- 50) 1488 North Ave. height approximately 6' wooden picket
- 51) 1484 North Ave. height approximately 5' vinyl lattice white
- 52) 1464 North Ave. height approximately 6' wooden picket
- 53) 1460 North Ave. height approximately 6' wooden picket
- 54) 1455 North Ave. height approximately 6' wooden picket
- 55) 1447 North Ave. height approximately 6' wooden slat
- 56) 1448 North Ave. height approximately 6' wooden natural
- 57) 1444 North Ave. height approximately 6' wooden picket
- 58) 1440 North Ave. height approximately 6' chain open
- 59) 1433 North Ave. height approximately 6' wooden stockade
- 60) 1421 North Ave. height approximately 6' wooden stockade
- 61) 1406 North Ave. height approximately 6' stockade white
- 62) 1394 North Ave. height approximately 6' wooden stockade
- 63) 1381 North Ave. height approximately 6' vinyl white
- 64) 1355 North Ave. height approximately 6' wooden picket
- 65) Volcano restaurant (behind) North Ave. height approximately 6' wooden picket white
- 66) 1350 North Ave. height approximately 5' wooden
- 67) 1334 North Ave. height approximately 6' wooden picket natural
- 68) 1330 North Ave. height approximately 6' wooden with lattice white
- 69) 1309 North Ave. height approximately 6' chain
- 70) 1297 North Ave. height approximately 5'-6' wooden curved picket white
- 71) 1300 North Ave. height approximately 6' wooden picket natural
- 72) 1291 North Ave. height approximately 6' open chain
- 73) 1236 North Ave. height approximately 6' wooden slats
- 74) 1234 North Ave. height approximately 6' wooden picket natural
- 75) 1230 North Ave. height approximately 6' wooden picket natural

There are many more additional privacy fences on side streets in the neighborhood, all approximately 6' in height which are not listed here.

Thank you kindly. I appreciate your time and consideration in helping to resolve this matter.

-----Original Message-----

From: Johnny Silvestera <johnnysilvestera7@gmail.com>

Sent: Tuesday, November 26, 2024 11:14 AM

To: Scott Gustin <SGustin@burlingtonvt.gov>

Subject: Zoning meeting

[WARNING]: This email was sent from someone outside of the City of Burlington.

Here is my rebuttal related to permit # ZPF - 24 - 74

Zoning Board

I refuse to engage in a response to a superficial novel that has been submitted to you to appeal my two foot fence extension. I have faith and stand by the original decision that was made by the Zoning Department. I will attend the meeting scheduled in the event you have any questions for me.

Thank you

Sent from my iPhone

Dec 16, 2024 at 7:11:52 AM



Department of Permitting & Inspections

Zoning Division
645 Pine Street
Burlington, VT 05401
Telephone: (802) 865-7188

William Ward, Director
Scott Gustin, AICP, CFM, Principal Planner
Mary O'Neil, AICP, Principal Planner
Garret King, Associate Planner
Joseph Cava, Permit Technician
Ted Miles, Code Compliance Officer
Ted Boylan, DPI Administrator



TO: Development Review Board
FROM: Garret King
DATE: December 17th, 2024
RE: ZP-24-467; 365 South Winooski Avenue

=====

Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: RM Ward: 6

Owner/Applicant: Connie Lael & Robert Viskup / Lewis Creek Builders

Request: Proposed variance request to replace the existing slate roof with standing seam roof to accommodate solar installation.

Applicable Regulations:
Article 12 Variances and Appeals.

Background Information:

This application is returning to the DRB as requested, with a representative to speak to the applicability of replacement materials for removing original slate. The DRB previously requested that the city and applicant have an individual to speak on this matter. The only change to the scope of the project is that now some of the street facing roof will now be replaced with Majestic Slate Ecostar along with the originally proposed metal roofing.



Contractors representing the owners of 365 South Winooski Avenue requesting a variance to remove the original slate roof and replace it with standing metal seam roofing. The application to remove the slate roof is driven by a desire to install solar on the roof of this home. This single family home with attached ADU is listed on the Vermont State Register of Historic Resources and is subject to the regulations of Sec. 5.4.8 Historic Buildings and Sites.

Previous zoning permit action:

- Zoning Permit 24-130; amendment to ZP-23-548 including movement of basement window and door. Proposal includes exterior reconfiguration of second floor.
- Zoning Permit 23-548; construction of a kitchen and bathroom addition. After-the-fact review of Accessory dwelling unit.

- Zoning Permit Roof/Siding 23-26; replacement of asphalt front porch roof with EDPM and snow guards. Proposal includes replacing rear asphalt roof with copper panels.
- Zoning permit 22-407; Replace the exterior wooden trim on several windows with PVC trim boards.
- Zoning Permit Roofing/Siding 22-6; Replacing existing wooden shingle siding with new fiber cement shingle siding.
- Zoning Permit 21-219; Replacement of front porch asphalt roof with EPDM. Addition of snow guards on front roof. Replacement of rear asphalt roof with copper panels.
- Zoning Permit 19-732; Install exterior lighting
- Zoning Permit 17-649; Remodeling porch and stairs at rear of house

Recommendation: **Variance Denial** as per, and subject to, the following findings and conditions:

Overview:

The applicant is requesting a variance to the Sec. 5.4.8 (b) with regards to the requirement of retaining a historical material. The applicant states “Seeking a variance to Section 5.4.8 (2), (5), (6), and (9) Historic Buildings and Sites, Section 6.2.2 Site Plan Design Standards, and Section 6.3.2 Architectural Design Standards under Sec 12.1.1 Variances”.

The Department of Permitting and Inspection does not regulate the installation of alternative energy devices, nor does it prohibit their installation. The Comprehensive Development Ordinance does regulate applications for alteration to historic building materials under Section 5.4.8. as allowed under statute §4414. The regulatory efforts to retain historic material integrity with listed resources is not mutually exclusive from the endeavors of Net Zero; there are typically alternatives that would preserve both goals. In this case, solar collection devices could be installed as free-standing rather than requiring the removal of a character-defining slate roof; or an alternate renewable energy resource could be pursued that would not forfeit the historic roofing material.

Under the earlier permit review, the contractors repeatedly asked to remove the slate roof without any opinion from a qualified slater that the slate had reached the end of its serviceable life, or without the indication that a solar array was desired. Removal of the slate roof was not included in the permit approval.

I. Findings

Article 12: Variance and Appeals

Sec. 12.1.1 Variances

*Use variances shall not be allowed under this ordinance. A variance from the provisions of this ordinance may be granted by the DRB, and a decision rendered in favor of the **request for a structure that is not primarily a renewable energy resource structure**, if all of the following facts are found and specified in its decision:*

The variance request is for the removal of a slate roof. The removal of the slate is to enable the applicant to install renewable energy equipment.

- (a) That there are unique physical circumstances or conditions, including irregularity, narrowness, or shallowness of lot size or shape, or exceptional topographical or other physical conditions peculiar to the particular property, and that unnecessary hardship is due to such conditions, and not the circumstances or conditions generally created by the*

provisions of the zoning regulation in the neighborhood or district in which the property is located;

The building has a slate roof which is common in the City of Burlington. Sec. 5.4.8 requires the retention of historic materials and repair of historic features before replacement. The retention of historical features/materials is common for many projects in the City that is not unique to this property. The property has available space in the rear yard that could allow for a freestanding solar array that would not require the removal of the slate roof. From testimony during the previous DRB meeting the applicant team stated that removal of the slate was the only way this project would be feasible. **(Adverse Finding)**

- (b) That because of such physical circumstances or conditions, there is no possibility that the property can be developed in strict conformity with the provisions of the zoning regulation and that the authorization of a variance is, therefore, necessary to enable the reasonable use of property;*

The applicant states that a slate roof with solar installed cannot be warrantied for any period of time, and without a warranty they cannot install a solar system. No evidence that ground mounted solar or any other renewable system could be implemented has been provided. There are potential alternatives that have not been explored that could be in conformance with the regulations of the Comprehensive Development Ordinance. From testimony during the previous DRB meeting the applicant team stated that removal of the slate was the only way this project would be feasible. **(Adverse Finding)**

- (c) The unnecessary hardship has not been created by the applicant;*

The applicant states that the required retention of the slate will prevent the installation of a solar array that will cause undue hardship. There are options unexplored by the applicant in the siting of the solar collection device. DPI does not prohibit alternative energy resources, but manages the retention of historic building features as allowed under Section 5.4.8. The applicant prefers the rooftop installation. The applicant has not demonstrated faithful examination of alternatives to the roof-top installation; at least one of which would be in conformance with the regulations. It really isn't "all or nothing"; the applicant has unexplored options for alternative energy that would be in conformance with the ordinance. From testimony during the previous DRB meeting the applicant team stated that removal of the slate was the only way this project would be feasible. **(Adverse Finding)**

- (d) That the variance, if authorized, will not alter the essential character of the neighborhood or district in which the property is located, substantially or permanently impair the appropriate use or development of adjacent property, reduce access to renewable energy resources, nor be detrimental to the public welfare;*

The essential character of the neighborhood will largely remain intact; however the visual intrusion of the panels from the public way will noticeably detract from the historic character of the neighborhood; and the loss of historic building materials is contrary to Section 5.4.8. A decision to issue a variance would set a precedent for allowing diminishment of historic character on listed buildings; opening the door for additional loss of historic fabric and character within Burlington's historic neighborhoods. As the protection of historic resources is within the sphere of public welfare in maintaining Civic pride and neighborhood character, the diminishment of historic integrity on a listed

property is an erosion of historic character, and therefore detrimental to the entire city.
(Adverse finding)

- (e) *That the variance, if authorized, will represent the minimum variance that will afford relief and will represent the least deviation possible from the zoning regulation and from the municipal development plan;*

The project that is expected is requesting the removal of all the existing slate on the home. Without an indication that analysis of alternative installation methods were considered such as a freestanding solar array there is no way to know if the removal of all the slate is required to meet the performance goals of this project. From testimony during the previous DRB meeting the applicant team stated that removal of the slate was the only way this project would be feasible. **(Adverse finding)**

- (f) *The variance, if granted, will not result in either the extension of a non-complying situation or allow the initiation of a nonconforming use of land.*

If the variance is granted it will not result in the extension of a non-complying situation or allow for a nonconforming use of land. If this variance is allowed it will create set a precedent for allowing diminishment of historic character on listed buildings; opening the door for additional loss of historic fabric and character within Burlington's historic neighborhoods. **(Affirmative Finding)**

As the applicant has alluded to statutory allowances provided under §4413 "Limitations on Municipal Bylaws", the following section is also evident within state statute:

§4414 Zoning: permissible types of regulations

(F) Local historic districts and landmarks

(i) *Bylaws may contain provisions for the establishment of historic districts and designation of historic landmarks. ...Bylaws may reference National and State Registers of Historic Places, properties and districts.*

(ii) *With respect to external appearances and other than normal maintenance, no structure within a designated historic district may be rehabilitated, substantially altered, restored, moved, demolished or changed, and no new structure within an historic district may be erected without approval of the plans therefor by the appropriate municipal panel. The panel shall consider the following in its review of plans submitted:*

I. The historic or architectural significance of the structure, its distinctive characteristics, and its relationship to the historic significance of the surrounding area.

II. The relationship of the proposed changes in the exterior architectural features of the structure to the remainder of the structure and to the surrounding area.

III. The general compatibility of the proposed exterior design, arrangement, texture, and materials proposed to be used.

IV. Any other factors, including the environmental setting and aesthetic factors that the panel deems to be pertinent.

Burlington's Comprehensive Development Ordinance allows for the review of alterations to any historic structure, as defined in Section 5.4.8. Under ZP-24-375 The board...

II. Reasons for Denial

Per the adverse findings above.



To whom it may concern,

Acting as an agent of Robert Viskup and Connie Lael, Lewis Creek Builders (LCB) in partnership with Green Mountain Solar (GMS), is proposing the installation of a photovoltaic array on the roofs at 365 South Winooski Ave.

365 South Winooski Avenue is an early 1910's Dutch-Colonial Revival Single Family Home with an Accessory Dwelling Unit in the basement. The structure sits on a stone foundation with a mix of brick veneer and fiber cement siding. Similar to others on the block this structure massing is rectangular in shape with a moderately pitched gambrel roof with a shed dormer on the main facade. The home has gone through several minor aesthetic updates that have retained the historic character and retained timely materials.

Due to the current state and materials of the existing roof, a zoning variance to 5.4.8(b) is requested to accommodate a roof replacement to a solar-compatible material. Please see below the proposal and supporting documentation for the requested variance.

- Install solar on all roofs at 365 South Winooski Ave to accommodate current and future demand.
 - See attachment: *Viskup - Green Mountain Solar Proposal 10.07.24.pdf*
- Roof replacement to accommodate solar current and future demand.
 - The existing slate roof is proposed for replacement
 - See attachment: *365 South Winooski Ave Roof Assessment Letter from Major's Home Repairs*
 - The rear addition roofs have been previously approved as standing seam under ZP-24-130.
 - See Attachment: *ZP-24-130 365 South Winooski Ave*
 - Roof finish on existing roof is proposed to be replaced with standing seam roofing.
 - Seeking a variance to Section 5.4.8 (2), (5), (6), and (9) Historic Buildings and Sites, Section 6.2.2 Site Plan Design Standards, and Section 6.3.2 Architectural Design Standards under Sec. 12.1.1 Variances.
 - The current materials and condition of the slate roof inhibit the installation of solar installation and interfere with state statute 24 V.S.A. § 2291a.
 - See attachment: *365 S. Winooski Ave Aerial View.pdf*
 - See attachment: *Metal Roofing Data Sheet.pdf*
 - 12.1.1(a), and 12.1.1(b): It is unusually difficult and risks undue expense to the applicant to repair the existing roof conditions and install a solar system on a slate roof. Slate roofs are not able to be warrantied for any period of time (unlike metal which can be guaranteed for 30-40 years), which in addition to the added penetrations to attach a solar array creates undue risk to the client in continued repairs to the roof, and damage to the home interior.
 - GMS and other solar installers will not install or warranty a solar array on a slate roof. The City's own guide does not recommend placing solar on slate roofs.



- See attachment: *GMS Slate Roof Letter.pdf*
- 12.1.1(c): This hardship was not created by the applicant as the roof is estimated to be approx. 110 years of age based on public and land records of the home. The requirement of a slate roof will prevent the installation of a solar array at this property creating undue hardship for the applicant in achieving Net Zero Energy goals.
 - See attachment: *State Title 24 Chapter 2291a.pdf*
- 12.1.1(c): The utility service line to the house is 1/0 aluminum which typically provides only 100-120 amp service. The current electrical service needed to power the home and apartment is 150-200 amp service, as such this property is already underserved by the utility. To achieve the needs of the electrical load the owners of 365 South Winooski Ave, have to invest in sustainable energy and due to site conditions, the most feasible location is on the roof of the home.
- To achieve the need for expected future electrical load, solar is recommended on the property. The recommended locations to achieve maximum efficiency and input are on the existing and proposed roofs of the house. To achieve maximum efficiency and input as much of the roof needs to be utilized as possible and so on the rear roofs, a setback variance is requested to reduce the required ridge and side setback.
- 12.1.1(d): This proposal will not alter the essential character of the neighborhood as many neighboring homes have metal roofs, including historic homes such as 287-289 S Winooski Ave, 360-362 S Winooski Ave, 348 S Winooski Ave, and 55 Spruce Street.
- Replacement of the roof with standing seam panels is preferred due to its long-lasting warranty, ease of installation and repairs, durability, and compatibility with solar installation. Other products that can be warrantied, are compatible with a solar installation, and do not create additional hardship for applicants can be considered if necessary.

We, Lewis Creek Builders, have submitted this permit application and variance request on behalf of our clients, Robert Viskup and Connie Lael at 365 South Winooski, Burlington.

Thank you,

Layne Darfler
Lewis Creek Builders



System Quote and Investment Details for:

Lael-Viskup Project

c/o Layne Darfler

365 South Winooski Avenue, Burlington, VT 05401

Updated 10/7/2024 - Valid for 30 Days

Front & Back of Home

Included:

Construction of a 11.9 kW DC roof-mounted solar array consisting of:

- 28) Jinko Eagle 425W all-black solar modules
- 28) Enphase IQ 8M AC micro inverters
- Anodized aluminum rail mount system
- Enphase Envoy installed and configured with My Enlighten monitoring system
- All electrical service from array to service panel / grid
- Building and electrical permitting, fees, and inspections
- 12-year workmanship warranty by Green Mountain Solar
- 25-year product and 30-year efficiency warranty on panels guaranteed by Jinko
- 25-year warranty on inverters guaranteed by Enphase
- 5-year warranty on Envoy guaranteed by Enphase

**Does not include cost of utility installed solar meter. Transformer upgrades and solar tariff possible as well- utility dependent. These charges will be billed directly to the customer from your utility company.*

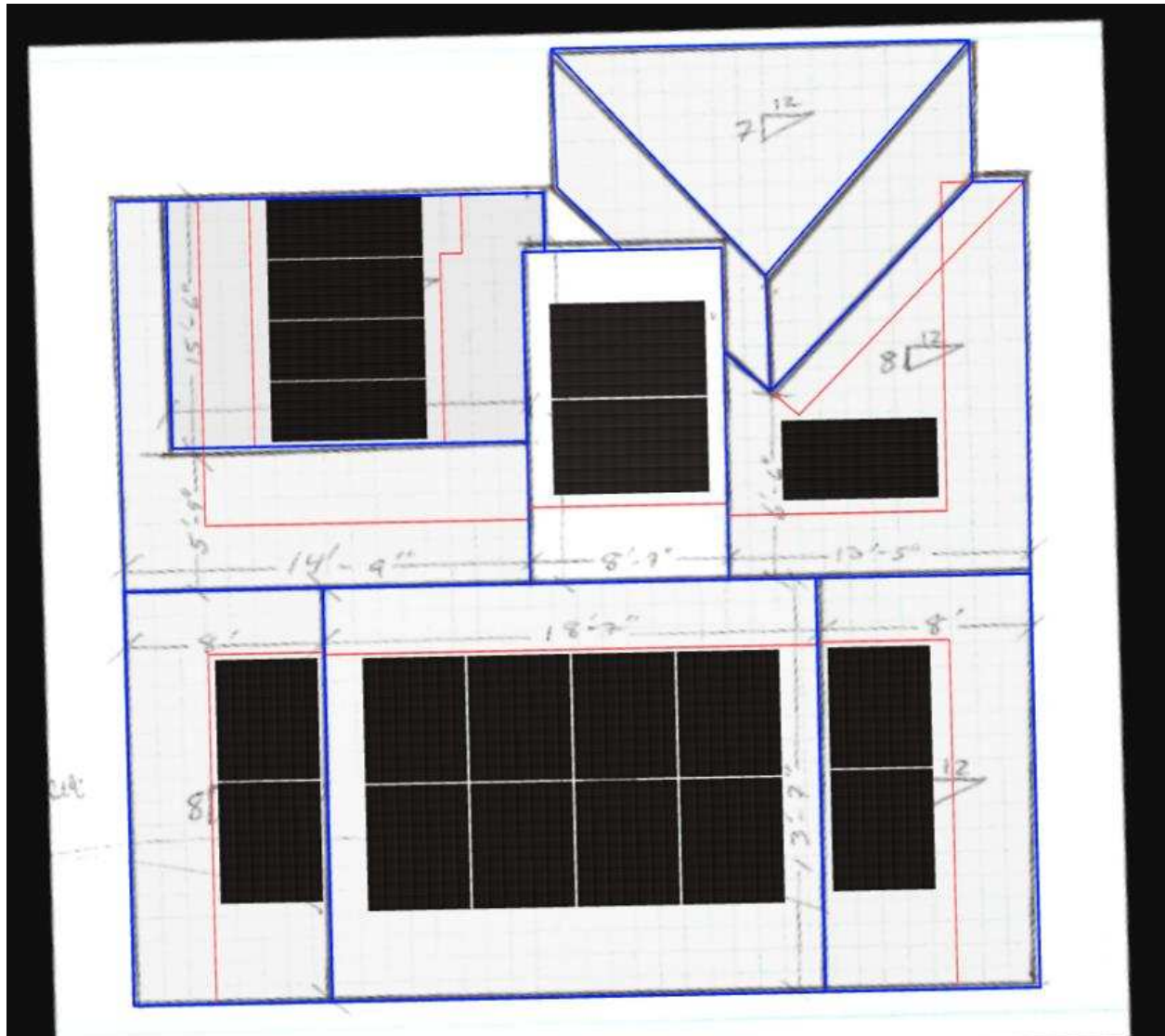
	System Information		
Annual Usage (kWh)	TBD		
Panel Count	28		
Array Output (DC Watts)	11,900		
Annual Production (kWh)	11,305		
Percentage of Electricity Usage Offset	TBD		
	15yr Home Equity Loan 6.25%	15yr Green Loan 7.75%	Client-Funded
Gross system cost (Paid to GMS)	\$ 40,088.00	\$ 40,088.00	\$ 40,088.00
Federal Tax Credit (30%) (Claimed by Client)	\$ 12,026.40	\$ 12,026.40	\$ 12,026.40
Net cost after recouping incentives	\$ 28,061.60	\$ 28,061.60	\$ 28,061.60
Initial Payment	\$343.72	\$271.24	
After Tax Credit payback	\$263.19	\$286.00	N/A

*Green Mountain Solar does not offer tax advice. Please consult with your accountant whether these tax benefits may apply to you.





Proposed System Layout:
365 South Winooski Avenue, Burlington, VT 05401
Front & Back of Home



Front of House



THE MOST DEPENDABLE SOLAR PRODUCT

EAGLE® 54 G6R

420-440 WATT • N-TYPE TOPCON

Positive power tolerance of 0~+3%

- NYSE-listed since 2010, Bloomberg Tier 1 manufacturer
- Top performance in the strictest 3rd party labs
- Automated manufacturing utilizing artificial intelligence
- Vertically integrated, tight controls on quality
- Premium solar factories in USA, Vietnam, and Malaysia

KEY FEATURES



Superior Aesthetics

Black backsheet and black frame create ideal look for residential applications.



N-Type Technology

N-type cells with Jinko's in-house TOPCon technology offers better performance and improved reliability.



Thick and Tough

Fire Type 1 rated module engineered with a thick frame, 3.2mm front side glass, and thick backsheet for added durability.



Shade Tolerant

Twin array design allows continued performance even with shading by trees or debris.



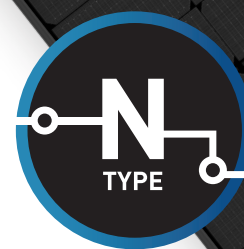
Protected Against All Environments

Certified to withstand humidity, heat, rain, marine environments, wind, hailstorms, and packed snow.



Warranty

25-year product and 30-year linear power warranty.

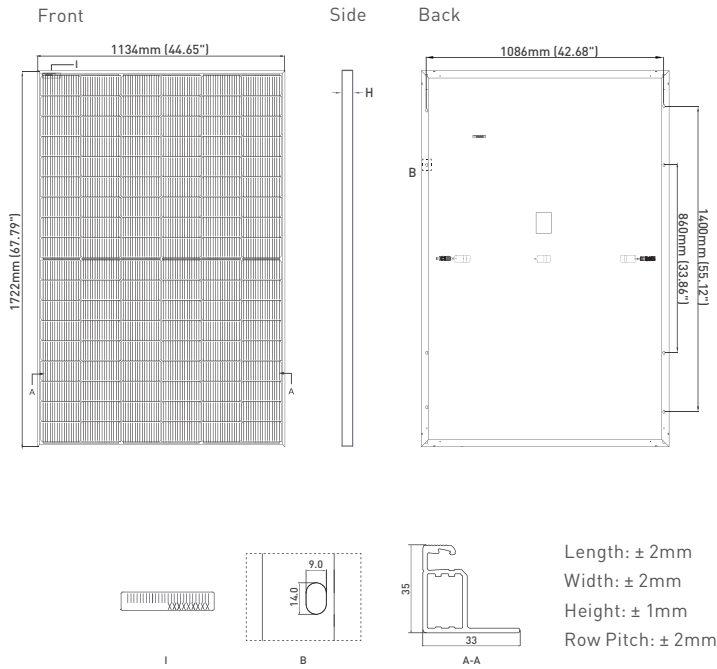


- ISO9001:2015 Quality Standards
- ISO14001:2015 Environmental Standards
- IEC61215, IEC61730 certified products

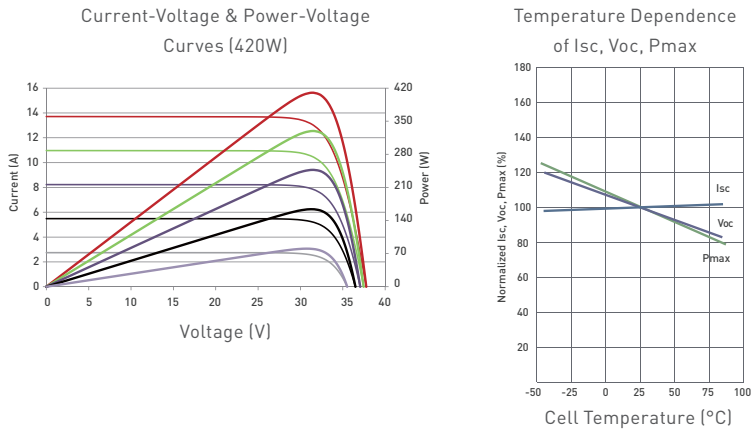
- ISO45001:2018 Occupational Health & Safety Standards
- UL61730 certified products



ENGINEERING DRAWINGS



ELECTRICAL PERFORMANCE & TEMPERATURE DEPENDENCE



MECHANICAL CHARACTERISTICS

No. of Half Cells	108 (2 x 54)
Dimensions	1722 x 1134 x 35mm (67.79 x 44.65 x 1.38 inch)
Weight	21.0kg (46.3lbs)
Front Glass	3.2mm, Anti-Reflection Coating High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminum Alloy
Junction Box	IP68 Rated
Output Cables	12 AWG, 1400mm (55.12in) or Customized Length
Connector	Staubli MC4
Fire Type	Type 1
Pressure Rating	5400Pa (Snow) & 2400Pa (Wind)*

*see Supplemental Installation Manual for higher wind pressure rating solutions

TEMPERATURE CHARACTERISTICS

Temperature Coefficients of Pmax	-0.29%/°C
Temperature Coefficients of Voc	-0.25%/°C
Temperature Coefficients of Isc	0.045%/°C
Nominal Operating Cell Temperature (NOCT)	45 $\pm$ 2°C

MAXIMUM RATINGS

Operating Temperature (°C)	-40°C~+85°C
Maximum System Voltage	1000VDC
Maximum Series Fuse Rating	25A

PACKAGING CONFIGURATION

(Two pallets = One stack)

31pcs/pallets, 62pcs/stack, 806pcs/40 HQ Container

WARRANTY

25-year product and 30-year linear power warranty

1st year degradation not to exceed 1%, each subsequent year not to exceed 0.4%, minimum power at year 30 is 87.4% or greater.

ELECTRICAL CHARACTERISTICS

Module Type	JKM420N-54HL4-B		JKM425N-54HL4-B		JKM430N-54HL4-B		JKM435N-54HL4-B		JKM440N-54HL4-B	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power [Pmax]	420Wp	316Wp	425Wp	320Wp	430Wp	323Wp	435Wp	327Wp	440Wp	331Wp
Maximum Power Voltage [Vmp]	32.16V	29.95V	32.37V	30.19V	32.58V	30.30V	32.78V	30.50V	32.99V	30.73V
Maximum Power Current [Imp]	13.06A	10.55A	13.13A	10.60A	13.20A	10.66A	13.27A	10.72A	13.34A	10.77A
Open-circuit Voltage [Voc]	38.74V	36.80V	38.95V	37.00V	39.16V	37.20V	39.36V	37.39V	39.57V	37.59V
Short-circuit Current [Isc]	13.51A	10.91A	13.58A	10.96A	13.65A	11.02A	13.72A	11.08A	13.80A	11.14A
Module Efficiency STC [%]	21.51%		21.76%		22.02%		22.28%		22.53%	

*STC: ☀ Irradiance 1000W/m²

NOCT: ☀ Irradiance 800W/m²

🌡 Cell Temperature 25°C

🌡 Ambient Temperature 20°C

☁ AM = 1.5

☁ AM = 1.5

🌬 Wind Speed 1m/s

*Power measurement tolerance: $\pm 3\%$

The company reserves the final right for explanation on any of the information presented hereby. JKM400-420N-54HL4-B-F4-US

BUILDING YOUR TRUST IN SOLAR. WWW.JINKOSOLAR.US



IQ8M and IQ8A Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has superfast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.



Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the IQ Battery, IQ Gateway, and the Enphase App monitoring and analysis software.



IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.



Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.



IQ8 Series Microinverters are UL listed as PV Rapid Shutdown Equipment and conform with various regulations, when installed according to manufacturer's instructions.

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) and IEEE 1547:2018 (UL 1741-SB 3rd Ed.)

Note:

IQ8 Microinverters cannot be mixed together with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, etc) in the same system.

*Only when installed with IQ System Controller 2, meets UL 1741.
 **IQ8M and IQ8A support split-phase, 240V installations only.

IQ8M and IQ8A Microinverters

INPUT DATA [DC]		I08M-72-2-US	I08A-72-2-US
Commonly used module pairings ¹	W	260 – 460	295 – 500
Module compatibility		54-cell / 108 half-cell, 60-cell / 120 half-cell, 66-cell / 132 half-cell and 72-cell / 144 half-cell	
MPPT voltage range	V	30 – 45	32 – 45
Operating range	V	16 – 58	
Min. / Max. start voltage	V	22 / 58	
Max. input DC voltage	V	60	
Max. continuous input DC current	A	12	
Max. input DC short-circuit current	A	25	
Max. module I _{sc}	A	20	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1 x 1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA [AC]		I08M-72-2-US	I08A-72-2-US
Peak output power	VA	330	366
Max. continuous output power	VA	325	349
Nominal (L-L) voltage / range ²	V	240 / 211 – 264	
Max. continuous output current	A	1.35	1.45
Nominal frequency	Hz	60	
Extended frequency range	Hz	47 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max. units per 20 A (L-L) branch circuit ³		11	
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.8	97.7
CEC weighted efficiency	%	97.5	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (H x W x D)		212 mm (8.3”) x 175 mm (6.9”) x 30.2 mm (1.2”)	
Weight		1.08 kg (2.38 lbs)	
Cooling		Natural convection – no fans	
Approved for wet locations		Yes	
Pollution degree		PD3	
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE 1547:2018 (UL 1741-SB 3 rd Ed.), FCC Part 15 Class B, ICES-0003 Class B, CAN / CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shutdown Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer’s instructions.		

(1) Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at <https://link.enphase.com/module-compatibility>. (2) Nominal voltage range can be extended beyond nominal if required by the utility.

(3) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

Major's Home Repairs

159b River Rd
Essex Junction, Vermont
802-782-6843
majorshomerepairs@gmail.com

Major's Home Repairs

Ed Major
Owner

To whom it may concern:

On August 22nd, 2024, Major Home Repairs was invited to consult on a renovation being conducted by Lewis Creek Builders, on behalf of the property owners Robert Viskup and Connie Lael, at 365 South Winooski Avenue Burlington. The request included inspecting the current slate roof to evaluate the condition and repairs necessary to provide adequate roof protection as well as the viability of installing solar panels on the existing slate roof.

During our visit, we made the following observations:

- 365 South Winooski Avenue is an early 1910's Dutch-Colonial Revival Single Family Home with an Accessory Dwelling Unit in the basement. The roof is slated with a semi-weathering gray/green slate tile. This roof is mostly original with several areas where patches and/or repairs have been made.
- Slate roofing tiles showed signs of being previously removed and attempted repair. These tiles showed signs of significant deterioration and pitting as can be seen by in the attached photos. This is likely due to water and corrosion from the steel fasteners that were used. The standard conventional practice is to fasten slate tiles with copper nails which are non-corrosive and adjust to temperature changes.
- Over 40% of the existing roof shows signs of significant deterioration, this is typical of the slate variety installed in addition to the age of the slate tiles and the effects of the steel fasteners after the extended exposure.
- Existing fasteners are steel, which being nonconforming with standard and best practices, will continue to fail, causing further damage to the roof. To replace these fasteners, the entire roof would need to be removed and reinstalled with proper fasteners

The recommended course of action for a long-lasting roof would be a full replacement. Given the difficulty of accessing the rear side of the roof, in addition to the desire to add solar panels, my professional recommendation would be to replace the roof with a long-lasting, warrantee-able, and solar-compatible roof.

I have over 12 years of experience in the slate industry. I worked as a steeplejack for Yankee Steeplejack Company out of Harvard, MA from 2005-2017. We did historical restoration of church steeples and other hard-to-access structures which included lots of slate and copper work. Below is a reference if you are interested in knowing more about the work we did repairing historic churches and structures. I have continued to tackle slate and roof repairs over the past 7 years on my own and as Major Home Repairs.

Tom Evarts- Owner of Yankee SteepleJack Company

978-456-7339

<http://www.yankeetower.com/>

If there are any questions for me please contact me at:

802-782-6843

majorshomerepairs@gmail.com

Proposed new roofing material layout, proposed change to all metal roofing



E4 EAST EXTERIOR ELEVATION
1/2 in = 1 ft



E5 SOUTH EXTERIOR ELEVATION
1/2 in = 1 ft

PRINT DATE: 10/7/2024



Lewis Creek Builders
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Find us on the web at :
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365 South Winooski Avenue
Burlington, VT 05401
**Connie Lael &
Robert Viskup**

**SOUTH
ELEVATION**

ISSUE DATE:
05-23-2024
SHEET #

2.2



Eq WEST EXTERIOR ELEVATION
1/2 in = 1 ft



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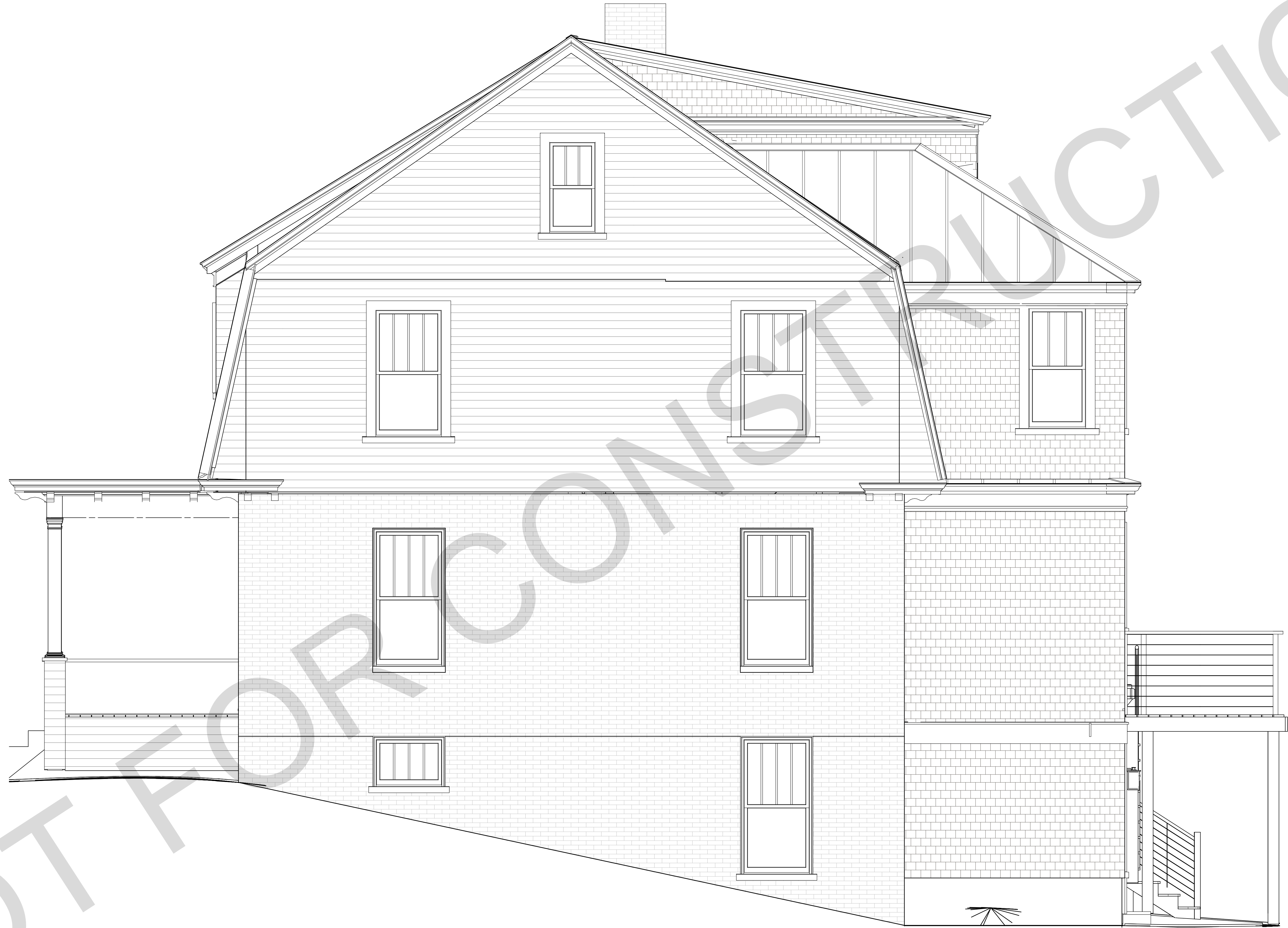
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Burlington, VT 05401

**Connie Lael &
Robert Viskup**

**WEST
ELEVATION**

ISSUE DATE:
05-23-2024
SHEET #

2.3



E3 NORTH EXTERIOR ELEVATION
1/2 in = 1 ft



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Robert Viskup**

**NORTH
ELEVATION**

ISSUE DATE:

05-23-2024

SHEET #

2.4

Existing roofing



E4 EAST EXTERIOR ELEVATION
1/4 in = 1 ft

Existing

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EAST EXTERIOR ELEVATION	
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ROBERT VISKUP**

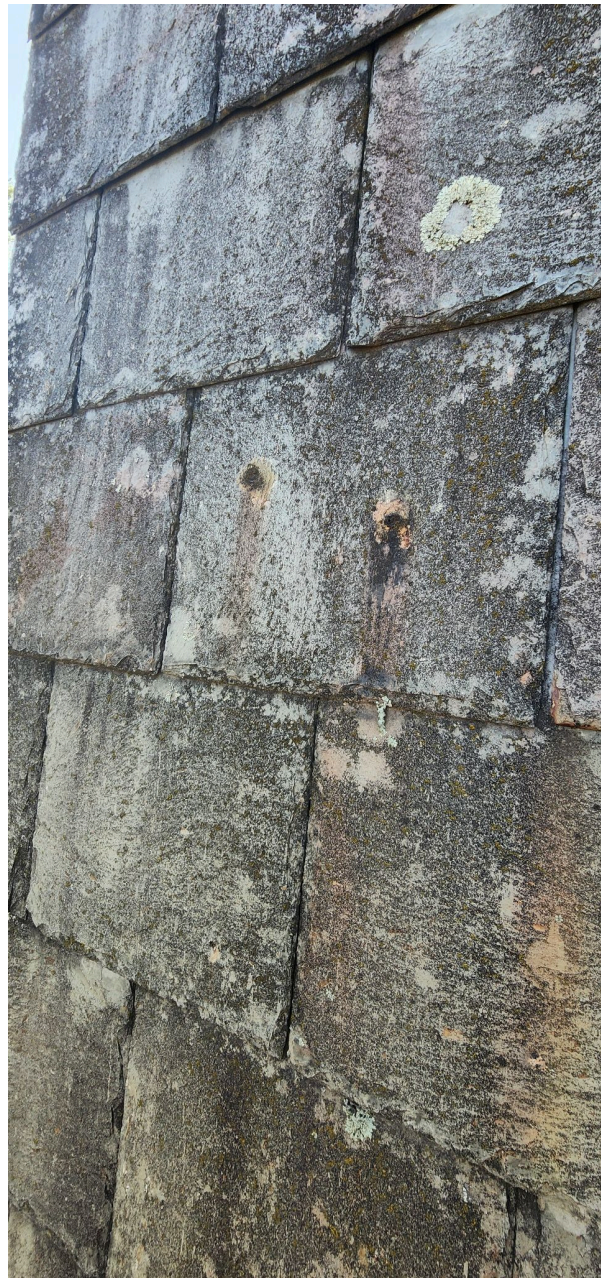
**WEST
EXTERIOR
ELEVATION**

ISSUE DATE:
TBD
SHEET #

3.2











M E T A L R O O F I N G

PRODUCT Catalog

Proposed roofing type

• ROOFING MACHINES

• ROOFING MATERIAL

• ACCESSORIES



“It’s all about the customer.”

To know Englert is to know the man who said those words, Herb Englert, and the vision behind the company. Whether you work with our salespeople or spec our products, when you deal with Englert, you understand the culture of our company and the heart of our business.

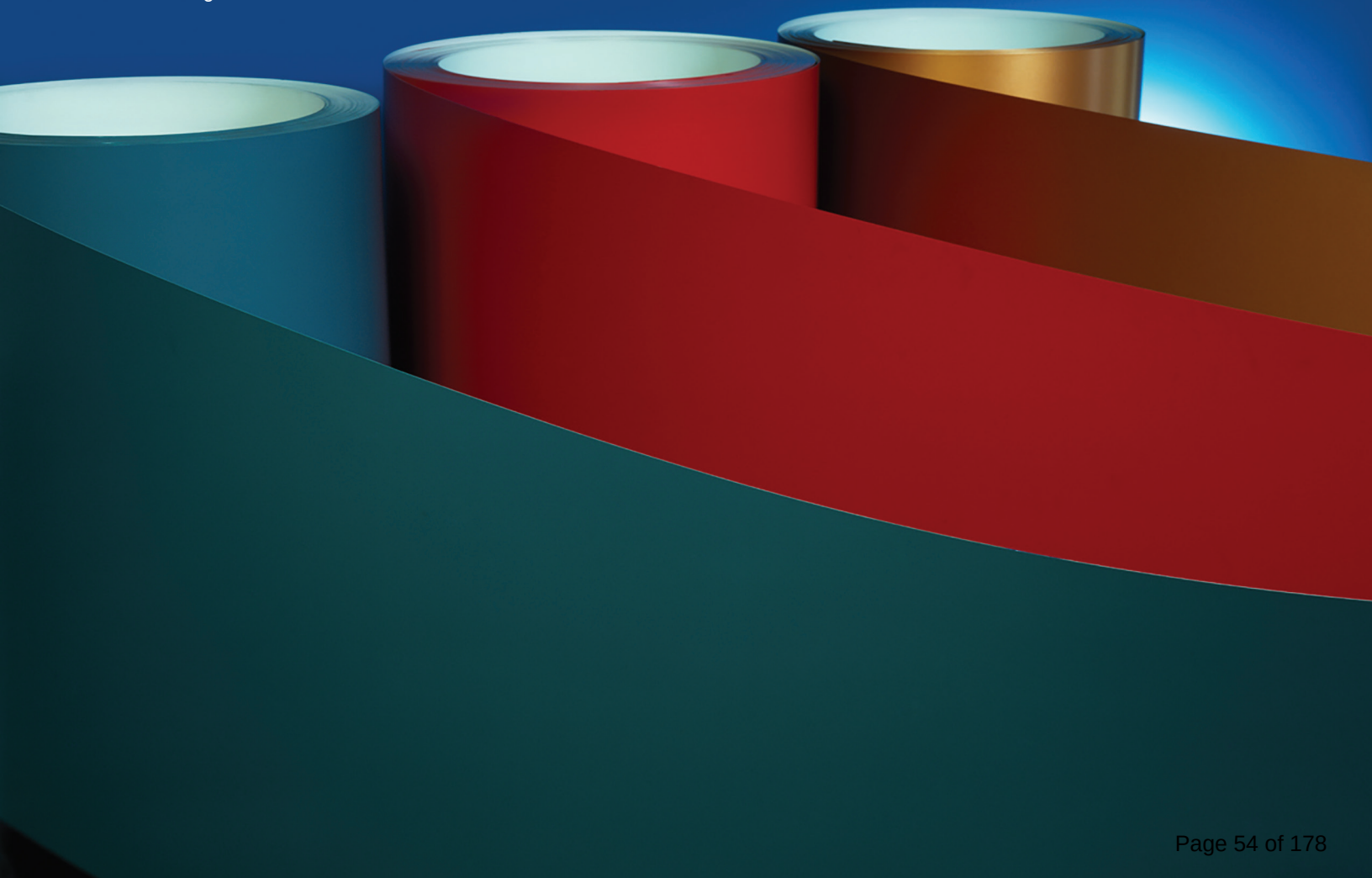
It revolves around our core belief that we’re not here to sell you roofing products, machines or accessories, we’re here to help you build your business. We’d love you to buy our products. But, to us, it’s more important that you buy into an ongoing business relationship that will help you build and grow your company.

We do this, as we have since 1966, with a commitment to innovation that continues to raise the bar – and eyebrows – in the building products industry. And we do it every day with our commitment to being your single source for seamless solutions.

After all, as my father Herb once said, “It’s all about the customer.” It still is.

Debbie Tripod

President
Englert, Inc.



Steel Roofing Coil 24" x 24 Gauge (.024) AZ-50 Galvalume/Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
2424BD	Burgundy	2424PB	Pacific Blue
2424BW	Bone White	2424PG	Patina Green
2424CG	Charcoal Gray	2424RB	Royal Blue
2424CR	Colonial Red	2424SB	Slate Blue
2424DB	Dark Bronze	2424SG	Slate Gray
2424DG	Dove Gray	2424SS	Sandstone
2424DR	Deep Red	2424ST	Sierra Tan
2424EM	Everglade Moss	2424SW	Stone White
2424FG	Forest Green	2424SN	SunNet Blue
2424HG	Hartford Green	2424TC	Terracotta
2424HL	Hemlock Green	2424MC	Metallic Copper
2424MA	Mansard Brown	2424CH	Champagne
2424MB	Medium Bronze	2424PW	Prewheathered Galvalume
2424MT	Matte Black	06410A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

Steel Roofing Coil 22" x 24 Gauge (.024) AZ-50 Galvalume / Kynar 500 Finish - Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2422BD	Burgundy	2422PB	Pacific Blue
2422BW	Bone White	2422PG	Patina Green
2422CG	Charcoal Gray	2422RB	Royal Blue
2422CR	Colonial Red	2422SB	Slate Blue
2422DB	Dark Bronze	2422SG	Slate Gray
2422DG	Dove Gray	2422SS	Sandstone
2422DR	Deep Red	2422ST	Sierra Tan
2422EM	Everglade Moss	2422SW	Stone White
2422FG	Forest Green	2422SN	SunNet Blue
2422HG	Hartford Green	2422TC	Terracotta
2422HL	Hemlock Green	2422MC	Metallic Copper
2422MA	Mansard Brown	2422CH	Champagne
2422MB	Medium Bronze	2422PW	Prewheathered Galvalume
2422MT	Matte Black	06310A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Steel Roofing Coil 20" x 24 Gauge (.024) AZ-50 Galvalume / Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
2420BD	Burgundy	2420PB	Pacific Blue
2420BW	Bone White	2420PG	Patina Green
2420CG	Charcoal Gray	2420RB	Royal Blue
2420CR	Colonial Red	2420SB	Slate Blue
2420DB	Dark Bronze	2420SG	Slate Gray
2420DG	Dove Gray	2420SS	Sandstone
2420DR	Deep Red	2420ST	Sierra Tan
2420EM	Everglade Moss	2420SW	Stone White
2420FG	Forest Green	2420SN	SunNet Blue
2420HG	Hartford Green	2420TC	Terracotta
2420HL	Hemlock Green	2420MC	Metallic Copper
2420MA	Mansard Brown	2420CH	Champagne
2420MB	Medium Bronze	2420PW	Prewheathered Galvalume
2420MT	Matte Black	06411A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

Steel Roofing Coil 16" x 24 Gauge (.024) AZ-50 Galvalume / Kynar 500 Finish - Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2416BD	Burgundy	2416PB	Pacific Blue
2416BW	Bone White	2416PG	Patina Green
2416CG	Charcoal Gray	2416RB	Royal Blue
2416CR	Colonial Red	2416SB	Slate Blue
2416DB	Dark Bronze	2416SG	Slate Gray
2416DG	Dove Gray	2416SS	Sandstone
2416DR	Deep Red	2416ST	Sierra Tan
2416EM	Everglade Moss	2416SW	Stone White
2416FG	Forest Green	2416SN	SunNet Blue
2416HG	Hartford Green	2416TC	Terracotta
2416HL	Hemlock Green	2416MC	Metallic Copper
2416MA	Mansard Brown	2416CH	Champagne
2416MB	Medium Bronze	2416PW	Prewheathered Galvalume
2416MT	Matte Black	06513A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- 1,000 Sq. Ft. Minimum Order.
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Steel Roofing Coil 48-1/4" x 24 Gauge (.024) "Master Coil"

AZ-50 Galvalume / Kynar 500 Finish – Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2248BD	Burgundy	2248PB	Pacific Blue
2248BW	Bone White	2248PG	Patina Green
2248CG	Charcoal Gray	2248RB	Royal Blue
2248CR	Colonial Red	2248SB	Slate Blue
2248DB	Dark Bronze	2248SG	Slate Gray
2248DG	Dove Gray	2248SS	Sandstone
2248DR	Deep Red	2248ST	Sierra Tan
2248EM	Everglade Moss	2248SW	Stone White
2248FG	Forest Green	2248SN	SunNet Blue
2248HG	Hartford Green	2248TC	Terracotta
2248HL	Hemlock Green	2248MC	Metallic Copper
2248MA	Mansard Brown	2248CH	Champagne
2248MB	Medium Bronze	2248PW	Prewathered Galvalume
2248MT	Matte Black	20483A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Master Coil is sold by the pound.
- **CAUTION!** Metallic Copper, Champagne and Prewathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

Steel Roofing Coil 20" x 26 Gauge (.018) AZ-50 Galvalume / Kynar 500 Finish – Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
1820BD	Burgundy	1820PB	Pacific Blue
1820BW	Bone White	1820PG	Patina Green
1820CG	Charcoal Gray	1820RB	Royal Blue
1820CR	Colonial Red	1820SB	Slate Blue
1820DB	Dark Bronze	1820SG	Slate Gray
1820DG	Dove Gray	1820SS	Sandstone
1820DR	Deep Red	1820ST	Sierra Tan
1820EM	Everglade Moss	1820SW	Stone White
1820FG	Forest Green	1820SN	SunNet Blue
1820HG	Hartford Green	1820TC	Terracotta
1820HL	Hemlock Green	1820MC	Metallic Copper
1820MA	Mansard Brown	1820CH	Champagne
1820MB	Medium Bronze	1820PW	Prewathered Galvalume
1820MT	Matte Black	06385A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Master Coil is sold by the pound.
- **CAUTION!** Metallic Copper, Champagne and Prewathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Steel Roofing Coil 24" x 26 Gauge (.018) AZ-50 Galvalume / Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
1824BD	Burgundy	1824PB	Pacific Blue
1824BW	Bone White	1824PG	Patina Green
1824CG	Charcoal Gray	1824RB	Royal Blue
1824CR	Colonial Red	1824SB	Slate Blue
1824DB	Dark Bronze	1824SG	Slate Gray
1824DG	Dove Gray	1824SS	Sandstone
1824DR	Deep Red	1824ST	Sierra Tan
1824EM	Everglade Moss	1824SW	Stone White
1824FG	Forest Green	1824SN	SunNet Blue
1824HG	Hartford Green	1824TC	Terracotta
1824HL	Hemlock Green	1824MC	Metallic Copper
1824MA	Mansard Brown	1824CH	Champagne
1824MB	Medium Bronze	1824PW	Prewheathered Galvalume
1824MT	Matte Black	06380A	Galvalume Plus



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

Steel Roofing Coil 48-1/4" x 26 Gauge (.018) "Master Coil" AZ-50 Galvalume / Kynar 500 Finish - Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2184BD	Burgundy	2184PB	Pacific Blue
2184BW	Bone White	2184PG	Patina Green
2184CG	Charcoal Gray	2184RB	Royal Blue
2184CR	Colonial Red	2184SB	Slate Blue
2184DB	Dark Bronze	2184SG	Slate Gray
2184DG	Dove Gray	2184SS	Sandstone
2184DR	Deep Red	2184ST	Sierra Tan
2184EM	Everglade Moss	2184SW	Stone White
2184FG	Forest Green	2184SN	SunNet Blue
2184HG	Hartford Green	2184TC	Terracotta
2184HL	Hemlock Green	2184MC	Metallic Copper
2184MA	Mansard Brown	2184CH	Champagne
2184MB	Medium Bronze	2184PW	Prewheathered Galvalume
2184MT	Matte Black	20484A	Galvalume Plus



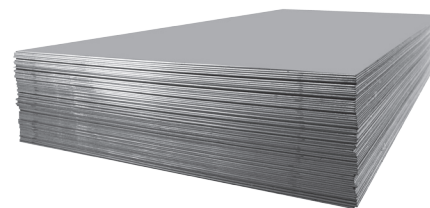
SPECIFICATIONS:

- Coil ID: 20"
- Master Coil is sold by the pound.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Steel Sheets 4 x 10 x 24 Gauge (.024) AZ-50 Galvalume / Kynar 500 Finish – Stocking

PART NO.	COLOR	PART NO.	COLOR
2410BD	Burgundy	2410PB	Pacific Blue
2410BW	Bone White	2410PG	Patina Green
2410CG	Charcoal Gray	2410RB	Royal Blue
2410CR	Colonial Red	2410SB	Slate Blue
2410DB	Dark Bronze	2410SG	Slate Gray
2410DG	Dove Gray	2410SS	Sandstone
2410DR	Deep Red	2410ST	Sierra Tan
2410EM	Everglade Moss	2410SW	Stone White
2410FG	Forest Green	2410SN	SunNet Blue
2410HG	Hartford Green	2410TC	Terracotta
2410HL	Hemlock Green	2410MC	Metallic Copper
2410MA	Mansard Brown	2410CH	Champagne
2410MB	Medium Bronze	2410PW	Prewheathered Galvalume
2410MT	Matte Black	06201A	Galvalume Plus

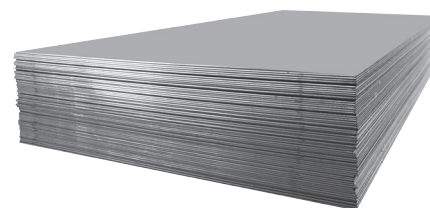


SPECIFICATIONS:

- 50 sheets to a skid.
- Sheets come standard with strippable clear film. (Except Galvalume Plus)
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plan.)
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)

Steel Sheets 4 x 10 x 26 Gauge (.018) AZ-50 Galvalume / Kynar 500 Finish – Stocking

PART NO.	COLOR	PART NO.	COLOR
1810BD	Burgundy	1810PB	Pacific Blue
1810BW	Bone White	1810PG	Patina Green
1810CG	Charcoal Gray	1810RB	Royal Blue
1810CR	Colonial Red	1810SB	Slate Blue
1810DB	Dark Bronze	1810SG	Slate Gray
1810DG	Dove Gray	1810SS	Sandstone
1810DR	Deep Red	1810ST	Sierra Tan
1810EM	Everglade Moss	1810SW	Stone White
1810FG	Forest Green	1810SN	SunNet Blue
1810HG	Hartford Green	1810TC	Terracotta
1810HL	Hemlock Green	1810MC	Metallic Copper
1810MA	Mansard Brown	1810CH	Champagne
1810MB	Medium Bronze	1810PW	Prewheathered Galvalume
1810MT	Matte Black	06160A	Galvalume Plus



SPECIFICATIONS:

- 50 sheets to a skid.
- Sheets come standard with strippable clear film. (Except Galvalume Plus)
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints.
- Galvalume Plus is AZ55 with a clear acrylic coating. (Aesthetics for Mill Finish products are not guaranteed.)



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Roofing Coil 24" x .032 #3105-H24 Alloy / Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
2432BD	Burgundy	2432PB	Pacific Blue
2432BW	Bone White	2432PG	Patina Green
2432CG	Charcoal Gray	2432RB	Royal Blue
2432CR	Colonial Red	2432SB	Slate Blue
2432DB	Dark Bronze	2432SG	Slate Gray
2432DG	Dove Gray	2432SS	Sandstone
2432DR	Deep Red	2432ST	Sierra Tan
2432EM	Everglade Moss	2432SW	Stone White
2432FG	Forest Green	2432SN	SunNet Blue
2432HG	Hartford Green	2432TC	Terracotta
2432HL	Hemlock Green	2432MC	Metallic Copper
2432MA	Mansard Brown	2432CH	Champagne
2432MB	Medium Bronze	2432PW	Prewheathered Galvalume
2432MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

Aluminum Roofing Coil 20" x .032 #3105-H24 Alloy / Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
3220BD	Burgundy	3220PB	Pacific Blue
3220BW	Bone White	3220PG	Patina Green
3220CG	Charcoal Gray	3220RB	Royal Blue
3220CR	Colonial Red	3220SB	Slate Blue
3220DB	Dark Bronze	3220SG	Slate Gray
3220DG	Dove Gray	3220SS	Sandstone
3220DR	Deep Red	3220ST	Sierra Tan
3220EM	Everglade Moss	3220SW	Stone White
3220FG	Forest Green	3220SN	SunNet Blue
3220HG	Hartford Green	3220TC	Terracotta
3220HL	Hemlock Green	3220MC	Metallic Copper
3220MA	Mansard Brown	3220CH	Champagne
3220MB	Medium Bronze	3220PW	Prewheathered Galvalume
3220MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Roofing Coil 16" x .032 #3105-H24 Alloy / Kynar 500 Finish – Stocking

PART NO.	COLOR	PART NO.	COLOR
3216BD	Burgundy	3216PB	Pacific Blue
3216BW	Bone White	3216PG	Patina Green
3216CG	Charcoal Gray	3216RB	Royal Blue
3216CR	Colonial Red	3216SB	Slate Blue
3216DB	Dark Bronze	3216SG	Slate Gray
3216DG	Dove Gray	3216SS	Sandstone
3216DR	Deep Red	3216ST	Sierra Tan
3216EM	Everglade Moss	3216SW	Stone White
3216FG	Forest Green	3216SN	SunNet Blue
3216HG	Hartford Green	3216TC	Terracotta
3216HL	Hemlock Green	3216MC	Metallic Copper
3216MA	Mansard Brown	3216CH	Champagne
3216MB	Medium Bronze	3216PW	Prewheathered Galvalume
3216MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

Aluminum Roofing Coil 24" x .040 #3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2440BD	Burgundy	2440PB	Pacific Blue
2440BW	Bone White	2440PG	Patina Green
2440CG	Charcoal Gray	2440RB	Royal Blue
2440CR	Colonial Red	2440SB	Slate Blue
2440DB	Dark Bronze	2440SG	Slate Gray
2440DG	Dove Gray	2440SS	Sandstone
2440DR	Deep Red	2440ST	Sierra Tan
2440EM	Everglade Moss	2440SW	Stone White
2440FG	Forest Green	2440SN	SunNet Blue
2440HG	Hartford Green	2440TC	Terracotta
2440HL	Hemlock Green	2440MC	Metallic Copper
2440MA	Mansard Brown	2440CH	Champagne
2440MB	Medium Bronze	2440PW	Prewheathered Galvalume
2440MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Roofing Coil 48-1/4" x .032 "Master Coil"

#3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2328BD	Burgundy	2328PB	Pacific Blue
2328BW	Bone White	2328PG	Patina Green
2328CG	Charcoal Gray	2328RB	Royal Blue
2328CR	Colonial Red	2328SB	Slate Blue
2328DB	Dark Bronze	2328SG	Slate Gray
2328DG	Dove Gray	2328SS	Sandstone
2328DR	Deep Red	2328ST	Sierra Tan
2328EM	Everglade Moss	2328SW	Stone White
2328FG	Forest Green	2328SN	SunNet Blue
2328HG	Hartford Green	2328TC	Terracotta
2328HL	Hemlock Green	2328MC	Metallic Copper
2328MA	Mansard Brown	2328CH	Champagne
2328MB	Medium Bronze	2328PW	Prewheathered Galvalume
2328MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Master Coil is sold by the pound.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

Aluminum Roofing Coil 48-1/4" x .040 "Master Coil"

#3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2408BD	Burgundy	2408PB	Pacific Blue
2408BW	Bone White	2408PG	Patina Green
2408CG	Charcoal Gray	2408RB	Royal Blue
2408CR	Colonial Red	2408SB	Slate Blue
2408DB	Dark Bronze	2408SG	Slate Gray
2408DG	Dove Gray	2408SS	Sandstone
2408DR	Deep Red	2408ST	Sierra Tan
2408EM	Everglade Moss	2408SW	Stone White
2408FG	Forest Green	2408SN	SunNet Blue
2408HG	Hartford Green	2408TC	Terracotta
2408HL	Hemlock Green	2408MC	Metallic Copper
2408MA	Mansard Brown	2408CH	Champagne
2408MB	Medium Bronze	2408PW	Prewheathered Galvalume
2408MT	Matte Black		



SPECIFICATIONS:

- Coil ID: 20"
- Master Coil is sold by the pound.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

ALUMINUM ROOFING MATERIAL – COILS

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Roofing Coil 48" x .050 "Master Coil"

#3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
2508BD	Burgundy	2508PB	Pacific Blue
2508BW	Bone White	2508PG	Patina Green
2508CG	Charcoal Gray	2508RB	Royal Blue
2508CR	Colonial Red	2508SB	Slate Blue
2508DB	Dark Bronze	2508SG	Slate Gray
2508DG	Dove Gray	2508SS	Sandstone
2508DR	Deep Red	2508ST	Sierra Tan
2508EM	Everglade Moss	2508SW	Stone White
2508FG	Forest Green	2508SN	SunNet Blue
2508HG	Hartford Green	2508TC	Terracotta
2508HL	Hemlock Green	2508MC	Metallic Copper
2508MA	Mansard Brown	2508CH	Champagne
2508MB	Medium Bronze	2508PW	Prewheathered Galvalume
2508MT	Matte Black		

**SPECIFICATIONS:**

- Coil ID: 20"
- Master Coil is sold by the pound.
- Approximate Coil Size 1,000 & 2,000 Sq. Ft.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Do not mix lots on one roof plane.)

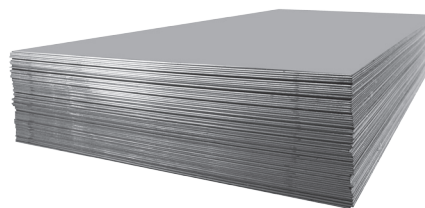


* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Sheets 4 x 10 x .032

#3105-H24 Alloy / Kynar 500 Finish - Stocking

PART NO.	COLOR	PART NO.	COLOR
3210BD	Burgundy	3210PB	Pacific Blue
3210BW	Bone White	3210PG	Patina Green
3210CG	Charcoal Gray	3210RB	Royal Blue
3210CR	Colonial Red	3210SB	Slate Blue
3210DB	Dark Bronze	3210SG	Slate Gray
3210DG	Dove Gray	3210SS	Sandstone
3210DR	Deep Red	3210ST	Sierra Tan
3210EM	Everglade Moss	3210SW	Stone White
3210FG	Forest Green	3210SN	SunNet Blue
3210HG	Hartford Green	3210TC	Terracotta
3210HL	Hemlock Green	3210MC	Metallic Copper
3210MA	Mansard Brown	3210CH	Champagne
3210MB	Medium Bronze	3210PW	Prewheathered Galvalume
3210MT	Matte Black	00839A	Mill Finish



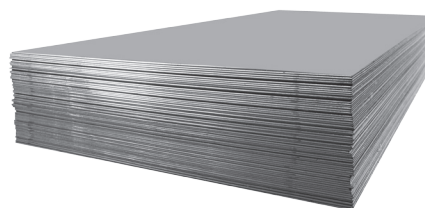
SPECIFICATIONS:

- 50 sheets to a skid.
- Sheets come standard with strippable clear film. (Except Mill Finish)
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Aesthetics for Mill Finish products are not guaranteed.)

Aluminum Sheets 4 x 10 x .040

#3105-H24 Alloy / Kynar 500 Finish - Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
1040BD	Burgundy	1040PB	Pacific Blue
1040BW	Bone White	1040PG	Patina Green
1040CG	Charcoal Gray	1040RB	Royal Blue
1040CR	Colonial Red	1040SB	Slate Blue
1040DB	Dark Bronze	1040SG	Slate Gray
1040DG	Dove Gray	1040SS	Sandstone
1040DR	Deep Red	1040ST	Sierra Tan
1040EM	Everglade Moss	1040SW	Stone White
1040FG	Forest Green	1040SN	SunNet Blue
1040HG	Hartford Green	1040TC	Terracotta
1040HL	Hemlock Green	1040MC	Metallic Copper
1040MA	Mansard Brown	1040CH	Champagne
1040MB	Medium Bronze	1040PW	Prewheathered Galvalume
1040MT	Matte Black	00875A	Mill Finish



SPECIFICATIONS:

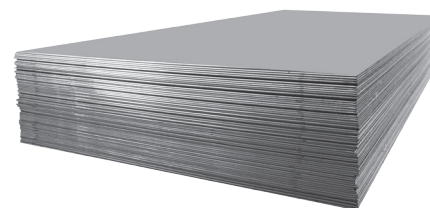
- 50 sheets to a skid.
- *Denotes in stock in that gauge and color.
- All other colors 100 sheet minimum.
- Sheets come standard with strippable clear film. (Except Mill Finish)
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Aesthetics for Mill Finish products are not guaranteed.)

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Aluminum Sheets 4 x 10 x .050

#3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

PART NO.	COLOR	PART NO.	COLOR
1050BD	Burgundy	1050PB	Pacific Blue
1050BW	Bone White	1050PG	Patina Green
1050CG	Charcoal Gray	1050RB	Royal Blue
1050CR	Colonial Red	1050SB	Slate Blue
1050DB	Dark Bronze	1050SG	Slate Gray
1050DG	Dove Gray	1050SS	Sandstone
1050DR	Deep Red	1050ST	Sierra Tan
1050EM	Everglade Moss	1050SW	Stone White
1050FG	Forest Green	1050SN	SunNet Blue
1050HG	Hartford Green	1050TC	Terracotta
1050HL	Hemlock Green	1050MC	Metallic Copper
1050MA	Mansard Brown	1050CH	Champagne
1050MB	Medium Bronze	1050PW	Prewheathered Galvalume
1050MT	Matte Black	00826A	Mill Finish

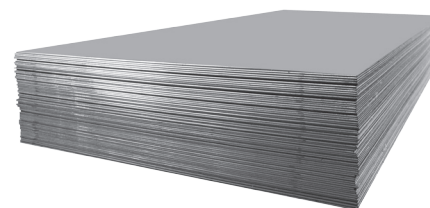
**SPECIFICATIONS:**

- 25 sheets to a skid.
- Sheets come standard with strippable clear film.
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Aesthetics for Mill Finish products are not guaranteed.)

Aluminum Sheets 4 x 10 x .063

#3105-H24 Alloy / Kynar 500 Finish – Standard, Non-Stocking

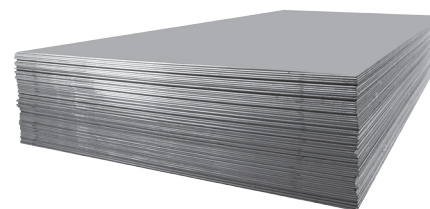
PART NO.	COLOR	PART NO.	COLOR
1063BD	Burgundy	1063PB	Pacific Blue
1063BW	Bone White	1063PG	Patina Green
1063CG	Charcoal Gray	1063RB	Royal Blue
1063CR	Colonial Red	1063SB	Slate Blue
1063DB	Dark Bronze	1063SG	Slate Gray
1063DG	Dove Gray	1063SS	Sandstone
1063DR	Deep Red	1063ST	Sierra Tan
1063EM	Everglade Moss	1063SW	Stone White
1063FG	Forest Green	1063SN	SunNet Blue
1063HG	Hartford Green	1063TC	Terracotta
1063HL	Hemlock Green	1063MC	Metallic Copper
1063MA	Mansard Brown	1063CH	Champagne
1063MB	Medium Bronze	1063PW	Prewheathered Galvalume
1063MT	Matte Black	1063MF	Mill Finish

**SPECIFICATIONS:**

- 25 sheets to a skid.
- Sheets come standard with strippable clear film.
- Storage of sheets, see page 39.
- **CAUTION!** Metallic Copper, Champagne and Prewheathered Galvalume are directional paints. (Aesthetics for Mill Finish products are not guaranteed.)

Copper Sheets

PART NO.	DESCRIPTION	AVAILABILITY
06203M	3 x 10 x 16 oz	Stock

**SPECIFICATIONS:**

- 65 sheets to a skid.
- 20 oz available through special request.
- Storage of sheets, see page 39. (Aesthetics for Mill Finish products are not guaranteed.)



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Copper Coil

PART NO.	DESCRIPTION	AVAILABILITY
00677A	20" x 16 oz	Stock
00677L	24" x 16 oz	Stock

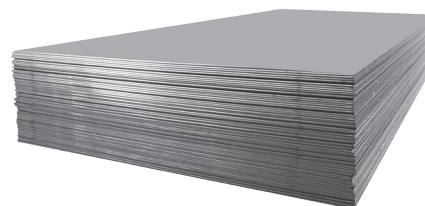


SPECIFICATIONS:

- Coil ID: 20"
- Coils range from 500 - 1000 LBS. (Aesthetics for Mill Finish products are not guaranteed.)

Zinc Sheets 39.4" x 10' .7mm/.8mm

PART NO.	DESCRIPTION	AVAILABILITY
ORZ0441	.7mm (24 gauge) Preweathered Blue-Grey	Stock
ORZ0461	.8mm (22 gauge) Preweathered Blue-Grey	Stock



SPECIFICATIONS:

- 25 sheets to a skid.
- Graphite Grey available through special request.
- Storage of sheets, see page 39. (Aesthetics for Mill Finish products are not guaranteed.)

Zinc Coil .7mm/.8mm

PART NO.	DESCRIPTION	AVAILABILITY
ORZ0442	39.4" x .7mm (24 gauge) Preweathered Blue-Grey	Stock
ORZ0451	19.7" x .7mm (24 gauge) Preweathered Blue-Grey	Stock
ORZ0462	39.4" x .8mm (22 gauge) Preweathered Blue-Grey	Stock
ORZ0471	19.7" x .8mm (22 gauge) Preweathered Blue-Grey	Stock



SPECIFICATIONS:

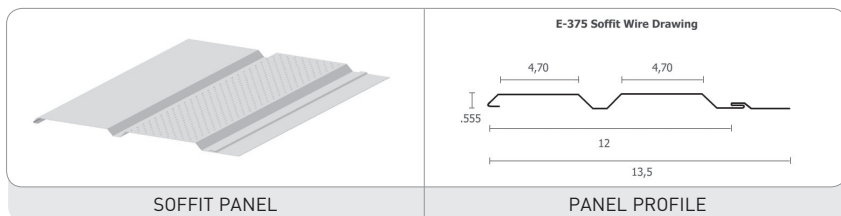
- Coil ID: 20"
- Approximate coil size 1100 LBS.
- Graphite Grey available through special request. (Aesthetics for Mill Finish products are not guaranteed.)

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Englert E-375 Commercial Soffit Panel & J Channel

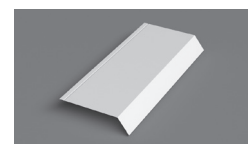
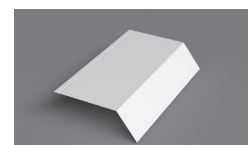
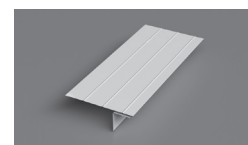
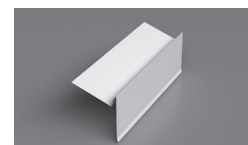
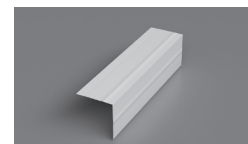
PART NO.	DESCRIPTION	BOX QUANTITY	AVAILABILITY
0038BW	.032" Soffit Panel/Bone White (Solid Face) (Aluminum)	12 pc. at 12'-0"	2-4 Weeks
0037BW	.032" Soffit Panel/Bone White (Perforated) (Aluminum)	12 pc. at 12'-0"	2-4 Weeks
0059BW	.032" x 3/8" J Channel (Aluminum)	25 pc. at 12'-0"	2-4 Weeks

Other lengths, colors and materials available by special quote. See your local Englert representative for info.



Edge Metal

PART NO.	DESCRIPTION	COLOR	FT/BOX	AVAILABILITY
00278H	Standard Asphalt Drip Edge (Fascia cap 4" x 10')	Bright White	500	Stock
00278I	Standard Asphalt Drip Edge (Fascia cap 4" x 10')	Brown	500	Stock
00278D	Gravel Stop (5.75" x 10')	Bright White	120	Stock
00278E	Gravel Stop (5.75" x 10')	Brown	120	Stock
00278F	T Style Drip Edge (5.78" x 10')	Bright White	120	Stock
00278G	T Style Drip Edge (5.78" x 10')	Brown	120	Stock
00278B	Gutter Apron 6 Inch Drip Edge (6" x 10')	Bright White	300	Stock
00278C	Gutter Apron 6 Inch Drip Edge (6" x 10')	Brown	300	Stock
00279B	Gutter Apron 4.5 Inch Drip Edge (4.5" x 10')	Bright White	300	Stock
00279C	Gutter Apron 4.5 Inch Drip Edge (4.5" x 10')	Brown	300	Stock



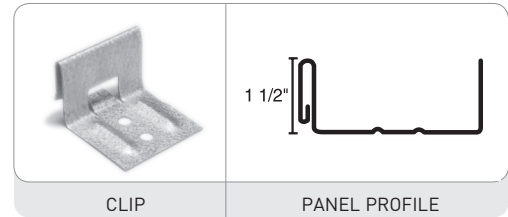
* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

About Clip Spacing...

This guide is intended to provide you with sufficient information so that you may choose the appropriate clip for our metal roof system. We have purposely omitted any reference to clip spacing as this element of roof design varies by panel width, panel material, seam style, substrate your fastening to, and building codes in the area your job is located. For more specific guidance on appropriate clip spacing for your particular job contact Englert for assistance at 1-800-610-1975.

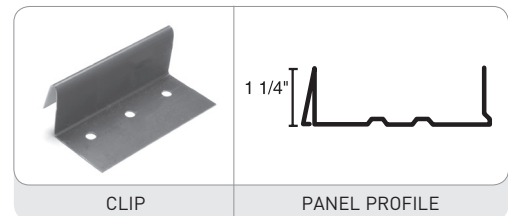
Series 1000

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05074B	R Clip 1000 Universal, 24 Gauge Galvalume	UL	800 pcs.	Stock
05074C	R Clip 1000 Universal, 24 Gauge Stainless Steel	Not Rated	800 pcs.	4-6 Weeks



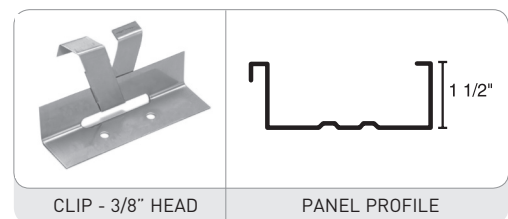
Series 1100

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05079A	R Clip 1100 Universal, 24 Gauge Galvalume	UL	400	Stock
05079F	R Clip 1100 Universal, 24 Gauge Stainless Steel	Not Rated	400	4-6 Weeks



Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05845A	R Clip 1300 Floating, .015" Stainless Steel	Not Rated	250	Stock
05815A	R Clip 1300 Floating, .030" Stainless Steel	Florida Building Code Listed	250	Stock



(For use with Englert, New Tech, Rollformer & ESE Panel Shapes)

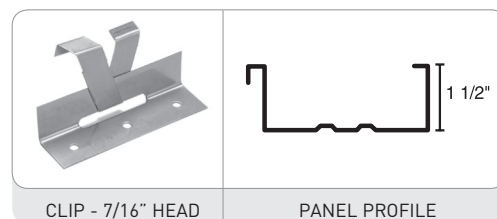
NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05855A	R Clip 1300 Floating, .015" Stainless Steel	Not Rated	250	Stock

(For use with Knudson Panel Shapes)



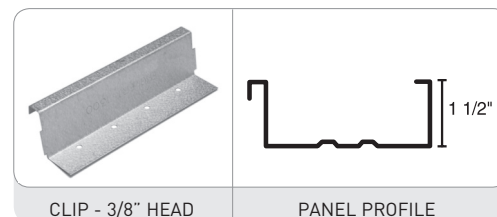
CLIP - 7/16" HEAD

PANEL PROFILE

Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05084D	R Clip 1300 Fixed, 24 Gauge Galvalume	UL/Florida Building Code Listed	250	Stock
05084E	R Clip 1300 Fixed, 24 Gauge Stainless Steel	Not Rated	250	Stock

(For use with Englert, New Tech, Rollformer & ESE Panel Shapes)



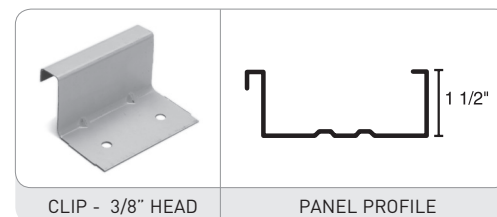
CLIP - 3/8" HEAD

PANEL PROFILE

Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05874A	R Clip 1300 Fixed, .018" Galvalume	Not Rated	800	Stock
05835A	R Clip 1300 Fixed, .015" Stainless Steel	Not Rated	800	Stock

(For use with Englert, New Tech, Rollformer & ESE Panel Shapes)



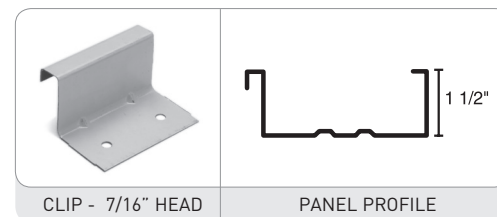
CLIP - 3/8" HEAD

PANEL PROFILE

Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05872A	R Clip 1300 Fixed, .018" Galvalume	Florida Building Code Listed	800	Stock
05837A	R Clip 1300 Fixed, .015" Stainless Steel	Not Rated	800	Stock

(For use with Knudson Panel Shapes)



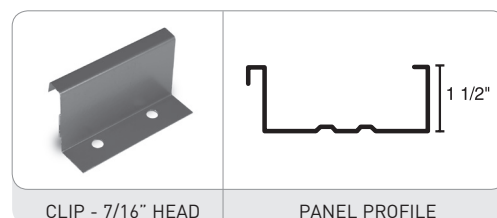
CLIP - 7/16" HEAD

PANEL PROFILE

Series 1300

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05828J	R Clip 1300 Fixed, 24 Gauge Galvalume 3"	Florida Building Code Listed	500	4-6 Weeks

(For use with Zimmerman, Knudson, Schleich & Rollformer Panel Shapes)



CLIP - 7/16" HEAD

PANEL PROFILE

NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**

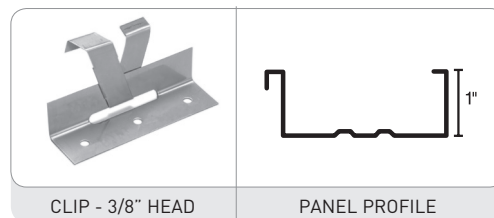


* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Series 1301

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05839A	R Clip 1301 Floating, .015" Stainless Steel	Not Rated	250	Stock
05839B	R Clip 1301 Floating, .030" Stainless Steel	Not Rated	250	4-6 Weeks

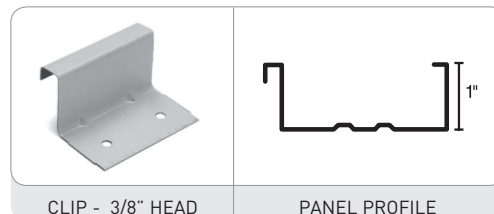
(For use with Englert, New Tech, Rollformer & ESE Panel Shapes)



Series 1301

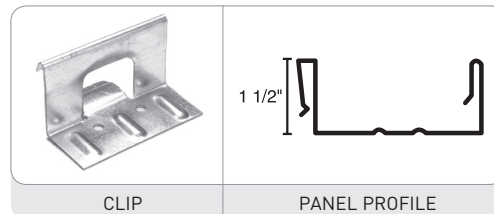
PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05875A	R Clip 1301 Fixed, .018" Galvalume	Not Rated	800	Stock
05833A	R Clip 1301 Fixed, .015" Stainless Steel	Not Rated	800	Stock

(For use with Englert, New Tech, Rollformer & ESE Panel Shapes)



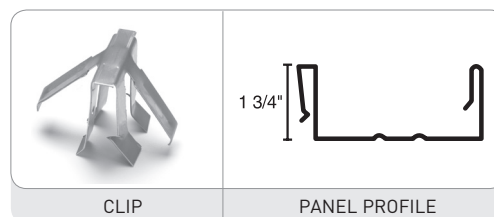
Series 1500

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05828H	R Clip 1500 20 Gauge Galvanized	Not Rated	500	Stock
SP5999	R Clip 1500 18 Gauge Galvanized	UL/Florida Building Code Listed	250	4-6 Weeks



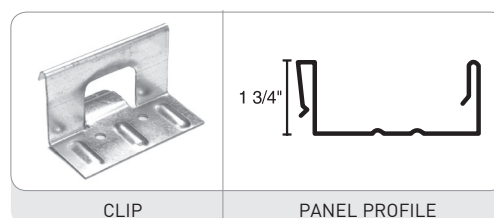
Series 2000

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05079B	R Clip 2000 Butterfly Batten, 24 Gauge Stainless Steel	Not Rated	400	Stock



Series 2000

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05076B	R Clip 2000 Universal, 18 Gauge Galvanized	UL	200	Stock
05076D	R Clip 2000 Universal, 18 Gauge Stainless Steel	Not Rated	200	4-6 Weeks



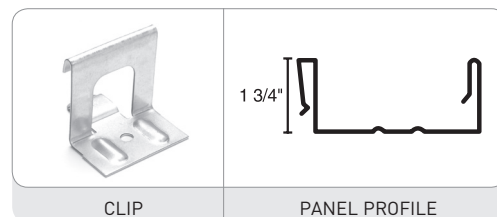
NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

ROOFING CLIPS - SERIES 1301, 1500 & 2000

Series 2000

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05076C	R Clip 2000 Universal, 18 Gauge Galvanized	Not Rated	400	Stock
05077B	R Clip 2000 Universal, 20 Gauge Stainless Steel	Not Rated	400	4-6 Weeks

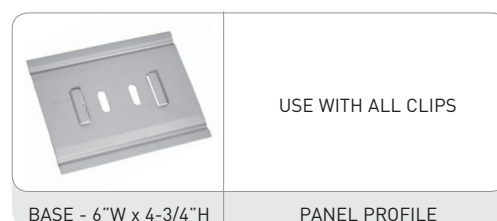


CLIP

PANEL PROFILE

Series 2000 Base Plate

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05075C	R BASE 2000 Bearing Plate, 24 Gauge Galvalume	Not Rated	200	Stock



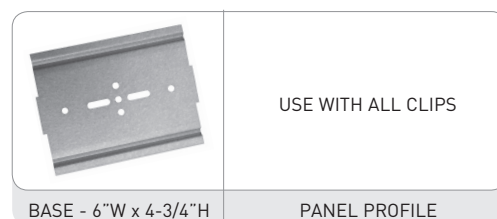
BASE - 6"W x 4-3/4"H

PANEL PROFILE

Universal Base Plate – All Clips

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05075F	R BASE Universal, 24 Gauge Galvalume	Not Rated	200	Stock

Universal base can be used with any clip over ISO board insulation

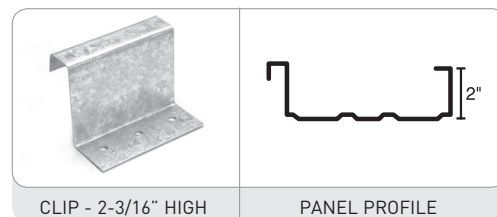


BASE - 6"W x 4-3/4"H

PANEL PROFILE

Series 2400

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05890I	R Clip 2400 Fixed, 24 Gauge Galvalume	Not Rated	250	Stock
05890H	R Clip 2400 Fixed, 22 Gauge Galvalume	Not Rated	250	2-4 Weeks



CLIP - 2-3/16" HIGH

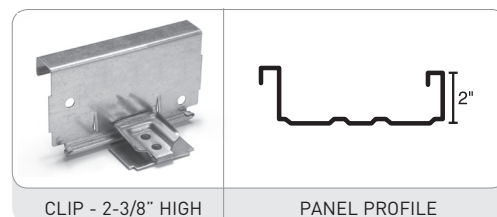
PANEL PROFILE

(Can also be used with Series 2500 Profile), (OK for Double Lock Seams)

Series 2500 Low Float

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05082F	R Clip 2500 Low Floating, 22 Gauge Galvanized	UL	100	Stock

(Can also be used with Series 2400 Profile), (Not available in Stainless Steel), (Not for Double Lock Seams)



CLIP - 2-3/8" HIGH

PANEL PROFILE

NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**

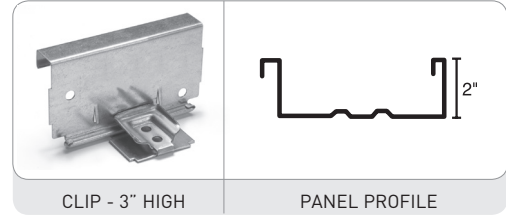


* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Series 2500 High Float

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05082C	R Clip 2500 High Floating, 22 Gauge Galvanized	UL	100	2-4 Weeks

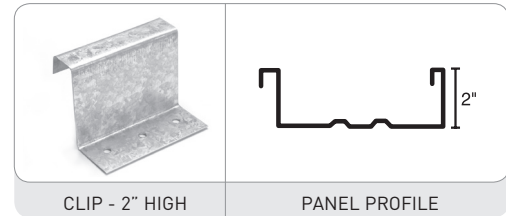
(Can also be used with Series 2400 Profile), (Not available in Stainless Steel), (Not for Double Lock Seams)



Series 2500

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05083A	R Clip 2500 Fixed, Utility 22 Gauge Galvanized	Not Rated	400	2-4 Weeks

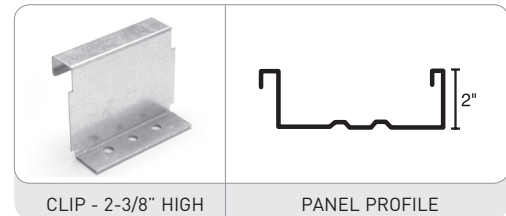
(Can also be used with Series 2400 Profile), (Not available in Stainless Steel), (OK for Double Lock Seams)



Series 2500

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05081B	R Clip 2500 Low Fixed, 22 Gauge Galvanized	UL	250	2-4 Weeks

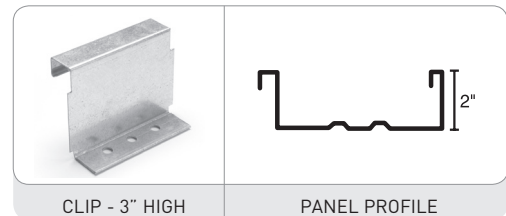
(Can also be used with Series 2400 Profile), (Not available in Stainless Steel), (Not for Double Lock Seams)



Series 2500

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05081C	R Clip 2500 High Fixed, 22 Gauge Galvanized	UL	250	2-4 Weeks

(Can also be used with Series 2400 Profile), (Not available in Stainless Steel), (Not for Double Lock Seams)



NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**

* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

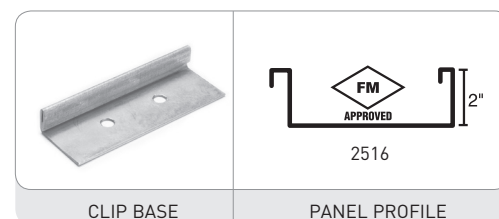
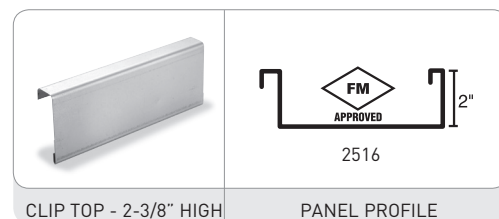
Series 2500/Series 2516 FM Approved

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05082H	R Clip 2500/2516 Floating Top, 24 Gauge Stainless Steel	FM 90*	250	Stock
05082J	R Clip 2500/2516 Floating Top, 24 Gauge Galvalume	FM 75*	250	4-6 Weeks

* Only Series 2516 is FM Approved
(Use with 05082I), (OK for Double Lock Seams)

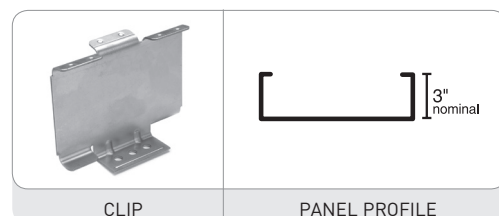
PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05082I	R Clip 2500/2516 Floating Base, 18 Gauge Galvanized	FM 75/90*	500	Stock
05082K	R Clip 2500 Floating Base, 18 Gauge Stainless Steel	Not Rated	500	4-6 Weeks

* Only Series 2516 is FM Approved
(Use with 05082H or 05082J), (OK for Double Lock Seams)



Series 3000

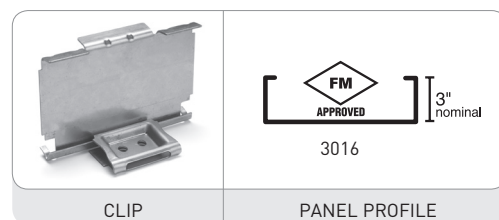
PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05085A	R Clip 3000 Fixed, .060" Galvanized	Not Rated	150	Stock
05085E	R Clip 3000 Fixed, .060" Stainless Steel	Not Rated	150	4-6 weeks



Series 3000/Series 3016 FM Approved

PART NO.	DESCRIPTION	RATINGS	BOX QUANTITY	AVAILABILITY
05085C	R Clip 3000/3016 Floating, .060" Galvanized	FM Rated*	100	4-6 Weeks
05085B	R Clip 3000 Floating Top, .060" Stainless Steel	Not Rated	100	4-6 Weeks

* Only Series 3016 is FM Approved



NOTE: These clips are designed for use with Englert Series Metal Roofing Systems. If you are using a similar profile and have not used our clips before, we encourage you to request a sample to check for fit before you place an order. **Contact your Englert sales representative for a sample today!**



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering. Specifications subject to change without notice.

Englert Approved -

Tube Sealants

PART NO.	COLOR	DESCRIPTION	TUBE SIZE	BOX QTY.	AVAILABILITY
----------	-------	-------------	-----------	----------	--------------

00319A Clear Geocel 2300 Tripolymer 10.3 oz. 24 Stock

Englert standard colors are available, but require minimum order.
Please contact your local Englert sales representative for details.



00319C White Geocel 2320 Tripolymer 10.3 oz. 24 Stock

Englert standard colors are available, but require minimum order.
Please contact your local Englert sales representative for details.



Englert Approved -

High Temperature Peel and Stick Roofing Underlayment

PART NO.	DESCRIPTION	ROLL QTY.	AVAILABILITY
----------	-------------	-----------	--------------

07050I MetalMan HT 40
[40 mil Peel & Stick Membrane] 200 Sq. Ft. Stock

07050P MetalMan HT 60
[60 mil Peel & Stick Membrane] 200 Sq. Ft. Stock

- FBC Approved



Englert Approved -

Roofing Underlayment Nail Down Vapor Barrier

PART NO.	DESCRIPTION	ROLL QTY.	AVAILABILITY
----------	-------------	-----------	--------------

07050J Premium Nailable Underlayment [48" x 250'] 1,000 Sq. Ft. Stock

- Required for Englert Weathertightness Warranty
- FBC Approved/Miami Dade Approved
- Synthetic Membrane - ASTM-D-226 Compliant



Englert Approved -

Hot Melt Seam Sealant for Metal Roof Rollforming

PART NO.	DESCRIPTION	UNIT	WT.	AVAILABILITY
----------	-------------	------	-----	--------------

00320H Pillows - HMT 3308-P 1 Box 25 Lbs. Stock

To be used with HMT-Proflex Unit in conjunction with your rollforming equipment

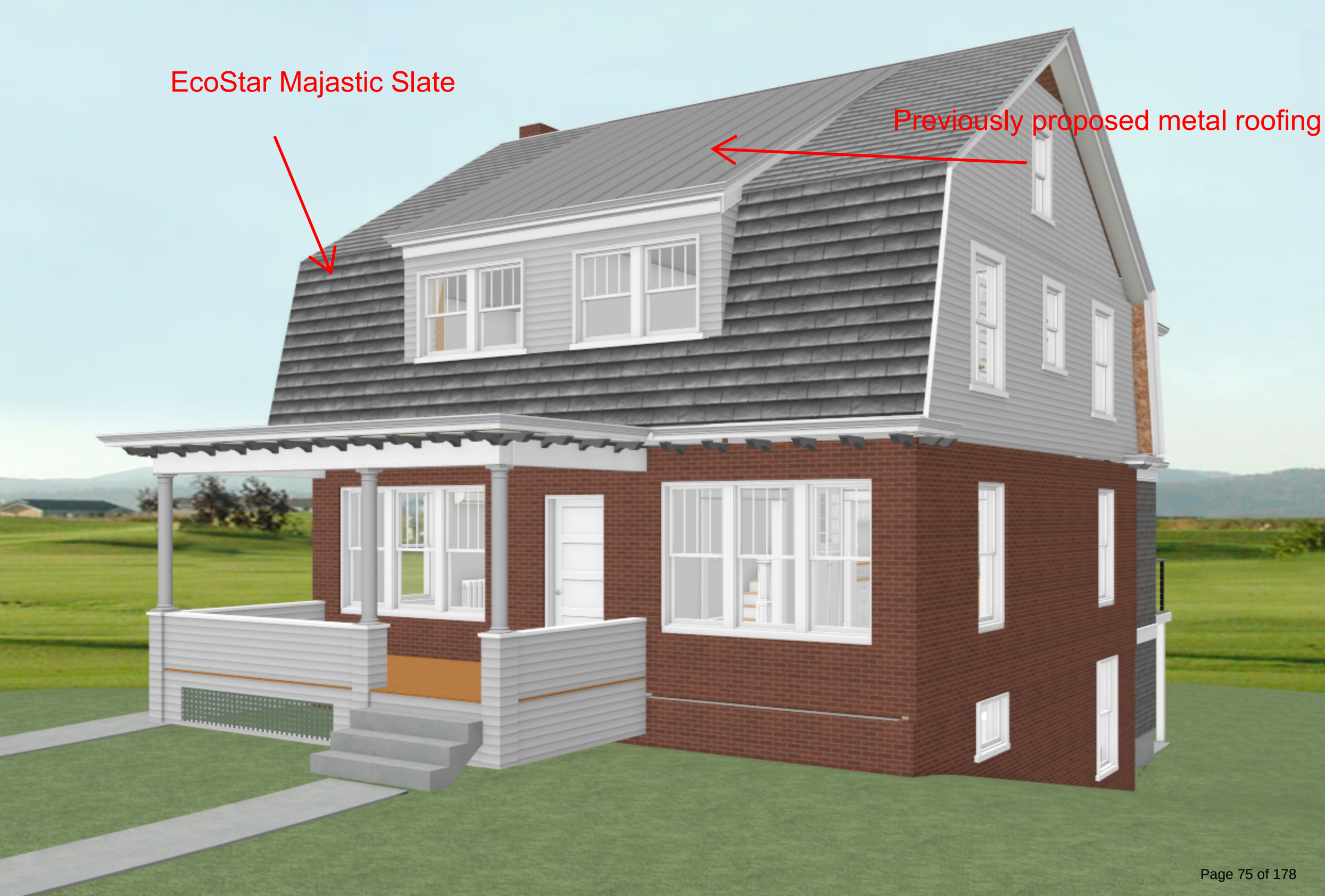
- 400 Lineal Ft/Lb at 1/8" Bead



* Minimum ordering quantities may apply. Please consult with an Englert representative before ordering.
Specifications subject to change without notice.

EcoStar Majastic Slate

Previously proposed metal roofing





42 Edgewood Drive
Holland, NY 14080
www.ecostarllc.com

MAJESTIC SLATE™ ECOSTAR GOLD STAR ROOF SYSTEM

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PART 1 – GENERAL

1.01 DESCRIPTION

- A. Furnish and install Majestic Slate tile roofing system as specified in the Contract Documents and roof plan.
- B. Furnish and install this Majestic Slate tile roofing system in strict accordance with specifications and drawings approved by EcoStar.
- C. Related Work
 - 1. Metal flashing work is not covered in this specification since EcoStar does NOT warrant metal flashing. EcoStar advises that metal flashing and securement of metal should be to industry standards (SMACNA) to prevent the metal from pulling free or buckling. EcoStar also suggests that all flashing metal be stainless steel or copper (see 3.03D).
 - 2. Roof ventilation products are not covered by the EcoStar Gold Star warranty. EcoStar advises that a ridge style venting system be utilized to ensure the best possible air movement and to provide the best aesthetic appearance to the roofing system. If a ridge ventilation system is not to be used on the project, another form of ventilation may be used.

1.02 QUALITY ASSURANCE

- A. To qualify for an EcoStar Gold Star warranty, an authorized EcoStar Gold Star applicator must install system.
- B. There shall be no deviation made from this specification without written approval from EcoStar prior to the start of the roofing project.
- C. For an EcoStar Gold Star warranty, upon completion of the installation, an inspection must be conducted by a Field Service Representative of EcoStar to ascertain that the roofing system has been installed according to EcoStar's published specifications and details at time of bid. This inspection is not intended to be a final inspection for the benefit of the owner, but for the benefit of EcoStar to determine whether a warranty shall be issued.
- D. It is the Authorized Gold Star Applicator's responsibility to adhere to all applicable building codes (local and national) and to have or acquire the appropriate licenses and permits for the roofing system installation requirements and limitations in their local areas applicable at the time of the bid.
- E. Specific testing requirements:
 - 1. Class C Fire Resistance – UL 790 Test Standard
 - 2. Class 4 Impact Resistance – UL 2218 Test Standard
 - 3. ASTM D3161 – 110 mph Wind Test

1.03 SUBMITTALS

- A. Submit an “EcoStar Gold Star Pre-Project Survey” to EcoStar’s technical department for approval PRIOR to project bid and the job start to enable the technical department to approve and assign a job number to the project.
 - 1. The “EcoStar Gold Star Pre-Project Survey Form” must be filled out completely and accurately to include any prior deviations approved from this specification, including a roof drawing showing all dimensions, all penetrations and roof slope.
- B. When an EcoStar Gold Star Warranty is desired, EcoStar must be contacted PRIOR to project bid and installation. Information will be required for wind speeds greater than 90 mph (145 kph) and deviation from standard slope requirements.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original unopened packages.
- B. Packages shall be labeled with manufacturer’s name, brand name and identification of various items.
- C. Majestic Slate tiles may not be installed if the tiles have been stored in temperatures lower than 45°F (7°C). If tiles have been stored in temperatures below 45°F (7°C), tiles must be brought back to a material temperature of 45°F (7°C). As the temperature rises, Majestic Slate tiles will expand beyond the designed installation pattern if the product is installed while cold or frozen.
- D. Store all materials in a dry protected area. Damaged materials must NOT be used. Installed materials found to be damaged shall be replaced at Gold Star Authorized Applicator’s expense.

1.05 JOB CONDITIONS (CAUTIONS AND WARNINGS)

- A. Contact the EcoStar technical department for procedures when installing a Majestic Slate tile roof system during temperatures lower than 45°F (7°C).
- B. Do not install the Majestic Slate tile roof system directly over existing asphalt shingles or existing tile roof systems. All existing roof materials MUST be removed prior to installation of the Majestic Slate tile roof system.
- C. Roofing surface must be free of ice, water, or snow prior to and during the roofing project.
- D. Decking materials must be dimensionally stable prior to installing the Majestic Slate tiles. If the materials are not dry, EcoStar recommends installing the underlayment and allowing the roof to dry out before installing Majestic Slate tiles.

1.06 WARRANTY

- A. EcoStar will provide the Gold Star warranty for those materials supplied by EcoStar when an authorized EcoStar Gold Star Applicator completes the project and all required materials have been utilized within the roof system.
- B. Only when an EcoStar Field Service Representative has inspected and approved the completed installation will an EcoStar Gold Star warranty be issued.

- C. The warranty is available for most types of buildings and structures.
- D. The warranty period is expressed on the warranty certificate, which reflects the inclusive dates of coverage.
- E. The warranty does NOT cover the aesthetic appearance of the Majestic Slate roof installation. It is the responsibility of the EcoStar Authorized Gold Star Applicator to ensure that color/shading and quality of workmanship meets the aesthetic expectations of the home/building owner.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All components of the Majestic Slate Gold Star roof system are to be products manufactured or supplied by EcoStar LLC.

NOTE: Only products supplied by EcoStar LLC are included in the warranty unless otherwise specified and approved in writing by EcoStar LLC.

2.02 TILES

- A. Majestic Slate tiles are made of Starloy™ an 80% recycled rubber and plastic compound with appropriate colorants and UV stabilizers at 10" (254 mm) or 12" (305 mm) widths by 18" (457 mm) long, and with a tapered nominal thickness of 1/4" (6 mm).

Weight shall be determined by the following acceptable tile exposures:

12" Tiles

[] 7" (178 mm)	=	260 - 275 lbs. (118 - 125 kg) per square
[] 6-1/2" (165 mm)	=	280 - 295 lbs. (127 - 134 kg) per square
[] 6" (152 mm)	=	300 - 320 lbs. (136 - 145 kg) per square

10" Tiles

[] 7" (178 mm)	=	245 - 260 lbs. (111 - 118 kg) per square
[] 6-1/2" (165 mm)	=	270 - 280 lbs. (122 - 127 kg) per square
[] 6" (152 mm)	=	290 - 300 lbs. (132 - 136 kg) per square

- B. Majestic Slate tile color selection shall be made prior to bid opening and shall conform to one or more of the following colors:

☐ Black	☐ Midnight Grey	☐ Federal Grey
☐ Smoke	☐ Mountain Plum	☐ Cedar Brown
☐ Chestnut Brown	☐ Earth Green	☐ Sage Green
☐ Stone Red	☐ Driftwood	

2.03 RELATED MATERIALS

A. Underlayment

1. AquaGuard – a roofing underlayment recognized for use as an alternative to Type 30 roofing underlayment, consisting of spunbonded polyolefin coated with a layer of UV stabilized polyolefin on both sides, meeting requirements of ASTM D2626, referred to as 30 lb. and without perforations.
2. Glacier Guard ice & water underlayment – Granular Surface 100 (55-mil), or Smooth Surface High Temperature 300 (40-mil) a composite membrane consisting of fiberglass-reinforced rubberized asphalt laminated to an impermeable polyethylene film layer (Smooth Surface High Temperature) or coated with a granular surface providing maximum skid resistance (Granular Surface).

B. Fasteners

1. AquaGuard
 - a. Fasteners shall be corrosive-resistant, plastic-capped roofing nails with a minimum plastic cap diameter of 1" (25 mm). Fasteners shall be 90° to the roof deck and shall not be under or over driven.
2. Tile Fasteners
 - a. EcoStar ring shank roofing nail with a 3/8" (9.5 mm) diameter head and a minimum of 1-1/2" (38 mm) long shank made from stainless steel. Nails can be supplied either as a hand-drive style or in coils for use in pneumatic tools. The EcoStar ring shank roofing nail is required for fastening of all EcoStar roof tiles.

PART 3 - EXECUTION

3.01 SUBSTRATE CRITERIA

- A. The building owner or owner's representative is responsible for providing and determining that the substrate is suitable to receive the Majestic Slate tile roof system and the Authorized EcoStar Gold Star Applicator should not proceed until all defects have been corrected.

B. The Majestic Slate roof system may only be applied over:

1. Minimum 15/32" (12 mm) plywood or 7/16" (11 mm) OSB decking, properly gapped for expansion.
2. Minimum 3/4" (19 mm) tongue and groove wood decking with end gaps not exceeding 1/4" (6 mm), and board widths not exceeding 6" (152 mm).
3. Approved metal deck systems – (Metal deck systems may require the installation of appropriate thickness nail base insulation prior to attaching the EcoStar tiles). Contact EcoStar's technical department for specifics.
4. Appropriate clearance on underside of decking or sheathing must be provided for proper penetration of the EcoStar fastener.

C. Minimum slope of substrate for installation of Majestic Slate roof systems shall be a minimum of 3/12 (14°) for 6" (152 mm) exposure installation and a minimum of 6/12 (27°) for 7" (178 mm) exposure installation. Contact the EcoStar technical department for approval of applications on lower slopes or exceptions to this requirement.

3.02 SUBSTRATE PREPARATION

- A. The building owner or owner's representative is responsible for ensuring that all wet or damaged substrate has been removed in a re-roofing application.
- B. Existing roof material **MUST** be removed and a clean substrate free of foreign material be provided prior to the installation of the Majestic Slate tile roof system. Majestic Slate tiles may **NOT** be installed directly over any existing roof material or system.

3.03 INSTALLATION

- A. Flashing & Sheet Metal – Install sheet metal and flashing metal in all valleys and where required. EcoStar recommends a V-type, W-type or Double W-type metal valley flashing be used at all valleys.
- B. Where required, install metal edging at all eaves and roof edges.
- C. EcoStar suggests that all metal work be made from copper or stainless steel. Final choice of metal work is at the discretion of building owner or their designate.
- D. Be aware that staining may occur where runoff from copper metal work comes into contact with the EcoStar tiles. (Example: ridges or cupolas.)
- E. Underlayment
 1. Glacier Guard
 - a. Lap end joints 6" (152 mm) and side joints 3.5" (89 mm).
 - b. Apply continuous 36" (914 mm) wide sheet in valley centered over valley.

- c. Overlap valley metal with a strip of Glacier Guard extending from at least 6" out from the edge of the valley metal to the edge of the tile, or at least 4" inside the edge of the valley metal.
- d. Apply rows of 36" (914 mm) wide sheets along all eaves and rakes. Lap end joints 6" (152 mm) and side joints 3.5" (89 mm).
- e. Apply rows of 36" (914 mm) wide sheets along and around all dormers and roof protrusions. Lap end joints 6" (152 mm) and side joints 3.5" (89 mm).
- f. When applicable install as far up as it can be installed on any head walls or vertical walls a minimum of 12" (305 mm) where possible.
- g. Do not leave Glacier Guard Granular Surface (100) exposed to weather more than 30 days after beginning of installation. Do not leave Glacier Guard Smooth Surface High Temp (300 black) exposed to the weather more than 60 days after the beginning of installation. Do not leave Glacier Guard Smooth Surface High Temp (300 white) exposed to the weather more than 120 days after the beginning of installation.
- h. Installation of Glacier Guard at temperatures below 40°F (4°C) may require cap nailing to hold membrane in place while adhesion develops.

2. Aqua Guard

- a. Apply 48" (1219 mm) wide sheet over complete deck, lapping the area covered with Glacier Guard a minimum of 4" (102").
- b. Refer to the AquaGuard installation instructions found on the label on each roll. Do not leave exposed to weather more than 180 days after beginning of installation.
- c. If a ridge vent is required, overlap the ridge slot with the Aqua Guard and fold it back over the last row of field tiles before installation of the ridge vent.

F. Majestic Slate Tile Installation

- 1. After installing underlayment, and before installing the Majestic Slate tiles, clean the surface of debris and dirt.
- 2. All Majestic Slate tiles come with shade variation. EcoStar tiles that have been ordered and supplied to the job site under one EcoStar sales order number are blended at the factory and do not need to be blended on site before installation. It is always the responsibility of the applicator to make frequent inspections from the ground or other vantage point to ensure that random shading occurs. EcoStar will not be held responsible for correcting the appearance of non-random installations. Roofers must inspect the roof frequently to prevent customer dissatisfaction.

NOTE: If EcoStar tiles have been supplied to the job site under two or more EcoStar sales order numbers, all tiles must be blended together on site before installation. Specific blending

instructions can be found at www.ecostarllc.com on the “Resource Library” page. EcoStar will not be held responsible for correcting the appearance of unblended installations.

Natural weathering will produce further shade variations, even in tiles appearing to be identical in color when new.

3. Minimum Fastening – No less than 2 EcoStar ring shank fasteners per tile shall be used with a minimum length of 1-1/2” (38 mm). Fasteners should be installed at the designated “nail here” marks on the tile. Failure to fasten the tile at these locations may result in a “lifted” tile that will require removal and replacement.
4. CAUTION: When using a pneumatic nailer, care should be taken to ensure that nails are not over driven causing the tiles to curl upward. If tiles have been installed with over driven nails causing the ends of the tile to curve upward, tiles will never lay flat. Overdriven tiles must be removed and re-nailed properly. Never hold the tile from behind while nailing, as this will cause an upward curl of the tile.
5. Do not install tiles against each other. A minimum gap of 3/8” (9.5 mm) must be maintained between installed tiles. A minimum 3/8” (9.5 mm) gap must be maintained between installed tiles and any sidewalls or roof protrusions.
6. It is the responsibility of the Gold Star Authorized Applicator to ensure that each Majestic Slate tile has been flexed to provide a downward curve prior to fastening. Do not install tiles with an upward curve.
7. Beginning at the eave, install a row of slate tiles gapped a minimum of 3/8” (9.5 mm) between tiles and any protrusions while achieving a 3/4” (19 mm) overhang. Fasten with two EcoStar ring shank fasteners per tile (in location shown on tiles). This layer of tiles will become the starter row. Care must be taken to make sure that the gaps in the starter row do not line up with the gaps in the first exposed row of tiles. Maintain at least 2” (51 mm) of gap offset. The final tile at roof edges or penetrations must be a minimum of 3” (76 mm) wide. This may involve cutting the EcoStar tile to fit. To cut the EcoStar tile to the correct width simply score the front of the tile with a straight edge and utility knife and snap tile at that score. It may be quicker and easier to use a power saw. Any power saw with a blade designed to cut wood can be used to cut the tiles. Install the first course of tiles offset to the starter row. The first course of tiles should be installed flush with the starter row with no exposure.
8. Continue installing rows of tile courses up the roof slope at the correct chosen exposure ensuring that bond lines are not placed directly over each other. It is recommended that chalk lines be placed horizontally up the roof slope for every tile course. This will ensure that each course is installed parallel with the roof eave. NEVER use red chalk, as this will permanently stain the EcoStar roof tiles.
9. Valley Areas - Either an open or closed valley design may be used.
 - a. With an open valley design leave a minimum of 2” (51 mm) on each side of the center of the valley exposed and uncovered by the roof tiles. A V-Style, W-Style, or Double W- Style valley metal may be used.

- b. With a closed valley design cut the tiles in a straight line to fit no closer than 3/8" (9.5 mm) against tile of adjoining roof slope.
 - 10. Install Majestic Slate Hip & Ridge tiles at all hip locations using a minimum 2" (51 mm) stainless steel ring shank, hand-driven EcoStar fastener. EcoStar recommends a chalk line be snapped up the hip line to ensure a straight application up the roof slope. Majestic Slate Hip & Ridge tiles are always installed with a 6" (152 mm) exposure.
 - 11. Install ridge vent system per the manufacturer's application instructions and then place Majestic Slate Hip & Ridge tiles over the ridge vent. A minimum 2-1/2" (64 mm) stainless steel ring shank, hand-driven EcoStar fastener should be used when installing Hip & Ridge tiles to the deck. Place fasteners in the location marked on the tile. Majestic Slate Hip & Ridge tiles are always installed with a 6" (152 mm) exposure.
 - 12. Care must be taken to minimize foot traffic over completed areas of the roof. Majestic Slate tiles will show mud and dirt causing appearance problems. The removal of dirt and debris is the responsibility of the applicator. Never use chemical cleaning agents not approved by EcoStar to wash an EcoStar roof assembly.
 - 13. Majestic Slate tiles can be slippery when wet; caution should be exhibited with early morning dew and after rain. EcoStar strongly recommends the use of toe boards and OSHA approved harnesses and safety equipment at all times.
 - 14. Upon completion of the roof system installation, inspect and remove all debris from roof.
- G. Phased Roofing – The weathering process of the EcoStar tiles will begin immediately upon installation and exposure to the elements. Therefore, every effort should be made to ensure that the EcoStar roof assembly is installed at a continuous rate to completion. Lengthy delays in installation may result in appearance differences when installation is resumed and tiles that have not been exposed to the elements are installed adjacent to tiles that have been on the roof for an extended period of time.

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DATE: December 16, 2024

TO: City of Burlington Development Review Board
Garret King, Associate Planner (City of Burlington Zoning Division)

FROM: Ryan Edwards (R. Edwards & Company)

SUBJECT: 365 South Winooski (ZP-24-467) : Substitute Roofing Materials

INTRODUCTION

On December 11, 2024, I was contacted by Mary O'Neil, Principal Planner, City of Burlington Zoning Division, to inquire if I would be able to provide professional guidance on appropriate substitute roofing materials for a single family residence located at 365 South Winooski Avenue that is currently under review by the City of Burlington Development Review Board (ZP-24-267). The Applicant is requesting a variance to Sec. 5.4.8 (b) (*Historic Buildings and Sites*) of the City of Burlington Comprehensive Development Ordinance with regards to the requirement of retaining a historical material, specifically requesting to replace an existing slate roof with a substitute material.

On December 12, 2024, I was provided with all applicable project documentation by Garret King, Associate Planner, City of Burlington Zoning Division. Along with the project documentation, it was made explicitly clear that the purpose of my professional guidance on this matter was to only provide recommendations on appropriate substitute roofing material(s) that would be compatible as a replacement for an existing slate roof, and not to professionally opine as to whether or not a substitute material would be appropriate. Therefore, in accordance with this request, this memorandum solely provides information on appropriate substitute materials for slate roofing on a historic building.

DETERMINING APPROPRIATE SUBSTITUTE MATERIALS

In determining what materials are an appropriate substitute for a historic material, one should first refer to the [Secretary of the Interior's Standards for Rehabilitation](#) (Page 75; PDF page 86), Standard #6, which states:

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. Replacement of missing features will be substantiated by documentary and physical evidence.

Applying this Standard, any substitute material should therefore match the existing historic material as closely as possible, including the design, color, and texture.

Next, one should next refer to the National Park Service Technical Preservation Services' [Preservation Brief #16, The Use of Substitute Materials on Historic Building Exteriors](#), which provides more technical assistance and guidance on this topic. Revised in October 2023, it's worth mentioning that Preservation Brief #16 has been updated to provide more flexibility with regard to substitute materials, noting:

While the use of matching materials to replace historic ones is always preferred under the Standards for Rehabilitation, the Standards also purposely recognize that flexibility may sometimes be needed when it comes to new and replacement materials as part of a historic rehabilitation project. Substitute materials that closely match the visual and physical properties of historic materials can be successfully used on many rehabilitation projects in ways that are consistent with the Standards.

[...]

Substitute materials can be cost-effective, permit the accurate visual duplication of historic materials, and provide improved durability.

With that said, speaking specifically to slate roofing, it is clear that an appropriate substitute material should replicate the existing slate roof as closely as possible – in size, color, and texture. While Preservation Brief #16 provides a few different potential substitute materials for roofing (see Historic Features and Substitute Materials table below), I would professionally advise utilizing a polymer composite product, preferably one made with recycled rubbers and plastics.

Historic Features and Substitute Materials

Historic Building Features						
	Masonry Stone, terra cotta	Architectural Metals Cast & wrought iron, steel, pressed metal	Siding Wood, asbestos	Roofing Wood shingle, slate, tile	Decking Tongue-and- groove & square-edge wood	Molding / Trim Wood
Potential Substitute Materials	Aluminum	●	●	●		●
	Cast Stone & Precast Concrete	●		●		
	Fiber Reinforced Concretes	●				
	Glass Fiber Reinforced Polymers	●	●			
	Fiber Cement		●	●		●
	Mineral / Polymer Composite		●	●	●	●
	Cellulose Fiber / Polymer Composite		●	●	●	●
	Non-composite Polymers		●		●	●
	Cellular PVC		●		●	●

The above chart lists materials that are sometimes used as substitutes for replacement of historic building features. Even within a given category, all materials may not be equally suitable as a substitute replacement material for the actual historic material or feature. Any substitute material should be selected based on its specific physical and visual characteristics, conditions, and intended application consistent with the Secretary of the Interior's Standards for Rehabilitation.

RECOMMENDED SUBSTITUTE MATERIALS

The two most well-known and trusted composite slate tile manufacturers, known for their commitment to sustainability (e.g. utilization of recycled content polymers), product quality, and proven, successful execution on historic buildings are:

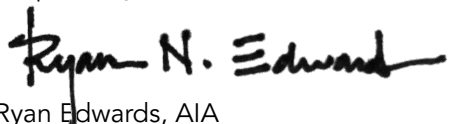
- [DaVinci Roofscapes](#)
 - [Single-Width Slate](#)
 - [Inspire Slate](#)
- [EcoStar](#)
 - [Majestic Slate](#)

To emphasize the importance of selecting a product which replicates the existing slate roof as closely as possible – in size, color, and texture – it is imperative that the specified substitute product match the color and dimensions (width, exposure, and thickness) of the existing slate roof to the greatest extent possible.

CONCLUSION

Albeit not suitable for every project, advancements in technology have led to numerous substitute materials which closely resemble the aesthetics of original and historic materials, some of which are more sustainable and durable than the original materials they're replacing. I hope that this overview of suitable substitute roofing materials for existing slate roofing has been helpful in considering the Applicant's variance request. If you have any questions whatsoever, please do not hesitate to contact me.

Respectfully submitted,



Ryan Edwards, AIA
Principal, R. Edwards & Company, PLC

ATTACHMENTS:

- *Preservation Brief #16, The Use of Substitute Materials on Historic Building Exteriors* (National Park Service, Technical Preservation Services, October 2023)
- *Alternative Roofing Materials: A Guide for Historic Structures* (U.S. Department of Agriculture, Forest Service, September 2007)

ABOUT RYAN EDWARDS

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16 PRESERVATION BRIEFS

The Use of Substitute Materials on Historic Building Exteriors

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The *Secretary of the Interior's Standards for Rehabilitation* generally require that deteriorated distinctive architectural features of a historic property be repaired rather than replaced. Standard 6 of the *Standards for Rehabilitation* further states that when replacement of a distinctive feature is necessary, the new feature must “match the old in composition, design, color, texture, and other visual properties, and, *where possible*, materials” (emphasis added). While the use of matching materials to replace historic ones is always preferred under the *Standards for Rehabilitation*, the Standards also purposely recognize that flexibility may sometimes be needed when it comes to new and replacement materials as part of a historic rehabilitation project. Substitute materials that closely match the visual and physical properties of historic materials can be successfully used on many rehabilitation projects in ways that are consistent with the Standards.

The flexibility inherent in the *Standards for Rehabilitation* must always be balanced with the preservation of the historic character and the historic integrity of a building, of which historic materials are an important aspect. Any replacement work reduces the historic integrity of a building to some degree, which can undermine the historic character of the property over time. With limited exceptions, replacement should only be considered when damage or deterioration is too severe to make repair feasible. When needed replacement is made with a material that matches the historic material, the impact on integrity can be minimal, especially when only a small amount of new material is needed. When a substitute material is used for the replacement, the loss in integrity can sometimes, although not always, be greater than that of a matching material. Also, whether historic or substitute material, there is a point where the amount of replacement can become excessive and the building's historic integrity is diminished to an unacceptable degree, regardless of the material used—that is, a loss of authenticity and the physical features and characteristics closely associated with the property's historic significance.

The term *substitute materials* is used to describe building materials that have the potential to match the appearance, physical properties, and related attributes of historic materials well enough to make them alternatives for use in current preservation practice when historic materials require replacement.

Compelling reasons to use a substitute material instead of the historic material include the unavailability or poor performance of the historic material, or environmental pressures or code-driven requirements that necessitate a change in material. When using a substitute material for replacement it is critical that it match the historic material in all of its visual and physical properties to preserve the historic character of the building and minimize the impact on its integrity.

Substitute materials can be cost-effective, permit the accurate visual duplication of historic materials, and provide improved durability. While the behavior of traditional, historic materials is generally well understood, the behavior of newer materials can be less established and sometimes less predictable. Substitute materials are most successful when the properties of both the original material and the substitute are thoroughly understood by all those involved in the design and construction process. The architect must be adept at the selection of substitute materials and their incorporation into architectural plans and specifications. The contractor or tradesperson in the field must also be experienced with their use.

This Preservation Brief provides general guidance on the use of substitute materials as replacement materials for distinctive features on the exterior of historic buildings. Due to the ever-evolving product market for construction materials, this Brief does not provide specifications for substitute materials. This guidance should be used in conjunction with qualified professionals who are knowledgeable in current construction and historic preservation practices.

This Brief includes a discussion of the appropriate use of substitute materials and provides a path for decision-making in their use. In considering the use of substitute materials, such issues as the deterioration or failure of the historic building component and material must be understood. The existing component's physical and visual properties, profile, surface texture, dimensions, and performance should be identified to establish the basis for evaluating a possible replacement material. The physical and visual properties of the various substitute materials available should also be assessed and compared to the original material for their physical and visual compatibility. Lastly, the suitability of a given substitute replacement material should be determined based on how well the material matches both the physical and visual properties of the existing material as well as any specific performance or application needs. The Brief's descriptions of common substitute materials are not meant to be comprehensive, and, as the performance history of newer materials continues to grow and new materials are developed, available options will change, and our understanding of current material performance will continue to evolve.

Historical Use of Substitute Materials

The tradition of using affordable and common materials in imitation of more expensive and less available materials is a long one. At Mount Vernon, for example, George Washington used wood painted with sand-impregnated paint to imitate rusticated stone. This technique, along with scoring stucco into block patterns, was common in Colonial America to imitate stone.

Nineteenth-century technology made a variety of materials readily available and widely used that were not only able to imitate traditional materials but were also cheaper to fabricate and easier to use. Traditionally, carved stone units were individually worked. Molded or cast materials greatly increased efficiency in creating repetitive elements. Cement-based products such as cast stone could provide convincing imitations of natural stone with carefully chosen aggregates and cements and was typically a commercially manufactured product. It could be tooled like natural stone, though that could reduce much of the cost advantage. These carefully-crafted cementitious products were widely used as trim elements for masonry structures or as the face material for an entire building. At the other end of the spectrum, mail-order catalogs provided a wide variety of forms for molding concrete that were merely evocative of natural stone and did little to match its appearance. Concrete masonry units could be fabricated locally and on site, avoiding expensive quarrying and shipping costs.

Offering similar efficiencies as cast stone for reproducing repetitive and even complex decorative shapes, terra cotta could mimic the surface characteristics of stone with various textures and glazes. It was popular in the late nine-

teenth and early twentieth centuries for details on stone or brick buildings as well as for the entire skin of large and elaborately detailed buildings.

Cast iron was also used to imitate stone, often with very decorative profiles, for a variety of architectural features ranging from window hoods to columns, piers, balustrades, and even whole façades. Cast iron offered its own set of efficiencies including cost, fabrication time, and weight, but required a painted finish.

While cast stone, terra cotta, and cast iron offered efficiencies over quarried and, particularly, carved stone, they were not cheap or impermanent materials. Less costly, but also less durable, stamped or brake-formed sheet metal, typically galvanized, could also be used instead of masonry for cornices, window hoods, roofing tiles, and even entire building façades.

Substitute Materials and Applying the Standards for Rehabilitation

The *Standards for Rehabilitation* are focused on preserving the important and distinctive character-defining features of a historic property (Standards 2 and 6), and they are to be applied in a reasonable manner, taking into account economic and technical feasibility ([36 CFR 67.7](#) and [36 CFR 68](#)). The Standards have an inherent flexibility that facilitates their application to diverse projects, historic properties, and conditions. They are to be applied on a "cumulative-effect" basis, when the overall effect of all work in the context of the specific conditions of the property and the project is consistent with the property's historic character.

The *Standards for Rehabilitation* require that the replacement of a distinctive feature match the old in physical and visual properties. While the use of matching materials is always preferred, the Standards purposely allow for the use of substitute materials when the use of original materials is not reasonably possible, such as in consideration of economic and technical feasibility or in new construction. They also provide additional flexibility in the treatment of secondary, less distinctive features that are less important in defining the historic character of the property. The *Standards for Rehabilitation* recognize that flexibility is appropriate to facilitate "a compatible use for a property ... while preserving those portions or features which convey its historical, cultural, or architectural values" (definition of "Rehabilitation," [36 CFR 67.2\(b\)](#)).

Examples of Historical Use of Substitute Materials



Figure 2a: Casting concrete blocks to mimic quarried stone was a popular late 19th- to mid 20th-century technique. Concrete masonry units could be completed by local craftsman, saving time and shipping costs. Photo: John Sandor, NPS.



Figure 2b: The 19th century also produced a variety of metal products used to imitate other materials. Across the country, cast iron was used in storefronts to imitate stone. Photo: John Sandor, NPS.



Figure 2c: Stucco has been used to imitate a number of building materials for many centuries. Seen here, stucco was applied to a brick structure and scored to represent a stone façade. Photo: John Sandor, NPS.



Figure 2d: Terra cotta gained popularity in the late 19th century as a cheap and lightweight alternative to stone. Glazing techniques allowed the blocks to imitate a variety of natural stone materials. Photo: John Sandor, NPS.

These examples of one material used to imitate another, more often in initial construction than for later repair and replacement purposes, are referred to as *imitative materials* in the *Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*, updated in 2017, that accompany the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. These imitative materials, while evoking other materials, usually had distinctive qualities of their own and were not always a very close match in appearance to the historic material they were meant to imitate.

Many of the traditional materials discussed above are still available and used to replace damaged or missing original features, both to replace matching historic materials and sometimes as substitute materials. Because of their extensive use over time and their known physical and chemical properties, cast stone, cast iron, and terra cotta are well understood substitute materials. This continued usage and familiarity means their installation requirements and service life are well established, which in turn makes it easier to determine when and how to use these traditional materials as substitutes for a deteriorated material. However, innovation in replacement materials continues, and new products (many of them consisting of synthetic materials) are continually introduced. These non-traditional products are an increasing part of both the new construction and rehabilitation industries. Some materials, like glass fiber reinforced polymers, glass fiber reinforced concrete, or fiber cement, have been in use long enough for an accurate prediction of their service life and performance. Other newer, non-traditional materials may be too new to have established performance records, thus, understanding their material properties is critical, and their use should be approached with more caution.

When to Consider Using Substitute Materials in Preservation Projects

According to the *Standards for Rehabilitation*, deterioration should generally be addressed through repair if in repairable condition. Repair can entail a variety of treatments that retain the unit of building material and remove and patch or replace only the damaged portion. This approach can be done with traditional methods and materials such as a dutchman, where like-kind material is precisely inserted into wood or stone, or it may employ other materials such as epoxies for wood repair or cementitious compounds for masonry. As long as the repair methods are sound and do not damage or accelerate the deterioration of the historic material, repairs are generally preferable to replacement of an entire element. More complex manufactured products, typical of more recent historic materials (as well as a lot of modern building materials generally), may be more difficult to repair, if they can be repaired at all.

There are situations, however, when the level of deterioration makes localized repairs infeasible and entire fea-



Figure 3: Incremental repair is best done using in-kind material to minimize differences in the performance characteristics that could negatively affect the overall assembly. Photo: NPS.

tures or units of historic material must be replaced. While achieving an effective match of all of the visual qualities of a material can be challenging, even when replacement is in kind, it can be even more challenging when the replacement is a substitute material. A good visual match is not the only consideration when a substitute material is to be used for incremental replacement within a larger assembly of historic material. When an individual siding board or a single block of ashlar is being replaced, it is usually best achieved with the original material. Introduction of a different material into an intact assembly requires that its inherent properties, such as expansion and contraction, moisture resistance, or permeability, be thoroughly considered relative to those of the surrounding historic materials to avoid causing damage.



Figure 4. While occasionally used to imitate other materials such as wood or slate shingle, many asbestos shingles and siding materials had their own distinct shape and profile. No longer manufactured today, alternative materials must be found to replace these materials when they are distinctive features on a historic structure. Drawing: Association for Preservation Technology, Building Technology Heritage Library.



Figure 5. (Left) Asbestos shingles were often used as a substitute for traditional slate roof shingles. The historic asbestos roof on this rehabilitation project had reached the end of its lifespan and required complete replacement. (Right) Given the limited replacement materials available to match the historic asbestos shingles, utilizing natural slate was determined to be the best visual match for the original shingles and design intent in this instance. Photos: Crosskey Architects.

Circumstances in which the use of substitute materials may generally be considered appropriate, taking into consideration technical and economic feasibility reasons, include: the unavailability of historic materials; the unavailability of skilled artisans or historic craft techniques; inadequate durability of the original materials; the replacement of a secondary feature; construction of a new addition; the reconstruction of a missing feature; code-required performance; and for enhanced resilience and sustainability:

- **Unavailability of historic material.** A common reason for using substitute materials is the difficulty in finding a good match using the historic material (particularly a problem for masonry materials where the color and texture are derived from the material itself). This may be due to the actual unavailability of the material or to protracted delivery dates, particularly if the material cannot be sourced domestically. It is not uncommon for a local quarry that is no longer in operation to have been the source of an original stone. If another quarry cannot supply a satisfactory match, a substitute material such as dry-tamp cast stone or textured precast concrete may be an appropriate alternative, if care is taken to ensure that the detail, color, and texture of the original stone are matched. Even when the color is successfully matched, the appearance of a cementitious product may diverge from that of the historic stone as the substitute material ages.

Many manufactured materials that were used historically on buildings are no longer made. Terne-plated steel, which was the material most typically used for painted standing-seam or flat-seam roofing, is no longer made. However, because it was always painted, other metals including galvanized steel or copper can generally be substituted if painted. When the historic material needing to be replaced is a manufactured product developed as an imitation of

a natural material, which was the case with asbestos shingles meant to imitate slate, the natural material may now be an appropriate substitute material to consider for the manufactured one that is no longer produced.

- **Unavailability of skilled artisans or historic craft techniques.** These two issues can complicate any preservation or rehabilitation project. This is particularly true for intricate ornamental work, such as carved wood, carved stone, wrought iron, or cast iron. While skilled craftsmen may not be as difficult to find as they once were, there can still be limitations geographically, even in finding less specialized skills, and particularly if a project is small. Technical advances have allowed some stone or wood carvers to take advantage of computerized equipment, but complex designs will likely still require hand work. It may also be possible to mimic a carved element using a material that can be cast in a mold, adding significant efficiency where an historic element survives from which a mold can be made. Options for casting include aluminum, cast stone, fiberglass, glass fiber reinforced concretes, and terra cotta, but not all carved elements can be duplicated by a casting, and mold-making and casting still require skilled craftsmen.
- **Inadequate durability of the original material.** Some historic building materials were of inherently poor quality or were not durable. In other cases, one material was naturally incompatible with other materials on the building, causing staining or galvanic corrosion. Examples of poor-quality materials are very soft sandstones, which eroded quickly, and brownstone, which is vulnerable to delamination. In some cases, more durable natural stones may be visually similar enough to stand in for these soft stones but cast stone or another material may be needed to achieve an appropriate match.

The ready availability of manufactured ornamental wood features fed a nineteenth-century taste for decorative architectural details that were often used on the exterior of buildings with little concern for how they would be affected by moisture or maintained. Even old-growth wood from decay-resistant species often could not prevent features with severe exposure from eventually needing to be replaced. Today's available commercial supplies of lumber no longer provide the denser, more decay-resistant wood of old-growth forests, so even careful matching to species, which is not always possible, will not yield a replacement equal in performance to the historic material. Old-growth wood is likely to be very expensive, if it can be found, and may not be available from a sustainable, environmentally responsible source. When features with severe exposure need to be replaced or reproduced, substitute materials that are less susceptible to decay can have a longer life, and when the feature is painted, as exterior wood features generally are, the visual effect of a substitute material can be minimal.

- **Replacement of a secondary feature.** When it is necessary to replace a less distinctive, secondary feature that is less important in defining the historic character of the property, there is more flexibility in how it can be replaced. While it may be less important to find an exact match in materials when replacing



Figure 6. The dramatic difference in the number of growth rings between old-growth wood and wood that was recently harvested from second- or third-growth forests is indicative of the diminished dimensional stability and durability of most lumber currently available. Photo: Zachary Dettmore.

such a feature, the retention of the overall historic character should still guide selection of an appropriate replacement material. For example, replacing secondary features such as those with limited visibility (e.g., siding materials on a rear elevation) may permit replacement materials that are similar in appearance or character without having to be a perfect match.

- **Construction of a new addition.** The *Standards* require that new additions to historic buildings and related new construction be differentiated from the old as well as be compatible with the historic character of the property and its site and environment. Using materials that evoke, without matching, the historic material can be an effective means of achieving the needed balance between compatibility and



Figure 7. A new addition replaced non-historic construction on the rear elevation of this building. Fiber cement gives the addition a compatible appearance without replicating the exposure for thickness of the historic siding. Photo: Ward Architecture + Preservation.

differentiation for new additions and new construction. Even if differentiation is achieved through design rather than materials, there generally is no basis for requiring the use of matching historic materials for new additions and new construction as part of a rehabilitation project.

- **Reconstruction of a missing feature.**

Many buildings lose significant features over the course of their lives for reasons such as those previously discussed. When a missing feature is to be reconstructed, the importance of matching the original material may be less important to the effect replacing the missing feature may have on the overall historic character and appearance of the building. Though replacement of missing features must be substantiated by documentary, physical, or pictorial evidence, in many cases the authenticity of the material may be secondary to the overall visual qualities. The use of a more cost-effective substitute material for the construction of a missing feature can often be an important factor in the feasibility of undertaking such work.

- **Code-required performance.**

Modern building codes are regularly amended to require higher performance levels for new and existing buildings in such areas as life safety, seismic retrofits, and accessibility. Rehabilitation projects often trigger compliance with code requirements that were not in place when a building was constructed. Although building codes may often allow for the retention of historic materials and assemblies, substitute materials can offer an alternative in situations when the historic materials are non-compliant and cannot otherwise be reasonably retained. In these instances, a change in material may be appropriate to meet code requirements, while in other instances selecting the optimal code compliance method for the project may achieve code-compliant solutions that also allow for the preservation of a building's historic materials and finishes.

For example, fire codes may require increased resistance to flame spread for buildings within dense urban environments where building proximity and separation between buildings is a concern. Some substitute materials are non-combustible, have good ratings for flame spread, and can provide an alternative to help meet

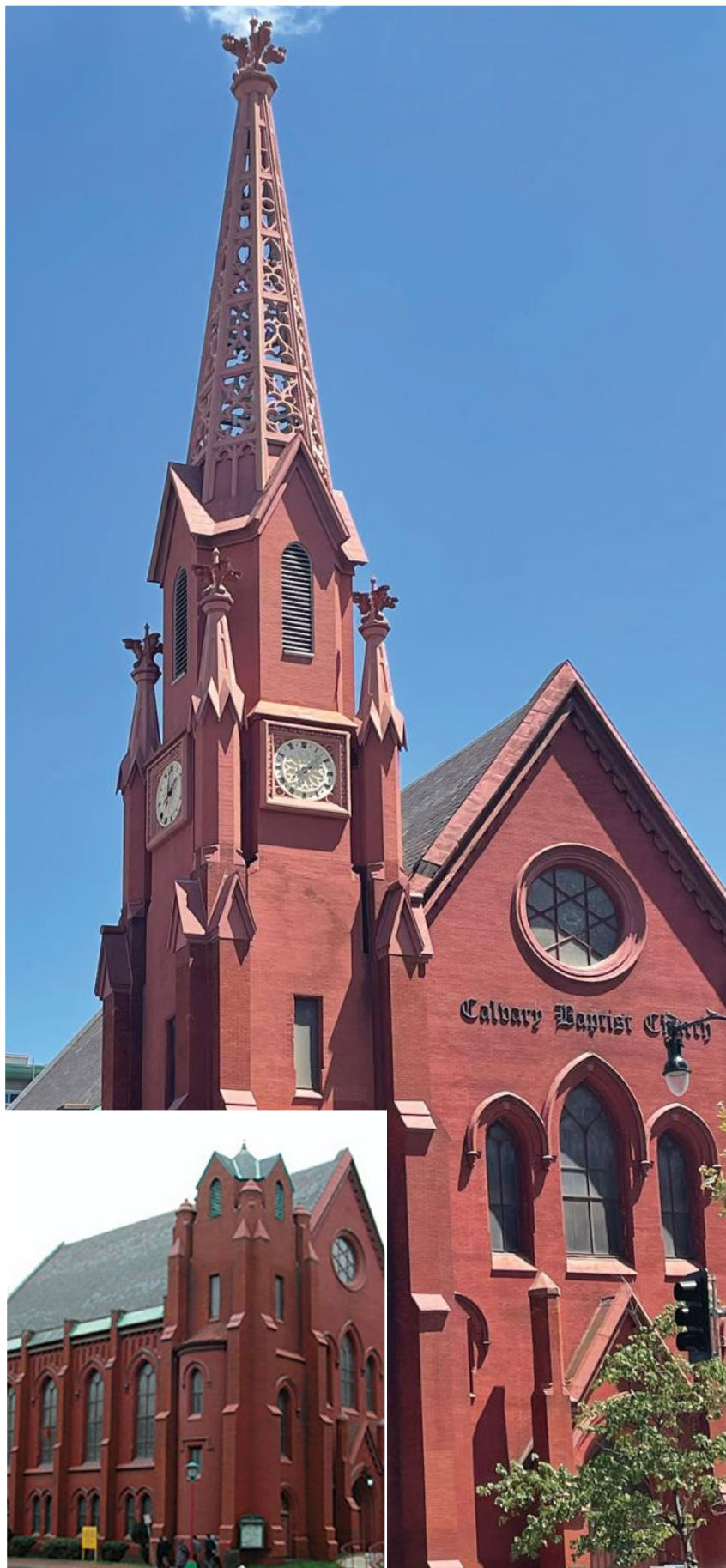


Figure 8. A long-missing cast-iron steeple was reconstructed in aluminum and fiber-reinforced polymer (FRP). Photo: John Sandor, NPS, Inset: Quinn Evans.

fire code requirements. Depending on the building component and the material, however, a substitute material may not resist fire any better than the historic material. In addressing code issues, all feasible alternatives should be considered to minimize the impact on the historic character of the building while still meeting code requirements.

With specific provisions in building code related to issues such as seismic hazards, the choice of materials for features inherently unstable in a seismic event can be a key part of a code-compliant retrofit solution. Elements at risk of falling such as parapets, finials, and overhanging cornices may be made safe by anchoring them to new structural frames. However, for some heavy masonry features, especially where there is deterioration or the feature is difficult to effectively brace, adequately anchoring the existing feature may not prove feasible. In such cases removing and replacing these features with lighter-weight replicas that incorporate a resilient structural framework can help preserve the historic character of the building while improving life safety performance.

- **Enhanced resilience and sustainability.** Wildfires, earthquakes, floods, hurricanes, and other extreme weather events put historic buildings and their occupants at risk and may require adaptive treatments that are more invasive than might be accepted in other circumstances, including related to the use of substitute materials. In these contexts, it is still necessary to try to minimize impacts on a building's historic character as much as possible while still adapting it to be more resilient. Widespread wildfires, for example, have increased demand for fire resistant materials for the exterior building envelope. Flood events may necessitate the replacement of historic materials that have been damaged or inundated with hazardous substances in contaminated floodwaters. When undertaking repairs in such circumstances, substitute materials may offer greater resilience to anticipated future exposure to natural hazard risks.

Similarly, efforts to improve energy efficiency and performance may include the use of substitute materials as replacement components when modifications to building assemblies are required and the historic materials cannot be preserved. When evaluating substitute materials in the context of sustainability objectives, factors such as the environmental impact of production, the full life cycle of products, and the embodied carbon of the materials already in place should be carefully analyzed. There may be more sustainable choices for a replacement material, including the use of more traditional materials in place of manufactured products that may consist of non-renewable resources or hazardous materials. While some synthetic substitute materials are made from recycled materials or are otherwise sustainably produced, many are not repairable, salvageable, or recyclable themselves, and

they may have shorter lifespans to their historic material counterparts. When either greater resilience or sustainability is a factor, all feasible alternatives should be considered in finding a balanced approach that maintains historic character while meeting resilience and sustainability goals.

Substitute Materials and Economic Feasibility

Economic feasibility is inevitably a concern when choosing a material for any part of a project, whether a historic or substitute material, but it should not be the sole determinant factor at the expense of maintaining the



Figure 9. Previously bricked-in openings below the flood line were reopened and new aluminum windows installed with cellular PVC trim detailed to hold back moderate flood waters and survive exposure to water. Photo: John Sandor, NPS.

historic character and historic integrity of a building. Other factors may prompt the consideration of a substitute material, such as the cost of maintaining the historic material, because it is comparatively difficult or costly to reach or access, or the frequency of required maintenance the historic material needs. Additionally, where in-kind replacement material is found to be prohibitively expensive, it may be reasonable to consider a substitute that offers an alternative and is a good physical and visual match. Not all substitute materials are, however, cost-effective replacements. Long-term durability and maintainability are other factors that should be considered in conjunction with initial cost.

Maintenance of a material, particularly where accessibility is difficult or expensive, can be an important part of a

cost evaluation. Maintenance costs should not be considered without also considering life-cycle expenses. While some substitute materials may offer reduced initial costs, they may be as or more costly than traditional materials to maintain over time. For example, many substitute materials are not readily repairable, necessitating full replacement when damaged. The cost to replace a material or assembly at the end of its lifespan may also be greater than the accumulated incremental expense to maintain the historic material, particularly if it is a more traditional, repairable material. Maintenance cost should never be the sole reason for replacing a historic material that is not deteriorated.

Criteria for the Appropriate Use of Substitute Materials

Substitute materials must meet three basic criteria to be considered: they must be compatible with the historic materials in appearance; their physical properties must be similar to those of the historic materials, or the materials must be installed in a manner that tolerates differences; and they must meet certain basic performance expectations over an extended period of time.

- **Matching the Appearance of the Historic Material**

Any material's appearance varies depending on the nature of the material and how it is used. Some historic materials, such as wood and ferrous metals, were typically painted, making the color of the substitute unimportant, though the texture of the surface, which telegraphs through a paint layer, is still an important consideration. Texture can be a large part of distinguishing a material formed by hand from one that is machine-made. Many historic materials, such as most building stones, are used without any coating, making the color, pattern, and reflectivity, as well as surface texture, dependent on the material itself. Matching the color and surface

characteristics of a historic natural material with a man-made substitute can often be quite difficult.

When the color and surface characteristics of an existing material are important, cleaning the material should be the starting point for evaluating a potential matching material. In situations where there are subtle variations in color and texture within the original material, the substitute material should be similarly varied so that it is not conspicuous by its uniformity. If a material is custom fabricated, a sufficient number of samples should be supplied to permit on-site comparison of color, texture, detailing, and other critical visual qualities. For a manufactured product with preset choices of color or texture, it may be necessary to look at samples from more than one manufacturer to find the best match. Similarly, prefabricated products, such as roofing slate, may offer limited, if any, choice of unit size, which can be a critical factor for achieving a good match. A substitute material should not be used to replace distinctive, character-defining materials and features if an adequate match in design and appearance is not possible.

As all exposed materials are subject to ultraviolet degradation, samples of a new material, particularly when custom formulated, should be prepared during the early planning phases to allow for evaluation of the effects of weathering on color stability. When that is not possible, or if a prefabricated product is used, the fabricator or manufacturer may be able to identify regional locations where equivalent products have been installed long enough ago to get a better sense of how the material weathers and performs.

While a perfect match is the desired goal for replacing distinctive features, it is not always possible, even when the same matching material is chosen for the replacement. When any compromise



Figure 10. Polymer slates offer a choice of shapes but not sizes, limiting their ability to achieve a good visual match for some historic slate. With the size of the polymer slates (right) being nearly twice that of the historic slates (left), the scale of the entire feature is incompatibly altered. The molded edges of this material, which contribute to its ability to replicate slate, would be lost if each shingle was resized by cutting. Photo: John Sandor, NPS.



Figure 11. The thickness of the wood siding on the front (left) creates a deeper shadow line than is achieved with the fiber cement siding used on the side (right) elevation. While the exposure can be adjusted, fiber cement siding is not available in a matching thickness. Photo: John Sandor, NPS.

must be made in the precision of the match, it is wise to consider the vantage point from which the material will be seen. Sometimes what seems important at close range, such as variations in the texture of a surface, may be secondary to other aspects of the material when viewed from some distance. The closer a feature is to the viewer, the more closely the material and craftsmanship should match the original. An on-site mock-up using a sample of the proposed material can help evaluate whether it is an adequate visual match.

- **Matching the Physical Properties of the Historic Material**

Carefully chosen substitute materials can often closely match the appearance of historic materials, but their physical properties may differ greatly. These differences are most critical when incrementally replacing components of a larger assembly that retains significant historic material. The chemical composition of the material (e.g., the presence of acids, alkalis, salts, or metals) should be evaluated to ensure that the replacement materials will be compatible with the adjacent historic materials. Materials that will cause galvanic corrosion or other chemical reactions must be isolated from one another.

The thermal- and moisture-driven expansion and contraction coefficients of each adjacent material must be within narrow limits or be accommodated



Figure 12. Cellulose composite materials, like wood, expand and contract with moisture. Here it was used to reconstruct a missing storefront. Unlike solid wood that is dimensionally stable parallel to the grain, this composite moves equally in all dimensions, resulting in gaps that were not adequately anticipated in the design. Photo: John Sandor, NPS.

by carefully designed joints and fasteners. Joints can play a role both in accommodating movement of materials as well as in managing moisture, either to keep it from entering the enclosure assembly or to let it escape from the building envelope, or both. Because some synthetic materials are less permeable to moisture than more traditional materials, installations must take into account the potential to trap moisture and cause deterioration of historic and new materials. An assembly incorporating new and historic materials should be designed so that if material failures occur, the failures occur within the new material rather than the historic one.

During installation, surface preparation is critical to ensure proper attachment. Deteriorated underlying material must be removed or stabilized. Non-corrosive anchoring devices or fasteners that are designed to carry the new material and to withstand wind, rain, snow, and other destructive elements should be used. Since physical failures often result from poor anchorage or improper installation techniques, a structural engineer should be included in planning any major project. For readily available, off-the-shelf materials, manufacturers' recommendations for attachment and spacing should be followed.

Nearly all substitute materials have some properties that are different from the historic materials they may replace. Even when substitute materials are isolated from historic materials and features, it is important to understand the substitute materials' properties in order to use them successfully.

- **Performance of the Material Over Time**

When more traditional materials are used to replace damaged historic materials and features, their performance is predictable in most cases. An exception may be modern wood that has durability and other prop-

erties different than those of historic wood from old-growth forests. Many of the materials used as substitutes have been in use long enough to provide some idea of how they perform over time. Other material may only have test results from accelerated weathering. The length of manufacturer warranties may be an indicator of expected durability and lifespan. Warranties only predict a manufacturer's expectation of a product's performance and are no guarantee that the manufacturers will still be in business at the time needed to stand behind them. Just as new manufacturers emerge with new materials, others disappear. Where possible, projects involving substitute materials in similar installations and exposures should be examined before selecting a new, less-tested material. It is unrealistic to expect a substitute material, which can be quite different in composition than the historic material, not to age differently.

Even traditional materials will not perform well if not used or detailed appropriately, and experienced architects, engineers, fabricators, and installers rely on their professional knowledge and experience to ensure proper installation and techniques when working with familiar materials. This is just one of many reasons that using the original materials for needed replacement is usually the best choice. Some of the materials now available as substitutes have properties that differ greatly from the traditional materials they may be used to replace. It is critical to the successful performance of substitute materials that everyone involved in the selection, design, and installation fully understands the material's properties, especially how it is different than the material it is replacing, and how that will affect the surrounding materials and building systems.

Many traditional building materials can be repaired either with traditional methods and materials or with more modern conservation techniques using substances like epoxies. However, many modern substitute materials (particularly synthetic ones) are not as easily repaired, if repairable at all, as their more traditional counterparts. Confirming that a material is repairable may be important for those used, e.g., where impact or significant wear or abrasion is likely.

Finally, it is critical that the substitute materials be documented as part of the historical record of the building so that proper care and maintenance of all of the building materials continue, ensuring the continued life of the historic building.

Choosing an Appropriate Substitute Material

Once all reasonable options for repair and replacement in kind have been considered and sufficient justification for substitute materials has been established, the choice among the variety of substitute materials currently available must be made. Rapidly developing technologies allow a wide variety of materials to choose from that are intended to mimic historic materials. Many of the materials that were historically used as substitutes for more traditional historic materials have themselves become historic, and some of these early substitutes continue to be reasonable options as substitute materials today. No substitute material will exactly match the historic material in all aspects, but many are able to adequately match the appearance and relevant physical attributes to make for a potential substitute. If a substitute material is not



Figure 13. Cast stone was used to effectively replace individual blocks of sandstone. Both the original (left) and the substitute material (right) retain similar physical and visible properties. Having weathered for over 30 years, some erosion of the binder has revealed quartz grains of the aggregate (inset), but it is only noticeable upon close inspection. Photo: John Sandor, NPS.

an adequate physical and visual match given the specific conditions of the building and the project, then it should not be used to replace distinctive, character-defining materials and features.

Listed below are various building components or features and the substitute materials which may, in some circumstances, be considered for use as possible replacement materials in a historic rehabilitation project consistent with the *Standards for Rehabilitation*. This list includes different substitute material options available today for these building features and poses questions that should be asked and considered when choosing between the original material and various types of substitute materials. This is followed by a list of some of the more commonly used, currently available materials that may have some applications as substitute materials and the properties of each that affect their suitability for use as substitutes. This list should not be read as an endorsement of any of these materials, generally, or their appropriateness for use as a substitute material, but it serves as a reminder that the successful use of any building material requires a careful consideration of its properties relative to where and how it will be used.

Considering Substitute Materials

Considering the use of a substitute material should begin with the following questions about the conditions and location where it will be used:

- Will the significance or visibility of the historic feature require a very precise match?
- Is the entire feature being replaced or just a component of it?
- Are pre-existing conditions contributing to the failure of the existing material, and, if so, how will they be addressed/corrected?
- Is the need for replacement due to inherent deficiencies of the original material?
- Will the material need to resist any environmental hazards such as flooding or fire?

Historic Features and Substitute Materials

		Historic Building Features					
		Masonry Stone, terra cotta	Architectural Metals Cast & wrought iron, steel, pressed metal	Siding Wood, asbestos	Roofing Wood shingle, slate, tile	Decking Tongue-and-groove & square-edge wood	Molding / Trim Wood
Potential Substitute Materials	Aluminum	●	●	●			●
	Cast Stone & Precast Concrete	●			●		
	Fiber Reinforced Concretes	●					
	Glass Fiber Reinforced Polymers	●	●				
	Fiber Cement			●	●		●
	Mineral / Polymer Composite			●	●	●	●
	Cellulose Fiber / Polymer Composite			●	●	●	●
	Non-composite Polymers		●			●	●
	Cellular PVC			●		●	●

The above chart lists materials that are sometimes used as substitutes for replacement of historic building features. Even within a given category, all materials may not be equally suitable as a substitute replacement material for the actual historic material or feature. Any substitute material should be selected based on its specific physical and visual characteristics, conditions, and intended application consistent with the Secretary of the Interior's Standards for Rehabilitation.

Historic Building Features: Criteria for selecting an appropriate replacement material

Masonry

FEATURES: corbels, brackets, balusters, cornices, window and door surrounds, friezes, wall surfaces, horizontal surfaces, incidental ornament, columns

HISTORIC MATERIALS: terra cotta, cast stone, stone, concrete

POTENTIAL SUBSTITUTES: cast stone, pre-cast concrete, GFRC, GFRP, non-composite polymers (polyurethane), cast or stamped metal

Questions to ask about the replacement material:

- Can it serve a structural function?
- How is the material affected by moisture?
- Can the material survive flooding and be reused?
- Can it reproduce the surface texture of the original?
- Is its shrinkage in curing low enough to allow it to be molded from existing stones?
- Can matching color be achieved without a coating and with UV stability?
- Can an adequate match of the surface (color and texture) be achieved with a coating?
- Is a coating required?
- If it is not self-supporting, is it lightweight enough to be supported by an underlying framework?
- Can multiple original units be replicated with a single replacement piece?
- Where thermal movement is different from the original material, how will joints accommodate?
- Is the material combustible?

Architectural Metals

FEATURES: pilasters, door and window surrounds, cornices, incidental ornament, columns, spandrels, ceilings, sheathing, roofing

HISTORIC MATERIALS: cast and wrought iron, steel, bronze, lead, aluminum, and stamped steel (usually galvanized or terne-coated)

POTENTIAL SUBSTITUTES: GFRP, aluminum, non-composite polymer (polyurethane), GFRC, metallic/polymer composite

Questions to ask about the replacement material:

- Will the replacement material serve a structural or cosmetic role?
- Will it expand and contract with temperature change enough to require special accommodation in its installation?
- If part of an assembly of mixed materials, how will any expansion and contraction of the dissimilar materials be accommodated?
- Will the replacement material increase deterioration of the historic or surrounding elements, for instance due to galvanic corrosion, moisture entrapment, jacking of original material, off-gassing creating a corrosive environment, or poor original design of the historic material?
- How will the replacement material mimic the surface color/patination of the original material?
- If a coating is needed, what preparation is needed, and what is its durability or service life of the finish?
- What attachment and support systems are necessary?
- If the original element is structural, but the new material is not, how can supplemental structure be introduced to support the new?



Figure 14. Surface texture is an important aspect in matching the appearance of a historic material, especially when a material is viewed at close range. As seen in these two images, many of the substitute materials produced for siding and trim have an embossed wood grain, making them incompatible for replacing historic wood that was typically planed to a smooth surface. Some substitute products are available with a smooth surface as well. Photos: John Sandor, NPS.

Siding

FEATURES: clapboard, tongue-and-groove or shiplap siding, board and batten, shingles

HISTORIC MATERIALS: wood and asbestos

POTENTIAL SUBSTITUTES: cellular PVC, wood fiber/polymer composite, fiber cement, mineral/polymer composite

Questions to ask about the replacement material:

- What are the widths, lengths, profiles, thicknesses, and textures available?
- What, if any, are the finishing requirements, and/or is it available factory-finished?
- How well does it hold paint, and can prefinished surfaces be renewed?
- What tools are needed to cut it, and can it be machined?
- Does it absorb moisture and, if so, to what effect?
- Can the material survive flooding and be reused?
- Will it expand and contract with temperature change enough to require special accommodation in its installation?
- What characteristics can affect its handling (e.g., weight, flexibility, brittleness)?
- Does it have specific fastening requirements?
- Is it susceptible to insect damage?
- What is its impact resistance?
- Does it have a flame spread rating?
- What is the expected lifespan and/or warranty?

Roofing

HISTORIC MATERIALS: wood shingle, slate shingle, asbestos shingle, clay tile, concrete tile, metal

POTENTIAL SUBSTITUTES: fiber cement, mineral/polymer composite, wood fiber/polymer composite, pre-cast concrete, metal

Questions to ask about the replacement material:

- What sizes and shapes are available?
- What are color choices?
- What is the color stability of the new material, and how will it age/weather?
- What is the impact resistance?
- What is its flame spread rating?
- What are the installation requirements of the new material?
- Can the feature being replaced be custom-produced if ready-made ones of the new material are not an accurate match?
- What is the expected lifespan and/or warranty?

Decking

FEATURES: tongue-and-groove, square-edge flooring

HISTORIC MATERIALS: wood

POTENTIAL SUBSTITUTES: cellular PVC, wood fiber/polymer composite, mineral/polymer composite, non-composite polymers (solid PVC)

Questions to ask about the replacement material:

- What are the widths, lengths, and textures available?
- Is it site painted or prefinished?
- How well does it hold paint, and can prefinished surfaces be renewed?
- What tools are needed to cut it, and can it be machined?
- What dimensional span does its strength allow?
- Does it absorb water, and if so, to what effect?
- Can the material survive flooding and be reused?
- Does it require a drainage plane, or can it be installed atop a membrane?
- Will it expand and contract with temperature change enough to require special accommodation in its installation?
- Is it susceptible to insect damage?
- Is it impact resistant?
- Does it have a flame spread rating?
- What is the expected lifespan and/or warranty?

Molding / Trim

FEATURES: run moldings, flat boards, casings, cornice, frieze, railings, balustrade, columns

HISTORIC MATERIALS: wood, metal

POTENTIAL SUBSTITUTES: cellular PVC, wood fiber/polymer composite, mineral/polymer composite, non-composite polymer (polyurethane), GFRP, sheet metal

Questions to ask about the replacement material:

- What are the widths, lengths, and textures available?
- What, if any, are the finishing requirements and/or is it available factory-finished?
- How well does it hold paint, and can prefinished surfaces be renewed?
- What tools are needed to cut it, and can it be machined?
- Does it absorb moisture, and if so, to what effect?
- Can the material survive flooding and be reused?
- Will it expand and contract with temperature change enough to require special accommodation in its installation?
- What characteristics can affect its handling (e.g., weight, flexibility, brittleness)?
- Does it have specific fastening requirements?
- Is it susceptible to insect damage?
- What is its impact resistance?
- Does it have a flame spread rating?
- What is the expected lifespan and/or warranty?



Figure 15. Tongue-and-groove porch flooring is manufactured in several different substitute materials. Each type has different properties, though most are more moisture-resistant than wood. The prefinished product shown can be painted when worn, but repainting is not recommended for some product choices. Photo: Oak Alley Foundation.

Potential Substitute Materials: Matching properties and performance needs

Physical Composition and Properties

After assessing different material options based on the intended application, the appropriateness of a substitute material should also be considered in context of the material's physical composition, associated properties, and necessary visual match.

Aluminum

MATERIAL: Aluminum is a highly corrosion-resistant alloy that can be cast, wrought, or extruded. Molten aluminum is cast into permanent (metal) molds or one-time sand molds forming cast aluminum. Extruded aluminum is formed by passing heated aluminum through a die which produces the desired form. Wrought aluminum is worked using the heated metal and then bending, stamping, and otherwise shaping the metal. If not self-supporting, aluminum elements are generally screwed or bolted to a structural frame. Aluminum can be welded, but more often sections, particularly extruded ones, are mechanically connected.

PROPERTIES:

- Isotropic
- Lightweight
- Thermal movement greater than cast iron or wood
- Corrosion-resistant, but direct contact with other metals may trigger galvanic corrosion
- Lower structural strength than iron or steel
- Ductile - less brittle than cast iron
- Non-combustible
- Retains high definition through molding process and produces crisp profiles through extrusion
- Can be given a durable metallic finish through anodization. Surface etching required for paint adhesion
- Can be machined into a large variety of shapes/ dimensions



Figure 16. Aluminum is a highly corrosion-resistant metal that is commonly used as a substitute material for cast iron. Aluminum can be a more affordable and lightweight alternative to cast iron that retains a similar texture, shape, and maintenance cycle. Photo: NPS.



Figure 17. The balustrade consists of multiple prior campaigns of using cast stone to replace the natural stone. The effective match for the surface texture and color of the original stone allowed individual elements to be incrementally replaced only when they had failed, thus retaining the maximum amount of original material as long as possible. Photo: EverGreene Architectural Arts.

Cast Stone & Precast Concrete

MATERIAL: A cement lime and aggregate mixture that is dry-tamped into a mold is generally referred to as cast stone. Cast stone is one of the original substitute materials. Its longevity has proved that the material ages compatibly with stone. A wet mix of cement and aggregate poured into molds also has a long history of being used to produce concrete masonry units mimicking stone and roofing tiles mimicking clay tile. Both methods have minimal shrinkage during curing, though they employ different curing and finishing techniques. Both can include reinforcing bars and anchorage devices installed during fabrication. The dry-tamp fabrication method is especially effective at producing an outer surface with the appearance of stone.

PROPERTIES:

- Isotropic
- Weight equivalent to stone
- Expansion/contraction similar to stone
- Water absorption may differ from that of any particular stone
- Can be structural
- Non-combustible
- Vapor-permeable
- May achieve a wide range of color and surface textures by varying mix, but use of pigments may reduce UV stability
- Can be coated
- May be tooled to match the appearance of tooled stone
- Repairs similarly to stone



Figure 18. Missing historic terra cotta spandrel panels on all floor levels were recreated utilizing glass fiber reinforced concrete (GFRC) replacements. New spandrels were fabricated as individual components and attached with metal clips between historic terra cotta piers. Photo: Kris Frail, Dewberry.

Fiber Reinforced Concretes (GFRC, CFRC)

MATERIAL: Fiber reinforced concretes are lightweight concrete compounds modified with additives and reinforced with alkaline resistant glass fibers (GFRC), or less frequently carbon fibers (CFRC). They are generally fabricated as thin-shelled panels and applied to a separate structural frame or anchorage system. GFRC is typically sprayed into forms, although it can be poured, and anchoring devices are included in the fabrication. The color is derived from the natural aggregates and, if necessary, a small percentage of added pigments. Because of its low shrinkage in curing, it can be produced using molds taken directly from the building.

PROPERTIES:

- Isotropic
- Lighter weight than solid masonry
- Expansion/contraction similar to stone
- No load bearing capacity, so underlying framework must be used to accommodate any loads
- Material can be fire-rated
- Vapor-permeable
- Can be produced in larger sections efficiently reproducing repetitive elements or features that were originally made up of small individual units
- Large range of colors achievable by varying aggregates, but when pigments are needed UV stability may be reduced
- May be left uncoated or may be painted



Figure 19. A new, lightweight fiber reinforced polymer is attached to a new metal armature to replicate damaged and missing elements of a terra cotta cornice. Photo: Quinn Evans.

Glass Fiber Reinforced Polymers (FRP, Fiberglass)

MATERIAL: Fiberglass is the most well-known of the FRP products generally produced as a thin, rigid, laminate shell formed by pouring a polyester or epoxy resin gelcoat into a mold. When tack-free, layers of chopped glass or glass fabric are added along with additional resins. The surface gel coat can be pigmented or painted. Reinforcing rods and attachment devices can be added when necessary. Because of its low shrinkage in curing, it can be produced using molds taken directly from the building. Rather than being produced as standard components, FRP is custom fabricated for individual applications.

PROPERTIES

- Isotropic
- Lighter weight than masonry, similar to sheet metal
- More thermally driven expansion than masonry or metals
- No load bearing capacity, so underlying framework must be used to accommodate any loads
- High strength to weight ratio
- Flammable
- Not vapor-permeable
- Can be produced in larger sections efficiently reproducing repetitive elements or features that were originally made up of small individual units
- May be difficult to match false joints in multi-unit assemblies to actual joints that need to accommodate movement
- Color can be incorporated into the surface gel-coat, or the surface may be coated



Figure 20. Cement board was used to replace a non-historic infill and mimics the configuration of a typical vehicular door of the period.
Photos: Historic Augusta.

Fiber Cement

MATERIAL: Fiber cement products are made from fiber, sand that is ground to a powder, cement, and proprietary additives to reduce moisture absorption. The fiber used in roof products is glass fiber alone, whereas siding and trim board products are primarily wood fiber. The material is formed with a smooth or textured surface, cut to standard sizes of panels, boards, or shingles, and cured in an autoclave. Roofing material has integral color, but board and siding products are produced with a primer, if not fully factory finished. Most siding and trim boards are embossed with a wood grain on one surface and are smooth on the other, the smooth side being the appropriate surface to imitate planed wood.

PROPERTIES:

- Products are minimally orthotropic
- Heavier and more brittle than wood, limiting available lengths
- Very little thermal- and no moisture-driven movement
- Low water absorption, but not recommended for ground or roof contact
- Class A flame spread
- Resists insect damage
- Available in limited thicknesses and widths
- Not machinable, but may be cut with special carbide blades; cutting requires dust collection and personal protective equipment
- Cut edges require sealing
- Available unfinished, primed, or prefinished, and must be painted (with latex paint)
- 15-year limited warranty typical



Figure 21. A mineral polymer composite siding was available in the profile very similar to the historic siding. The replacement siding was used where the original material was almost completely missing beneath a more modern covering. Areas where the original wood was largely intact were replaced with matching wood to sustain more of the material integrity of the building. Photo: Belk Architecture.

Mineral / Polymer Composite

MATERIAL: Calcium carbonate or fly ash are mineral ingredients held in a matrix of various polymers to produce materials formed or molded into a number of building products. Additives found in some of the roofing products include pigments and UV stabilizers. Some use a substantial portion of recycled material. Different combinations yield products with different properties, each formulated for a specific building component. When the material is fly ash with some glass fibers bound in a matrix of polyurethane, it is identified as polyash. Siding, trim, bead board, and deck products are primed or prefinished, whereas roof products have integral color.

PROPERTIES:

Fly ash (siding and trim)

- Isotropic
- Heavier and more brittle than wood, and lacking structural capacity
- Little thermal or moisture-driven movement
- Sufficiently low water absorption to permit ground contact
- Class C flame spread
- Resists insect damage
- Available in limited thicknesses and widths
- Machinable with carbide tools blades; requires dust collection
- Cut edges do not require sealing

- Must be painted
- 30-year limited warranty typical

Calcium carbonate or recycled rubber (roofing)

- Isotropic
- More thermally-driven movement than slate or wood
- Little to no moisture absorption
- As shingles: lighter and more flexible than slate
- As tongue-and-groove decking: heavier and harder than wood
- Not vulnerable to insect damage
- Available in limited dimensions
- As shingles: Class 4 impact resistance, and flame spread ratings ranging from Class A to Class C depending on the specific product
- As shingles: integral color, that may be subject to fading
- As tongue-and-groove decking: prefinished with non-renewable finish, and can be cut with woodworking tools
- 50-year limited warranties on roofing products typical

Cellulose Fiber / Polymer Composite

MATERIAL: Wood strands or fibers are coated with resin for moisture resistance and zinc-borate for insect and fungal-decay resistance, then consolidated under heated pressure. Solid composite core boards are cut from sheets of material, then factory-primed or finished. Resulting siding and trim board products can be referred to as engineered wood, fiber board, or hardboard. Products may be embossed with a wood grain or have a smooth finish, the smooth side being the appropriate surface to imitate planed wood. Siding, trim, and tongue-and-groove decking with a slightly different properties are produced by extruding polyvinyl chloride (PVC) combined with non-wood cellulose. Roofing shingles are molded from fine wood fibers, color additives, and UV stabilizers bound with polypropylene or polyethylene (thermoplastics).

PROPERTIES:

Predominantly Cellulose (siding, trim and decking)

- Minimal thermal movement
- Resistant to moisture-driven movement
- Lighter and more flexible than solid wood, but lacks structural capacity
- Rice hull cellulose: can span typical floor-framing spacing as decking
- Low water absorption (for wood, no ground or roof contact)
- Class A or Class C flame spread
- Resists insect damage
- Available in limited dimensions
- Machinable with woodworking tools
- Wood cellulose: Cut edges must be sealed and may need additional surface prep for finish; must be painted if unfinished or primed, also available prefinished
- Rice hull cellulose: Accepts stain/paint, but no finish required
- 30–50 year limited warranty, depending on manufacturer

Predominantly Polymer (roofing)

- Minimal thermal movement
- Little to no moisture absorption
- Lighter and more flexible than slate
- Class 4 impact-resistance
- Class A flame spread
- Available in limited shingle size
- 50-year limited warranty typical



Figure 22. A porch was reconstructed using posts fabricated on site from a smooth-surface cellulose/polymer composite material. Though the face of the posts are painted, the lack of paint on the bottom at the cut ends is not consistent with manufacturers' recommendations. This treatment will allow moisture to be absorbed, shortening the life of the new replacement feature. Photo: John Sandor, NPS.



Figure 23. 3-D printing using various polymers is occasionally used to replicate missing metal or wood features. This new application is continually being refined, but the application can be successful when a painted, lightweight feature needs to be replicated. Photo: NPS.

Non-composite Polymers

MATERIALS: The main two polymer materials used without significant other components are polyurethane and polyvinyl chloride (PVC). Polyurethane millwork is constructed of urethane foam created by mixing isocyanate and resin. The polyurethane mixture is kept under pressure in a mold as it expands to any desired shape. These molded products have a closed-cell, foamed core with a denser surface skin. Polyurethane products can have exterior applications but are more often used for interior features. Polyvinyl chloride (PVC) in a solid extruded form is another polymer that can have architectural application as tongue-and-groove decking. Various polymers formed using 3-D printing are also being explored as replacements for painted metal or wood ornamental features.

PROPERTIES: Each of the two groupings has distinct physical properties

Urethane Foam (moldings and decorative elements)

- Lightweight and flexible, but lacking structural capacity
- More thermally-driven movement than wood or stone, but less than cellular PVC
- Does not absorb water
- Flammable
- Resists insect damage
- Can be cut with standard woodworking tools
- Adhesive and mechanical fasteners both recommended for installation

- Supplied primed and must be painted (latex paint)
- Lifetime limited warranty typical

Solid PVC (flooring)

- Isotropic
- Heavier and less flexible than wood
- Minimal thermal movement
- Does not absorb water
- Strength to span typical floor-framing spacing
- Impact-resistance greater than wood
- Class A flame spread
- No insect susceptibility
- Good paint adhesion, but also available prefinished
- 20-year warranty typical

Cellular Polyvinyl Chloride (PVC)

MATERIAL: Varying amounts of calcium carbonate and a foaming agent are added to melted PVC before passing through an injection die and then a calibrator to produce the shape and size of the finished product. Cellular PVC is produced as sheets, boards, and moldings. Differences in the specifics of the equipment and the rate of cooling create two varieties of product, with distinct properties. One is known as free-foam, having a fairly consistent structure throughout its section, and the other is identified as Celuka, having a skin that is denser than its core. This primarily affects the ease with which the product can be milled and shaped. The material is white and needs no applied finish. When produced for decking the material has a colored and textured wear layer over the PVC core.

PROPERTIES

- Isotropic
- Lighter and more flexible than wood
- Less strong than wood (in tension and shear), but can span typical floor- framing spacing as decking
- More impact-resistance than wood
- Negligible water absorption; no moisture-driven movement, unlike wood
- Subject to thermal expansion and contraction significantly greater than wood, though the thermal movement is less for the same dimension than the cross-grain moisture-driven movement of wood
- For longer pieces, thermal movement requires manufacturer's specifications to be followed for attachment, and inclusion of expansion joints when installed at low temperature (joints should be glued)
- Class A flame spread
- Resists insect damage
- Machinable with woodworking tools, though cut edges may need additional surface prep for finish
- Good paint adhesion; if painted, high light reflectance (HLV) is recommended to minimize heat driven expansion
- 25–30-year limited warranty, depending on manufacturer



Figure 24. Cellular PVC when painted can be used to replace deteriorated wood features. This beadboard set in a wood frame was not historically designed to shed water effectively and had deteriorated. Cellular PVC was able to match the appearance of the wood details, while its properties were well matched to the shady location, painted finish, and limited size and configuration within the overall assembly; thus, it should provide a long-lasting solution for this application. Photo: Jennifer Balson Alvarez, NPS.

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Alternative Roofing Materials: A Guide for Historic Structures



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INTRODUCTION

The task of replacing roofs on historic Forest Service, U.S. Department of Agriculture, structures presents forest heritage and facilities employees with the challenge of identifying possible alternative materials that are historically appropriate, cost effective, easy to install, and functional in wildland fire environments. Forest heritage and facilities professionals are spending increasing amounts of time trying to identify alternative roofing materials for cedar shakes and shingles.

The objective of this guide is to identify alternative roofing materials to cedar shakes and shingles that are available in today's market. The guide discusses the characteristics and qualities of cedar shakes and shingles and identifies look-alike cedar roofing material alternatives that are available. A table compares various roofing materials for cost, fire resistance, weight, and other qualities important when selecting an alternative material. The guide also provides a list of manufacturers who make alternative materials for cedar shakes and shingles and their Web sites and Web links to historic information and preservation requirements, treatments, and other related information. This guide is written for Forest Service engineers, and heritage and facilities staffs involved in reroofing historic structures.

BACKGROUND AND GENERAL GUIDELINES FOR APPROPRIATE SUBSTITUTES

For a Forest Service reroofing project, first determine whether the building is a significant historic structure. If the structure is not significant, any suitable material may be used. Refer to the Forest Service's Built Environment Image Guide for ideas about appropriate roofing materials based on looks and longevity.

If the structure is significant (listed or eligible for listing on the National Register), the Forest Service is required to consult with the State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act. Contact SHPO through the forest or district archeologist or architectural historian whenever making changes to significant historic buildings. The Forest Service INFRA database should show the historic status of buildings, but check with the archeologist to make sure. Also, there may be structural issues with new roofing materials, so check with the facilities engineer.

One reason for consultation is to determine whether there will be an adverse effect on the historic building. If so, work with SHPO to mitigate that adverse effect. This is a legal and sometimes lengthy process that culminates in a Memorandum of Agreement (MOA). One way to avoid an adverse effect and save time and money on developing an MOA is to follow the Secretary of the Interior's Standards and Guidelines for Treatment of Historic Properties, as the Forest Service Handbook 7309.11, Chapter 40—Management. In addition, the Department of the Interior, National Park Service, has published a number of technical guides for maintaining, stabilizing, rehabilitating, and restoring various materials, finishes, and architectural components.

The link to the Secretary of the Interior's Standard and Guidelines for Treatment of Historic Properties is http://www.cr.nps.gov/hps/tps/standards_guidelines.htm.

The National Park Service's Technical Preservation Services' Preservation Brief Number 16 states that "Some preservationists advocate that substitute materials should be avoided in all but the most limited cases. The fact is, however, that substitute materials are being used more frequently than ever in preservation projects, and in many cases with positive results. They can be cost effective, can permit the accurate visual duplication of historic materials, and can last a reasonable time. Growing evidence indicates that with proper planning, careful specifications and supervision, substitute materials can be used successfully in the process of restoring the visual appearance of historic resources." For more information, go to: <http://www.cr.nps.gov/hps/tps/briefs/brief16.htm>.

Losing the character and patina of an old roof is always regrettable, but there are circumstances when a new alternative roof becomes necessary. Regarding replacement materials in general, the National Park Service stresses that they "be compatible with historic materials in appearance." As outlined in Preservation Brief Number 16, The Use of Substitute Materials on Historic Building Exteriors, the new, substitute material "should match the details and craftsmanship of the original, as well as the color, surface texture, surface reflectivity and finish of the original material. The closer an element is to the viewer, the more closely the material and craftsmanship must match the original." See <http://www.cr.nps.gov/hps/tps/briefs/brief16.htm>.

Because there is so much useful information on the Web sites listed in the appendix regarding historic information, historic preservation requirements, traditional building materials, contractors, treatments, and other information, this guide will not repeat this information. This information is covered very well by the National Park Service, Heritage Preservation Services, in their preservation briefs. See <http://www.cr.nps.gov/hps>. For detailed information on the repair and replacement of historic wooden shingle roofs, see <http://www.cr.nps.gov/hps/tps/briefs/brief19.htm>.

HISTORIC WOOD SHINGLES

For the past 100 years wood shakes and wood shingles have been used for roofing Forest Service structures. The two most commonly used woods are Alaska yellow cedar and western red cedar wood. Other wood alternatives to cedar wood shakes or shingles are white oak and sugar pine. White oak is primarily found in the East; it is amazingly durable and has been known to last 75 to 100 years. Decay-resistant sugar pine is primarily found in the West, particularly in California.

The differences between historic shingles and modern shakes and shingles are discussed in Preservation Brief Number 19, see: <http://www.cr.nps.gov/hps/tps/briefs/brief19.htm>. This brief also discusses the differences in historic and modern installation methods and structural requirements. While this guide is only about available alternative materials, architects and engineers can assist with identifying appropriate methods for historic buildings.

MODERN WOOD SHAKES AND SHINGLES

Wood roofs are a traditional, beautiful, and rustic look that is appropriate in a woodland setting. Nothing compares to the beauty, earthy colors and texture, flexibility in design, and insulating properties of a natural cedar shake roof (figures 1 and 2).



Figure 1—Cedar shake roof.



Figure 2—Cedar shake roof.

The difference between a shake and a shingle is that generally a shingle is sawn on both sides from a block of cedar and is thinner at the butt than a shake. Cedar shingles are sawn on both faces and have a smooth face.

A shake is typically split on one or both sides, which gives a rustic appearance. Hand-split and resawn cedar shakes have a split face, which allows the natural grain to be exposed to the elements. They are thicker than shingles. The exception is the taper-sawn shake, which looks like a thick shingle. Taper-sawn shakes are sawn as well but are thicker than shingles and are applied like shakes. Another difference is the amount of exposure. An 18-inch shingle is applied with a 5 ½-inch exposure to the weather, while an 18-inch shake is applied at 7 ½-inch exposure to the weather. Shingles applied at 5 ½ inches become a 3-ply roof, which means that there are three layers of shingles at any location on the roof. Shakes are 2 ply. Shakes are layered with felt between each layer, thus having two layers of felt at any location. No felt is required between each layer of the shingle application.

Cedar shakes and shingles are hail and wind resistant. Cedar shakes and shingles contain oils that make them naturally decay resistant. Also, wood roofing is a renewable resource. It is biodegradable, pollution minimizing, energy conserving, and 100-percent recyclable.

Wood roofing presents fire resistance problems, especially when the wood is not treated. The Forest Service requires that roofs be fire resistant. Therefore, this guide does not discuss nontreated wood roofing materials. Fire-resistant treated shingles are not available in colors and painting or staining voids the warranty.

The Cedar Shake and Shingle Bureau (<http://www.cedarbureau.org>) is an association of member mills, distributors, treatment companies, installers, and maintenance technicians. It is the industry “watch-dog” of cedar wood products. The Cedar Shake and Shingle Bureau recommends looking for the Certi-Label™ when selecting cedar shakes and shingles. This label is one way the consumer is assured of the highest possible ratings of cedar wood products.

Treated cedar shakes and shingles are available in two forms, pressure impregnated, fire-retardant treated wood and pressure treated wood with chromated copper arsenate preservative. Permanent fire protection is provided by pressure impregnating fire-retardant polymers into the innermost cells of cedar shakes and shingles. Select the Certi-Guard™ permanent label if fire-retardant is needed where the threat of fire exists. This treatment results in a Class A rating for fire resistance (figure 3).



Figure 3—Fire-retardant treated wood shingles.

Chromated copper arsenate (CCA) preservative protects wood against fungal decay associated with high heat and humidity conditions. Select the Certi-Last™ CCA label if preservative-

treatment is needed. Certi-Last™, treated for decay, mold, moss, algae, mildew, and fungus, is recommended for high humidity areas.

See <http://www.cedarbureau.org> for information on how the wood is treated for both fire and rot resistance. See the appendix for definition and further discussion on fire resistance classes.

Maintenance is important for any type of roof. A cedar shake roof should last 25 to 30 years or more when properly selected, installed, and maintained. It is more cost effective to maintain a roof properly at regular intervals than to replace it. To prolong the roof's life, it should be checked periodically for signs of wear and maintenance should be performed to clean loose debris from roofs and gutters.

For further information on caring for wood shakes and shingles, see the following links:

1. Care and Maintenance of Wood Shingle and Shake Roofs: <http://extension.oregonstate.edu/catalog/pdf/ec/ec1271.pdf>
2. Wood Shakes and Shingles for Roof Applications – Tips for Longer Life: <http://www.fpl.fs.fed.us/documnts/finlines/knaeb98d.pdf>

ALTERNATIVES TO WOOD SHAKES AND SHINGLES

There is a wide range of alternative materials available, such as treated cedar shakes and shingles, composition, metals (aluminum, steel, and copper), stone and slate, and concrete and clay tiles. The potential for fire damage to wood roofs and the desire for more durability and longevity highlights the need for cedar shake and shingle alternatives discussed below. Each one has its advantages and disadvantages. In the case of a significant historic structure, the substitute material must be acceptable to SHPO. The final decision also should consider the use, location, and historical aspects of the building, as well as cost, maintenance, and longevity for that particular building.

Composition Shingles

The dictionary defines composition shingles as a type of shingle used in steep-slope roofing and generally comprised of weathering-grade asphalt, a fiberglass reinforcing mat, an adhesive strip, and mineral granules. It also can be defined as a complex material, such as wood or fiberglass, in which two or more distinct, structurally complementary substances, especially metals,

ceramics, glasses, and polymers, combine to produce structural or functional properties not present in any individual component.

Examples of composite materials are asphalt shingles (figures 4 and 5) made from laminated fiberglass that mimic wood shakes. These look similar to the real thing, but generally only from a distance. Some are rated Class A fire resistant, wind resistant, and have up to a 50-year limited lifetime warranty. There also is a super heavyweight-plus product for ultimate durability. Many companies make asphalt shingles.



Figure 4—Asphalt shingles.



Figure 5—Asphalt shingles.

Engineered Molded Shingles

Made of engineered rubber, plastic, polymer, asphalt, or resin, engineered molded synthetic shingles are usually blended with a fire retardant and ultraviolet stabilizers to ensure long life and durability. Some synthetic shingles are composed of recycled materials such as tires, milk bottles, and fiberglass. Some include ground wood or stone and some are 100-percent resin (figures 6 and 7). Molded synthetic shingles are usually fire resistant, durable, and can last up to 50 years. There are many colors available. The molded synthetic material usually will not fade and turn gray with use as will natural wood material. The properties of engineered molded shingles vary widely. Check the manufacturer's literature to be sure the product will work for your application.



Figure 6—Rubber tiles—EcoStar.



Figure 7—Synthetic molded tiles—DaVinci.

Metal Shingles

Metal roofing has long been used on forest buildings. Now metals also are made to mimic cedar shakes and shingles (figure 8). Metal is rot-proof, lightweight, fire resistant, fairly easy to install, excellent for steep-pitched roofs in heavy snow areas, and available in many colors. Metal roofing can be applied as shingles. Most metal roofing is approved for Class A, B, and C fire ratings and is recognized widely for its resistance to airborne sparks and burning

debris. Metal conducts electricity; consequently, if in a lightening-prone area, the roof should be grounded by a lightening-protection specialist. Insulation in the roof and solid decking reduces noise transmission from rain.



Figure 8—Metal shingle—Classic Products.



Figure 9—Metal shingle with coating—Gerard Roofing Technologies.

Types of metal roofing are steel (available plain or with factory applied paint or baked on colored finishes), galvanized (coated with rust-resistant zinc), Galvalume® (steel coated with aluminum and zinc), stainless steel, aluminum, copper, and zinc alloys (figure 9). The metal can be installed as standing-seam sheets (figures 10 and 11) or made as shingles (figure 9) or shakes to resemble wood shakes, clay tiles, or shingles. Standing seam is the oldest style of metal roofing on traditional and restored buildings.

Metal roofs are durable, offering a high-strength to low-weight ratio. These roofing systems are almost maintenance-free, need no cleaning or pressure washing, and will not lose impact resistance with age. Metal roofs are lightweight and can be installed over many existing roofs. (<http://www.tradtional-building.com>.) They are energy

efficient, and are made from 60- to 65-percent recyclable material. They can withstand winds over 110 miles per hour. If installed properly, the expected life of metal ranges from 50 to 100 years.

Galvanized steel is coated with rust-resistant zinc. It is the least expensive metal roof. It is affordable, has excellent structural capabilities, and is warranted against corrosion for up to 20 years. The recycled content of galvanized steel is approximately 35 percent. Because of its strength, it is a good option for hail-prone areas, although unusually large hail may dent the roofing or damage colored finishes. “The Metal Roofing Alliance recommends the use of only G-90 for roofing applications.” G-90 is the weight of zinc on steel (90 ounces per square foot), not the weight of the overall metal thickness (<http://www.traditional-building.com>).

“Galvalume® steel combines metallic coatings of both aluminum and zinc. This combination joins the healing properties of zinc with the superior barrier protection of aluminum” and “offers superior weathering properties”(<http://www.traditional-building.com>). However, since Galvalume® steel isn’t able to self-protect any scratches or cracks as well as galvanized steel does, it is best used for simple profiles such as standing seam because there is not as much bending in the metal. Recycled content is approximately 35 percent (<http://www.classicroof.com>).

Aluminum roofing is produced in standing-seam (figures 10 and 11), shake, shingle, tile, and slate-look forms. It is lightweight, durable, and corrosion resistant. It does not require structural reinforcement, and will not split, rot, curl, dry out, lift, or invite insects, mildew, moss, or fungus. Generally, it is wind and wind-driven-rain proof at speeds up to 110 miles per hour. Most aluminum roofing is prepainted. The recycled content is approximately 95 percent (mostly post-consumer), and it is very light—as low as 45 pounds per square foot. When aluminum is heavily formed, it adds to its structural strength. A formed aluminum, such as an aluminum shingle, is more hail resistant than a less-formed aluminum, such as standing-seam.

Terne steel is a zinc-tin alloy coating over base carbon steel. Terne II is often selected for historical retrofit projects because of its dull gray color, which patinates into a weathered gray. It is durable and corrosion resistant. It will last for centuries and costs about as much as copper (<http://www.classicroof.com>).

TCS II, Terne Coated Stainless, is stainless steel coated with the zinc-tin alloy. It looks very similar to Terne's dull gray color, although it is more durable and costly because stainless steel is considered an exotic metal (<http://www.classicroof.com>).



Figure 10—Standing-seam roof.



Figure 11—Standing-seam roof.



Figure 12—Copper and aluminum tiles—Zappone.

Zinc—very soft and malleable—starts out as dull gray and patinates into an attractive charcoal color. It commonly is used in standing-seam applications, but also comes in preformed shingles. It is very expensive, and although it's been used for hundreds of years in Europe, it's relatively new in the United States.

Copper, while beautiful and durable, is used rarely due to its high cost. It is still measured by the ounce because it is considered a precious metal. The cost per 100 square feet is about \$1,000 or more. A green patina or crust of copper sulfate or copper chloride is formed on copper after exposure to the elements over a period of time. The patina acts as a barrier against corrosive elements and is part of the reason for copper's extremely long life. Copper can last 100 to 200 years or longer (figure 13).



Figure 13—Copper roof on Chilao Visitor Center, Angeles National Forest.

Concrete Tile Shingles

A roof is always exposed to the elements, and concrete is among the most durable products available. Concrete roof tile does not degenerate or wear out and gets harder with age. It is made of Portland cement, sand, water, with oxide for color. Concrete

tiles— regular and lightweight—are used for roofs. The tiles can be shaped as shakes and shingles (figure 14). Most products have Class A fire ratings, are easily installed, and last for decades. Breakage is a concern with concrete tiles (figures 15 and 16). Only periodic maintenance is required for metal flashings and ventilation systems. It has a 50-year product warranty. See <http://www.westtile.com/homeowner.asp?img=1&cat=own>.



Figure 14—Concrete tile roof.



Figure 15—Concrete tiles.



Figure 16—Concrete tiles.

Clay and Stone

Clay tiles are one of the most distinctive and decorative historic roofing materials because of their great variety of shapes, colors, profiles, patterns, and textures. Traditionally, clay tiles were formed by hand, and later by machine extrusion of natural clay, textured or glazed with color, and fired in high-temperature kilns. The unique visual qualities of a clay tile roof often make it a prominent feature in defining the overall character of a historic building. The significance and inherently fragile nature of historic tile roofs dictate that special care and precaution be taken to preserve and repair them. Clay tile has one of the longest life expectancies among historic roofing materials—generally about 100 years and often several hundred (figure 17).



Figure 17—Clay tiles, Gladding McBean & Co.

Slate is one of the finest roofing materials available. It is fireproof, resists hail damage, possesses unquestionable beauty, and often has a service life of 100 years or more (figure 18).



Figure 18—Slate tiles, Tru-Slate.

Installation techniques are fairly standard for most alternative roofing materials. Some materials may require specialized knowledge by an installer. This is a consideration when selecting material. Most manufacturers' Web sites provide detailed information on installation procedures.

NOTE: The prices listed in the following table are estimates only. Actual pricing is dependent on specific material, shipping costs, and manufacturer. These alternative selections, while not exhaustive, are based on the manufacturers' claim that the product looked similar to wood shakes or shingles.

Table 1. Roofing materials and specifications

Roofing Material	Fire Resistant	Wind Resistant (mph)	Impact Resistant	Freeze-Thaw Resistant	Low Maintenance	Special Skills Required for Installation	Recyclable	Durability (years)	Fade Resistant	Price (\$ Per Square	Weight (pound per square 1 square = 100 ft ²)
Cedar											
<i>Treated Shakes</i>	Class A	245	Class 3- 4	Yes	Yes	No	Yes	25 to 30	Weathers to a silver-gray	170 to 200	260 to 450
<i>Treated Shingles</i>	Class A	173	Class 3- 4	Yes	Yes	No	Yes	25 to 30	Weathers to a silver-gray	170 to 200	260 to 450
Metal											
Aluminum											
<i>Zappone Shingles</i>	Class A,B,C	110	Yes	Yes	Yes	No	Yes	50 to 100	Yes	196	42
<i>Classic Metal</i>	Non-combustible	120	Class 4	Yes	Yes	No	Yes	Lifetime	Yes	250 to 400	50
Coated Steel											
<i>Gerard Stone</i>	Class A	120	Class 4	Yes	Yes	No	Yes	Lifetime	Yes		140
Copper											
<i>Zappone Shingles</i>	Class A	110	Yes	Yes	Yes	No	Yes	100 to 200	Patinares	1,120	124
Composition											
<i>DaVinci</i>	Class A	80 to 90	Class 4	Yes	Yes	No	Yes	50	Yes	370 to 420	304 to 342
<i>Enviroshake®</i>	Class C	87	Class 3	Yes	Yes	No	Yes	50	Lightens to a silver/grey	330 to 350	325

Table 1. Roofing materials and specifications (continued)

Roofing Material	Fire Resistant	Wind Resistant (mph)	Impact Resistant	Freeze-Thaw Resistant	Low Maintenance	Special Skills Required for Installation	Recyclable	Durability (years)	Fade Resistant	Price (\$ Per Square	Weight (pound per square 1 square = 100 ft ²)
Asphalt											
CertainTeed Presidential Shake TL	Class A	110	Not rated yet	Yes	Yes	No	Fiberglass composition	50	Yes	140	480
CertainTeed Presidential Shake	Class A	110	Not rated yet	Yes	Yes	No	Fiberglass composition	50	Yes	100	355
CertainTeed Centennial Slate	Class A	110	Not rated yet	Yes	Yes	No	Fiberglass composition	Lifetime	Yes	130	355
CertainTeed Landmark TL IR	Class A	110	Class 4	Yes	Yes	No	Fiberglass composition	Lifetime	Yes	85 to 90	340
CertainTeed Landmark Special IR	Class A	110	Class 4	Yes	Yes	No	Fiberglass composition	40	Yes	75	260
Clay											
Ludowici	Class A	150	Class 2	Yes	Yes	No	Clay tile	75	Yes	300 to 800	900 to 1,200
Gladding, McBean	Non-combustible	Not rated	Yes	Yes	Yes	No	Clay tile	75	Yes	350 to 375	1,120
Stone											
TruSlate (neutral)	Non-combustible	100	hail resistant	Yes with special under-layment	Yes	Special system	Yes	Lifetime 75 years for inter-layment	Yes	275	650 to 750

Table 1. Roofing materials and specifications (continued)

Roofing Material	Fire Resistant	Wind Resistant (mph)	Impact Resistant	Freeze-Thaw Resistant	Low Maintenance	Special Skills Required for Installation	Recyclable	Durability (years)	Fade Resistant	Price (\$ Per Square = 100 ft ²)	Weight (pound per square 1 square
Polymérica											
<i>EcoStar Majestic Slate TPO and EPDM synthetic rubber</i>	Class A	70 to 120	Class 4	No issue	Yes	No	Yes	50	Minimal	544 to 752	220 to 290
<i>EcoStar Seneca Cedar Shake Tiles</i>	Class A	70 to 120 w/Gold Star Warranty	Class 4	Yes	Yes	No	Polymer-rubber and recycled industrial plastic	50	Minimal	562 to 712	220 to 251
<i>EverShake</i>	Class A		Class 3	Yes	Yes	No	Polymer	40	Minimal		300
<i>Re-New Wood Eco-Shake</i>	Class A	70 to 110	Class 4	Yes	Yes	No	Recycled PVC and wood fiber	40 to 50	No	240	244
<i>Crowe Building Products Authentic 2000 (Slate look-alike)</i>	Class A, B, or C	110	Class 4	Yes	Yes	No	Yes Recycled plastic and rubber and TPO	40 to 50	Yes	300	223 to 260
Concrete											
<i>Westile</i>	Class A	85 to 100	Class 4	Yes	Yes	No	Yes	50	Yes	55 to 100	6 to 10
<i>Eagle Roofing Products</i>	Class A	80 to 110	Not rated yet	Yes	Yes	No	Concrete	Lifetime	Lightens slightly	300 to 400	720 to 1,000

APPENDIX

FIRE CLASSES

Fire resistant classes, A, B, and C measure roof assemblies' relative resistances to external fire exposures. See <http://www.professionalroofing.net/past/nov99/qa.asp>.

Class A uses a class B fire retardant product plus an Underwriters Laboratories (UL)-rated fire retardant fiberglass cap sheet underlay. It is not readily flammable, has a high degree of protection, does not slip, and does not have a flying-brand hazard.

Class B provides a moderate degree of protection, is not readily flammable, does not slip from position, and poses no flying-brand hazard.

Class C provides light fire exposure protection, is not readily flammable, and there is a measurable degree of fire protection.

IMPACT-RESISTANT CLASSES

UL 2218 classifies the resistance of roofing products to impact damage. In the test, steel balls are directed at roof samples, and damage is observed. Products that receive a Class 4 rating from UL 2218 are the most resistive to hail damage.

Several standards set by the American Society for Testing and Materials (ASTM International) and Underwriters Laboratories (UL) test impact and wind resistance including: ASTM D 3161: Standard Test Method for Wind-Resistance of Asphalt Shingles; UL 997: Wind Resistance of Prepared Roof Covering Materials (for wind ranging from 55 to 63 miles per hour); and UL 2218: Impact Resistance of Prepared Roof Covering Materials. See <http://www.toolbase.org/Technology-Inventory/Roofs/wind-resistant-asphalt-shingles>.

USEFUL WEB SITES

The following Web sites provide historical information:

<http://fs.web.mtdc.wo.fs.fed.us/toolbox/his/his02.htm>

<http://www.cedarbureau.org>

<http://www.cr.nps.gov/hps/tps/recentpast/>

<http://www.cr.nps.gov/hps/tps/standguide/>

<http://www.oldhousejournal.com>

<http://www.oldhouses.com>

<http://www.recentpast.org>

<http://www.traditional-building.com>

<http://www.watkinsawmills.com>

Consumer Reports magazine has tested shingles. You can sign up for a subscription and see the ratings on composition shingles.

<http://www.consumerreports.com>

<http://www.oldhousejournal.com>

<http://www.roofsandroofing.com/index.html>

Below are some links to roofing manufacturers that make alternatives to rustic roofing products:

Polymer

<http://www.davinciroofscapes.com>

Composites

<http://www.alltheindustrials.com>

<http://www.atlasroofing.com>

<http://www.buildinggreen.com>

<http://www.elkcorp.com>

<http://www.enviroshake.com>

<http://www.greenbuilder.com>

<http://www.owenscorning.com>

<http://www.premiumroofs.com>

<http://www.stonewayroofing.com>

<http://www.traditional-building.com>

Wood

<http://www.askthebuilder.com>

<http://www.bcfshake.com>

<http://www.cedarbureau.org>

<http://www.stavelake.com>

<http://www.wescocedar.com>

<http://www.woodroof.com>

Rubber

<http://www.redwoodrubber.com>

<http://www.rubberconcepts.com>

Metal

The Metal Roofing Alliance “is a not-for-profit coalition of metal roofing manufacturers, paint companies, coil coaters, associations, and contractors formed to introduce homeowners to the many value benefits of metal roofing.” See <http://www.metalroofingalliance.com> for more information on metal roofing.

<http://accelroofing.com/>

<http://atas.com/>

<http://www.bethsteel.com>

<http://www.classicroof.com>

<http://www.custombiltmetals.com>

<http://www.duralock.com>

<http://www.hometips.com>

<http://www.kasselandirons.com>

<http://www.mbc.com>
<http://www.metalroofing.com>
<http://www.metroroofproducts.com>
<http://www.perfectionusa.com>
<http://www.wbdg.org>
<http://www.zappone.com>

Clay

<http://www.gladdingmcbean.com>
<http://www.ludowici.com>
<http://www.oldhousejournal.com>

Concrete

http://www.cement.org/homes/ch_bs_roofing.asp
<http://www.monierlifetile.com/>
<http://www.thetileman.com>

Fasteners for clay and concrete tile

<http://www.newportfastener.com>
<http://www.wire-works-inc.com>

Underlayments

<http://www.carlisle-syntec.com>
<http://www.cetco.com/BMG/>
<http://www.fieldscorp.com>

Vendors for roofing products

<http://www.alliedbuilding.com>

Asphalt Roofing Manufacturers Association (ARMA)

ARMA is a trade association representing the majority of North America's asphalt roofing manufacturing companies, plus their raw material suppliers.

<http://www.asphaltroofing.org/>

Auburn Tile, Inc.

909-984-2841

<http://www.auburntile.com>

Certainteed

800-782-8777

<http://www.certainteed.com>

Columbia Concrete Products Limited

877-388-8453

rooftile@crooftile.com

Crowe Building Products

905-529-6818

<http://www.authentic-roof.com>

DaVinci Roofscapes

800-328-4624

<http://www.davinciroofscapes.com>**EcoStar**

800-211-7170

<http://www.premiumroofs.com>**Elk**

800-354-7732

<http://www.elkcorp.com>**Follansbee Steel**

800-624-6906

<http://www.follansbeeroofing.com/>**GAF Materials Corporation**

973-628-3000

<http://www.gaf.com>**Gerard Roofing Technologies**<http://www.gerardusa.com/>**Gladding, McBean**

800-964-2529

<http://www.gladdingmcbean.com>**IKO**

888-456-7663

<http://www.iko.com>**Ludowici Roof Tile**

800-699-9988

<http://www.ludowici.com>**Monier Lifetile**

800-598-8453

<http://www.monierlifetile.com/>**Owens Corning**

1-800-GET-PINK

<http://www.owenscorning.com>**Richmond Precast Concrete Products**

Richmond, VA

804-231-0100

Royal Building Products

866-852-2791

<http://www.royplas.com>**Tamko**

800-641-4691

<http://www.tamko.com>**Vande Hey-Raleigh**

800-236-8453

<http://www.vhroof-tile.com>

For additional information on alternative roofing materials contact Marty Willbee at 909-599-1267.

SDTDC's national publications are available on the Internet at: <http://www.fs.fed.us/eng/pubs/>

Forest Service and U.S. Department of the Interior Bureau of Land Management employees also can view videos, CDs, and SDTDC's individual project pages on their internal computer network at:

<http://fsweb.sdt dc.wo.fs.fed.us/>

About the Author...

Martha Willbee, Outdoor Recreation Planner, came to the San Dimas Technology and Development Center in 1991 and served as Administrative Assistant. Marty joined the Recreation Program in 2002. She holds a B.A. in Recreation Administration from Chico State University in California. Her prior work background was in banking and insurance.



Department of Permitting & Inspections

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William Ward, Director
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Mary O'Neil, AICP, Principal Planner
Garret King, Associate Planner
Joseph Cava, Permit Technician
Steve Cormier, Code Compliance Officer
Ted Boylan, DPI Administrator



TO: Development Review Board
FROM: Scott Gustin
DATE: December 17, 2024
RE: ZP-24-253; 93-97 North Street

=====

Note: These are staff comments only; decisions on projects are made by the Development Review Board, which may approve, deny, table or modify any project. THE APPLICANT OR REPRESENTATIVE MUST ATTEND THE MEETING.

Zone: NMU Ward: 3

Owner/Applicant: Michael Alvanos / 3G LLC

Request: Proposed demolition and reconstruction of rear addition with associated site improvements. Demolition of rear outbuilding. Proposal includes adding seven new residential units for a total of ten.

Applicable Regulations:
Article 3 (Applications, Permits, and Project Reviews), Article 4 (Maps & Districts), Article 5 (Citywide General Regulations), Article 6 (Development Criteria & Guidelines), Article 8 (Parking), Article 9 (Inclusionary & Replacement Housing)

Background Information:
The applicant is seeking approval to demolish the rear ell and to replace it with a larger rear addition. The number of dwelling units would increase from three to ten, and the commercial space in the remaining original portion of the building would be converted to residential use. A detached outbuilding would also be demolished, and surface parking would increase. Note that the site plan reference to the number of dwelling units needs to be updated to reflect the current unit count proposal.

The Design Advisory Board reviewed this application August 13 and November 26, 2024 and unanimously recommended approval subject to the following conditions:

1. Provide complete exterior materials information, including roofing, infill siding, trash and recycling enclosure, and any exterior mechanical equipment and screening.
2. Depict mailbox location(s).
3. Provide a revised site plan depicting curb stops for all parking spaces.
4. Provide stormwater management and erosion prevention and sediment control plans for review by the city’s stormwater program.

No revised project plans have yet been submitted. Recommendations of the DAB will be incorporated into the permit conditions.

Previous zoning actions for this property:

- 6/4/24, Approval for replacement windows in the building at 93 North St
- 1/15/10, Approval of parallel sign
- 12/29/09, Approval to change use from general merchandise to small grocery
- 12/14/93, Approval of window signage

Recommendation: Certificate of Appropriateness approval as per, and subject to, the following findings and conditions:

I. Findings

Article 3: Applications, Permits, and Project Reviews

Part 3: Impact Fees

The applicant will be required to pay impact fees set forth and calculated by the Impact Fee Administrative Regulations based on the net new square footage of the proposed addition. Space for the required inclusionary housing is exempt. **(Affirmative finding as conditioned)**

Article 4: Maps & Districts

Sec. 4.4.2, Neighborhood Mixed Use Districts:

(a) Purpose

(2) Neighborhood Mixed Use (NMU)

The Neighborhood Mixed Use district is intended primarily for small scale commercial development that provides neighborhood goods and services in a walkable environment. Multi-family residential development is also permitted within the district. **(Affirmative finding)**

(b) Dimensional Standards & Density

Floor area ratio is limited to 2.5 with inclusionary housing. The project plans note 2.0 FAR under existing and proposed conditions. This information is incorrect. Although the resultant FAR is clearly less than 2.5, accurate FAR is needed.

The front yard setback remains unchanged. The easterly side yard setback for the addition is 5,' and its rear yard setback is ~28.' There are no minimum side or rear yard setback requirements where the addition is proposed. Further south, a 15' district setback applies where residential district properties abut the subject property. None of the addition projects into the 15' district setback. The proposed parking and the dumpster enclosure are compliant with applicable 5' side and rear yard setbacks.

Total lot coverage increases from 62.2% to 71.5%. With inclusionary housing, the maximum permissible lot coverage is 92%.

The proposed addition is ~37' tall as measured to the midpoint of the slopped roof. Up to 45' tall is permissible with inclusionary housing, subject to a 10' front yard setback. The addition is set well beyond 10' from the front property line. **(Affirmative finding as conditioned)**

(c) Permitted & Conditional Uses

The proposed multi-family residence is a permitted use in the NMU zone. **(Affirmative finding)**

(d) District Specific Regulations

See Sec. 4.4.2 (b) above as to inclusionary housing bonuses. This subsection is otherwise not applicable.

Article 5: Citywide General Regulations

Sec. 5.2.3, Lot Coverage Requirements

See Sec. 4.4.2 (b) above.

Sec. 5.2.4, Buildable Area Calculation & Steep Slopes Overlay District

Not applicable.

Sec. 5.2.5, Setbacks

See Sec. 4.4.2 (b) above.

Sec. 5.2.6, Building Height Limits

See Sec. 4.4.2 (b) above.

Sec. 5.2.7, Density and Intensity of Development Calculations

See Sec. 4.4.2 (b) above.

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.

The subject principal building is included in the Vermont Historic Sites & Structures survey and dates to circa 1895. It was originally constructed as a mixed use commercial and residential building and remains so today. The rear detached outbuilding slated for demolition is not included in the survey and is not subject to the provisions of this section. **(Affirmative finding)**

(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 existing building, set at the front property line along North Street, is obviously commercial with rectangular block massing, a flat roof, and large storefront windows. This application proposes to eliminate the ground floor commercial use and to replace it with residential use. Doing so is permitted in this NMU district. Project plans depict minimal exterior changes to the building. Windows will be replaced, and the existing rear ell will be removed and replaced with a new, larger rear addition with parking and additional residential units. **(Affirmative finding)**

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.*

The existing rear addition will be replaced with a new larger rear addition. It is set back from North Street. The primary façade along North Street will be retained largely as-is. Windows will be replaced with acceptable units. **(Affirmative finding)**

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. **(Affirmative finding)**

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

None identified. **(Affirmative finding)**

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

The existing building is clad in wooden clapboards and trim. The proposed replacement rear addition will be clad in "LP Smartside" clapboard and trim. The remaining front portion of the building will retain its wooden exterior cladding. Infill siding is assumed to match but is not expressly noted. New and replacement windows will be combination fiberglass and wooden units that resemble the appearance of the existing windows. **(Affirmative finding)**

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.*

As noted above, the wooden cladding on the front portion of the original building will be retained. The replacement windows are consistent with present replacement window guidelines for historic buildings. **(Affirmative finding)**

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 or physical treatments are noted. Work with the existing building will likely require “lead safe” practices. **(Affirmative finding)**

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

The property is not included in Burlington’s archaeological points GIS data layer. Not applicable. **(Affirmative finding)**

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 new rear addition will replace an existing rear addition. Its location behind the remaining original structure limits impacts to the streetscape and the historic integrity of the building as perceived by the public. The new rear addition is clearly new as compared to the remaining original structure. **(Affirmative finding)**

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.*

The new rear addition will replace the existing rear addition. Its removal would leave just the remaining portion of the original structure in place. That said, this new rear construction is independent from the front portion of the original structure. It does not necessarily affect the historic integrity of the remaining original building. **(Affirmative finding)**

Sec. 5.5.1, Nuisance Regulations

Nothing in the proposal appears to constitute a nuisance under this criterion. **(Affirmative finding)**

Sec. 5.5.2, Outdoor Lighting

New exterior lighting is proposed, and fixture cut sheets have been provided. Recessed canister fixtures will be installed for illumination of entries. Illumination levels are acceptable, and the bulbs qualify as low output lamps. **(Affirmative finding)**

Sec. 5.5.3, Stormwater and Erosion Control

The proposed development is large enough to require review of stormwater management and erosion control measures by the city’s stormwater program per the standards of Chapter 26. **(Affirmative finding as conditioned)**

Article 6: Development Review Standards

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

There are no significant natural features on the property as identified in the Open Space Protection Plan or related Natural Resources Overlay District. **(Affirmative finding)**

(b) Topographical alterations

The subject property is essentially flat and will remain so. Limited excavation is associated with this project. **(Affirmative finding)**

(c) Protection of important public views

There are no important public views from or through the subject property. **(Affirmative finding)**

(d) Protection of important cultural resources

See Sec. 5.4.8 above.

(e) Supporting the use of alternative energy

There is no indication of alternative energy utilization in the project plans. The project does not inhibit future utilization on the subject, or neighboring, properties. **(Affirmative finding)**

(f) Brownfield sites

The property is not included in the VT DEC Hazardous Sites List. **(Affirmative finding)**

(g) Provide for nature's events

The sheltered front entry facing North Street will remain. All three entries on the west elevation are sheltered, as depicted in the project plans.

An erosion prevention and sediment control plan will be required for implementation during construction. A post-construction stormwater management plan may be required due to the increase in lot coverage. Applicant follow up with the city's stormwater program is required. **(Affirmative finding as conditioned)**

(h) Building location and orientation

Building location and orientation will remain unchanged. **(Affirmative finding)**

(i) Vehicular access

Vehicular access to the site remains unchanged via private driveway onto North Street. **(Affirmative finding)**

(j) Pedestrian access

The front entry continues to access North Street directly. Project plans depict a concrete walkway running the length of the building's western elevation, connecting to the public sidewalk. **(Affirmative finding)**

(k) Accessibility for the handicapped

No ADA details are evident in the project plans. It is likely that at least one of the apartments will need to be ADA accessible. Such standards are administered by the Building Inspector through the applicable building codes. **(Affirmative finding as conditioned)**

(l) Parking and circulation

New surface parking spaces will be provided in an enlarged rear parking area extending further south. Several new spaces will be provided under the new rear addition. All of these spaces will be accessed by the existing private driveway into the property. The new spaces will be dimensionally compliant per the standards in Article 8: Parking. Although parking will be notably increased, it does not reach the threshold requiring shade trees. Parking spaces under the building will be screened from the adjacent property by the building. An existing wooden fence will provide screening of surface parking along the westerly property line. The gravel parking area requires curb stops, whether concrete, granite, or similar, to prevent parking creep onto adjacent green spaces. **(Affirmative finding as conditioned)**

(m) Landscaping, fences, and retaining walls

No new fencing or retaining walls are proposed. Existing wooden fencing adjacent to the addition will be removed, and existing wooden fencing along the westerly boundary will remain. Project plans depict three new trees, two new shrubs, and grassy yard space to the south of the new addition. Three additional boxwood shrubs are proposed along the southern edge of the parking area. **(Affirmative finding)**

(n) Public plazas and open space

Not applicable.

(o) Outdoor lighting

See Sec. 5.5.2 above.

(p) Integrate infrastructure into the design

No ground mounted mechanical equipment is depicted in the project plans. Project plans depict a trash and recycling enclosure at the south end of the parking area. Enclosure details are needed, as are mailbox locations. **(Affirmative finding as conditioned)**

Part 3, Architectural Design Standards

Sec. 6.3.2, Review Standards

(a) Relate development to its environment

1. Massing, Height, and Scale

The proposed rear addition is larger than the one it will replace. It has a larger, longer footprint, and the height is greater. Building dimensions are compliant with dimensional standards. The larger scale of the addition is mitigated by its placement behind the existing building, and the sides of the addition are tucked inward as compared to the original building in front. The original building and the addition read as two separate masses rather than one uniform mass. Overall, the development results in a building of a scale within the range established in this mixed use neighborhood. **(Affirmative finding)**

Roofs and Rooflines

The proposed roof is a “saw tooth” form and is unusual in the neighborhood. The proposed roof form helps to split the proposed building mass into three components rather than one large mass. **(Affirmative finding)**

2. Building Openings

The building’s front entry remains along North Street. Fenestration within the addition is consistent with that in the original building. The eastern side of the addition is 5’ from the

property line and contains windows. There is no building on the other side of the property line.
(Affirmative finding)

(b) Protection of important architectural resources

See Sec. 5.4.8 above.

(c) Protection of important public views

See Sec. 6.2.2 (c).

(d) Provide an active and inviting street edge

The street edge along North Street is defined by the existing historic building. It will be retained largely as-is and contains an inset, centered primary entrance. **(Affirmative finding)**

(e) Quality of materials

The original building will retain its wooden clapboard siding and trim. Acceptable fiberglass and wooden windows will be installed throughout. The addition will be clad in composite clapboard siding and trim. Roofing material is not noted. The roof pitch appears to be too low for shingles as originally proposed. Roofing material must be noted. **(Affirmative finding as conditioned)**

(f) Reduce energy utilization

Proposed building must comply with current energy efficiency standards. **(Affirmative finding as conditioned)**

(g) Make advertising features complimentary to the site

Not applicable.

(h) Integrate infrastructure into the building design

No rooftop mechanical equipment is noted in the project plans. No vents, piping, or other punctures in the building envelope are noted either. If any exterior items such as these are proposed, they must be depicted and screened as appropriate. **(Affirmative finding as conditioned)**

(i) Make spaces safe and secure

Proposed building must comply with the city's current egress requirements as administered by the building inspector. Entries will be illuminated as noted above. **(Affirmative finding)**

Article 8: Parking

Sec. 8.1.8, Minimum Off-Street Parking Requirements

There is no longer a minimum on-site parking requirement. **(Affirmative finding)**

Sec. 8.1.9, Maximum On-Site Parking Spaces

Up to 2 parking spaces per dwelling unit may be allowed for multi-family dwellings in the mixed use parking district. As proposed, 16 parking spaces will serve the 10 dwelling units.

(Affirmative finding)

Sec. 8.1.10, Off-Street Loading Requirements

(Not applicable)

Sec. 8.1.11, Parking Dimensional Requirements

Parking spaces are dimensionally compliant at 9' X 20.' Back-up distance is 24.' **(Affirmative finding)**

Sec. 8.1.12, Limitations, Location, Use of Facilities

(a) Shared Parking for Off-Site Use

(Not applicable)

(b) Front Yard Parking Restricted & Residential Driveways

(Not applicable)

(c) Availability of Facilities

The parking to be constructed as part of this development will serve residents and visitors. It may not be used for the storage or display of vehicles or materials. **(Affirmative finding)**

Sec. 8.1.13, Parking for Disabled Persons

ADA parking details are depicted as required. **(Affirmative finding)**

Sec. 8.1.14, Stacked and Tandem Parking Restrictions

(Not applicable)

Sec. 8.1.15, (Reserved)

Sec. 8.1.16, Transportation Demand Management

(b) Applicability

The construction of 7 additional dwelling units triggers minimal TDM requirements. **(Affirmative finding)**

(c) Transportation Demand Management Program

Construction of 7 new dwelling units constitutes a “small project” under the TDM standards. As such, the applicant need only unbundle the cost of parking from the residential leases and make available at market rate. The 1 required inclusionary housing unit is exempt from this unbundling requirement. **(Affirmative finding as conditioned)**

Sec. 8.2.5, Bicycle Parking Requirements

The project plans depict an existing bike rack in front of the building and otherwise note that bike parking will be provided as required. For the 7 new dwelling units, 1 short term bike parking space is required. The number of long term bike parking spaces required is determined by the number of bedrooms (1 per 2 bedrooms). Bedroom count is not specified and must be. Revised project plans depicting compliant bicycle parking are required. **(Affirmative finding as conditioned)**

Article 9: Inclusionary and Replacement Housing

Sec. 9.1.5, Applicability

The project includes 7 additional dwelling units, and therefore, requires inclusionary housing. Typically, 15% of the units must be inclusionary (in this case, 1). Details as to the inclusionary housing provided need to be worked out with the housing trust fund manager, and a Certificate of

Inclusionary Housing Compliance issued prior to a certificate of occupancy for the project.
(Affirmative finding as conditioned)

II. Conditions of Approval

1. **Prior to release of the zoning permit**, revised project plans addressing the following shall be submitted, subject to staff review and approval:
 - a. Correct dwelling unit information in all of the project plans;
 - b. Correct FAR (at least as proposed);
 - c. Bicycle parking (short term and long term) location and capacity;
 - d. Depiction of curb stops for all surface parking spaces; and,
 - e. Project details as to the dumpster enclosure, roofing material, mailboxes, and exterior mechanical equipment and utility meter locations and associated screening.
2. Final review and approval of the EPSC and stormwater management plans shall be obtained from the city's stormwater program prior to construction.
3. A State of Vermont wastewater permit will be required. A capacity letter issued by the Dept. of Public Works will be required in order to obtain the wastewater permit.
4. The cost of onsite parking shall be unbundled from the residential leases and made available at market rate. This condition does not apply to the inclusionary housing and related parking.
5. A Certificate of Inclusionary Housing Compliance shall be obtained from the manager of the housing trust fund **prior to issuance of a certificate of occupancy**.
6. At least **7 days prior to the issuance of a certificate of occupancy**, the applicant shall pay to the Permitting & Inspections Department the impact fee as calculated by staff based on the new square footage of the proposed development. The inclusionary housing is exempt from the impact fees.
7. All new utility lines shall be buried.
8. It is the applicant's responsibility to comply with all applicable ADA requirements.
9. All new construction is required to meet the Guidelines for Energy Efficient Construction pursuant to the requirements of Article VI. Energy Conservation, Section 8 of the City of Burlington Code of Ordinances.
10. Standard Conditions 1-15.



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97 NORTH STREET
APARTMENTS
7 NORTH STREET

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APARTMENTS

SITE PLAN

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Date	09/24/2024
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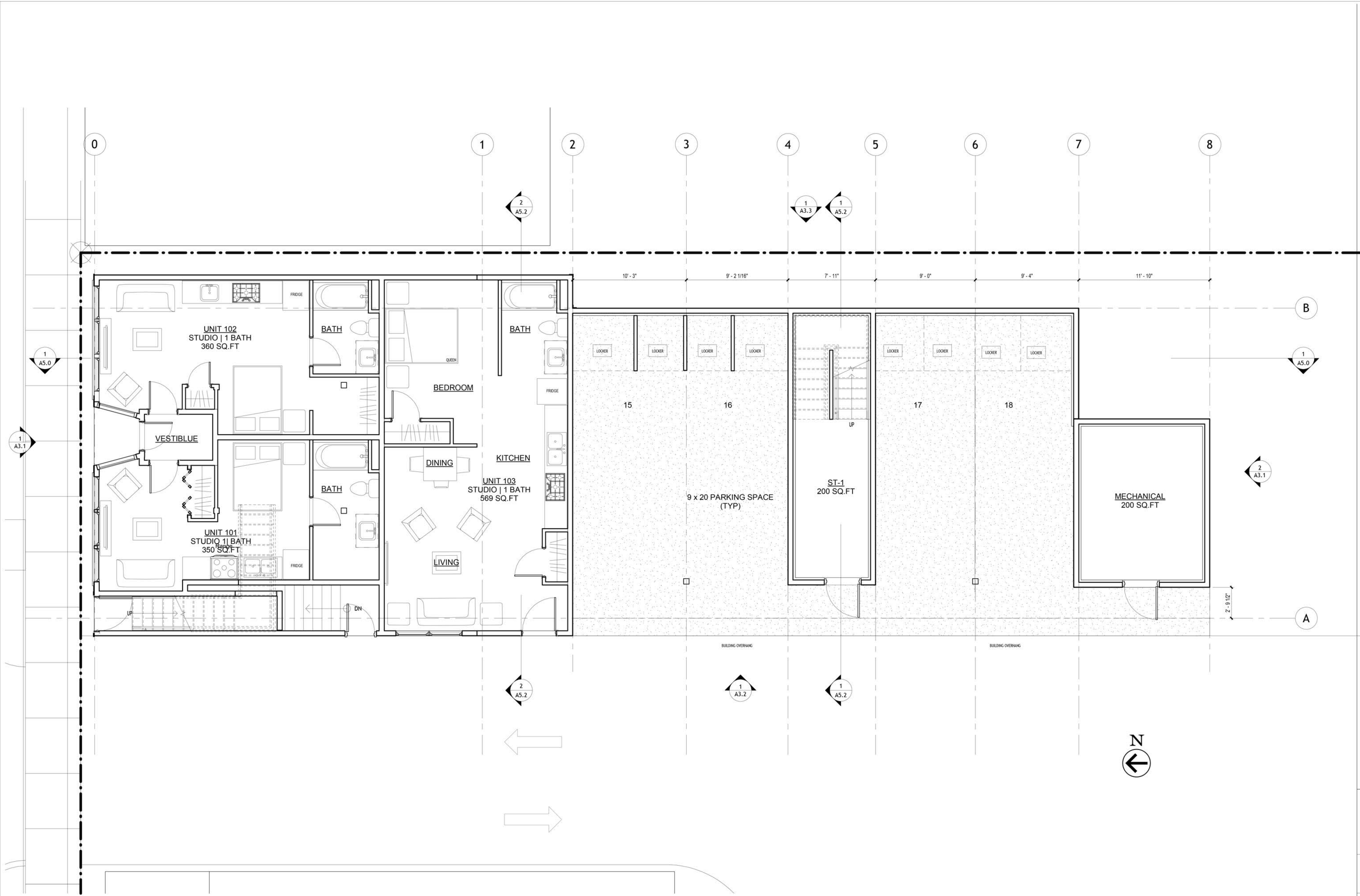
LANDSCAPE
PLAN

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ISSUED FOR DAB/DRB ZONING PERMIT





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APARTMENTS

87 NORTH STREET
BURLINGTON, VERMONT 05401

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No.	Description	Date
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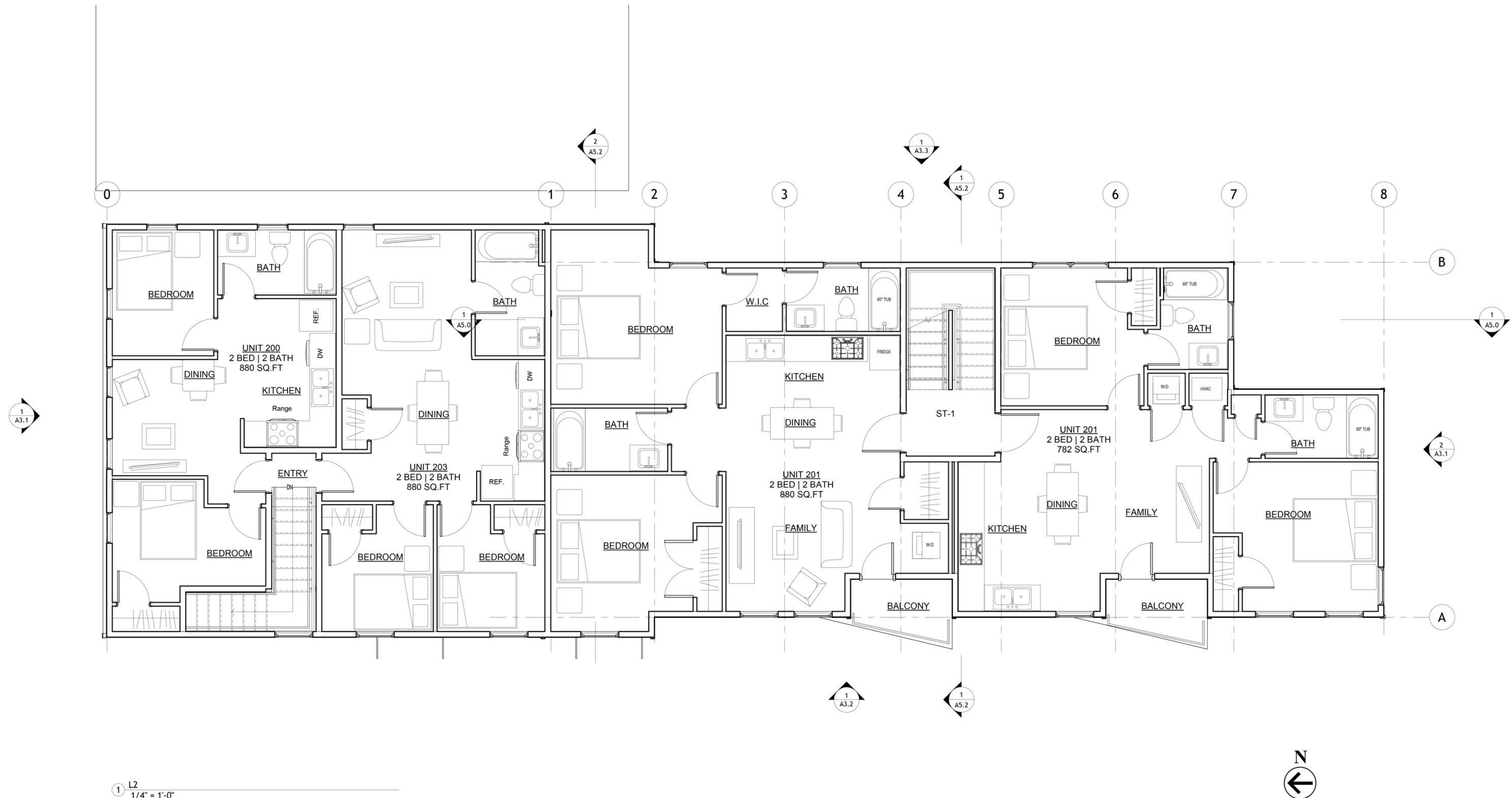
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PLANS

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93 NORTH STREET
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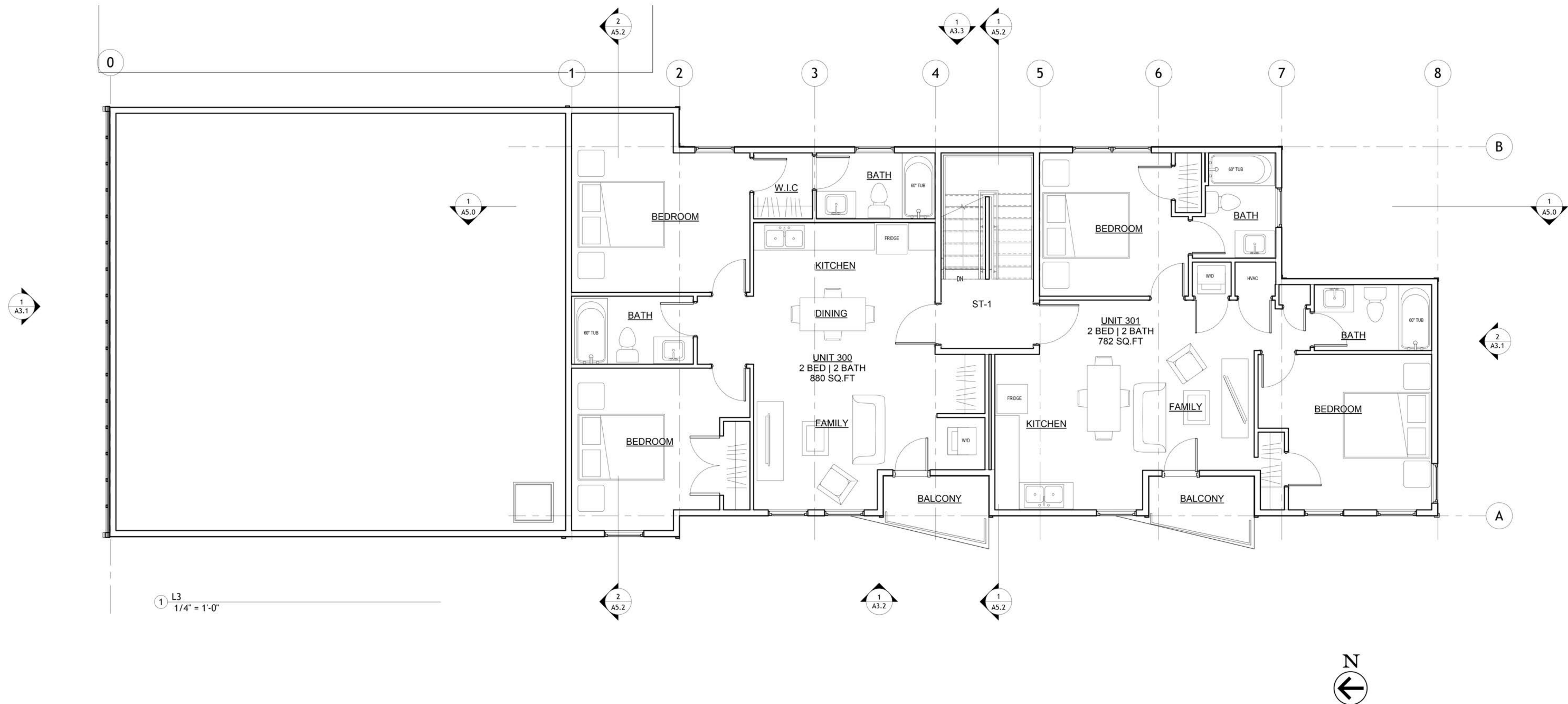
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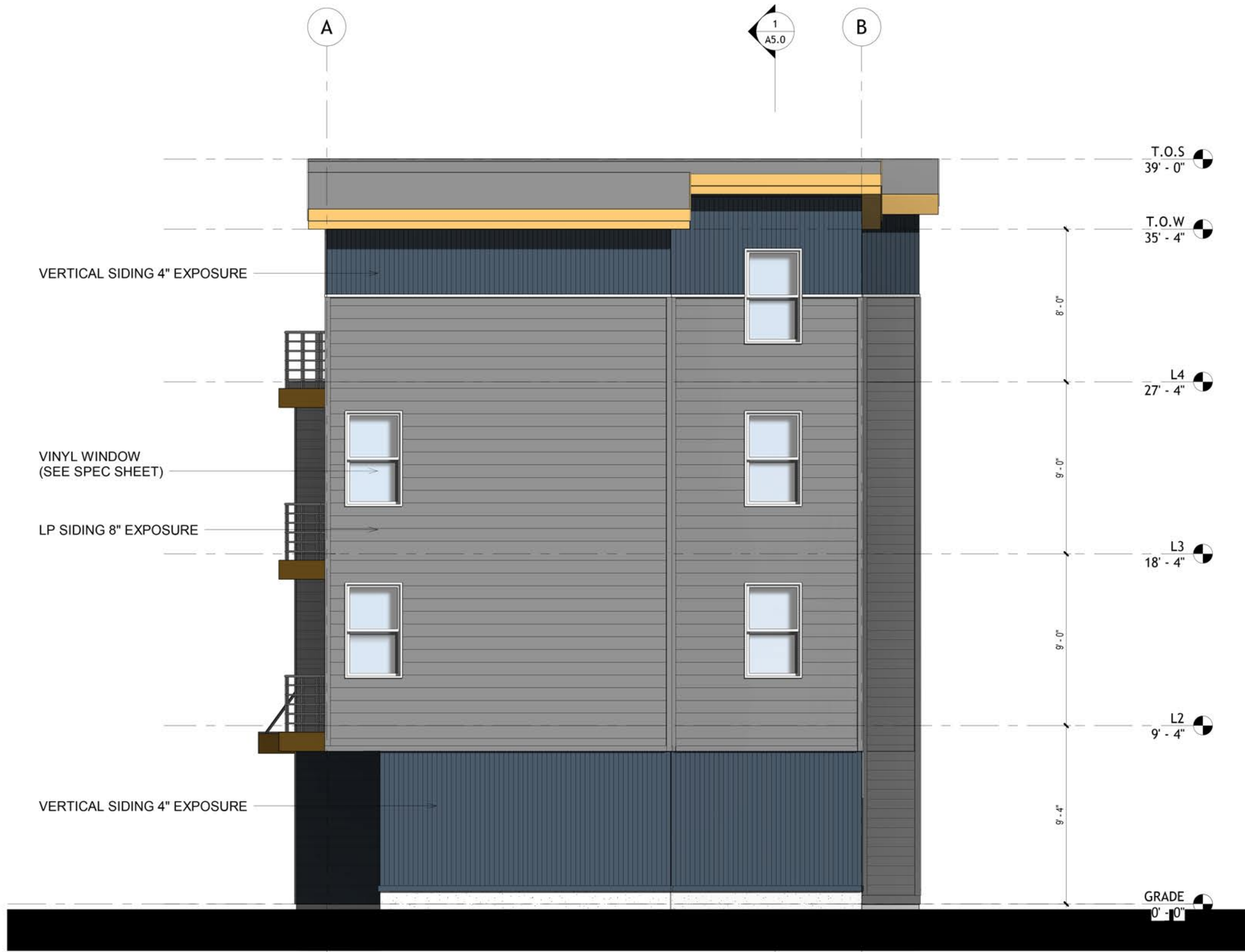
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2 SOUTH ELEVATION
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1 NORTH ELEVATION
1/4" = 1'-0"

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No.	Description	Date
1	SD/PERMIT	05/24

97 NORTH STREET

ELEVATIONS

Project number 2024 293
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1 WEST ELEVATION
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No.	Description	Date
1	SD/PERMIT	05/24

97 NORTH ST

ELEVATIONS

Project number	2024 293
Date	09/24/2024
Drawn by	Author
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ADVANCED DURABILITY FOR LONGER LASTING BEAUTY.®



ADVANCED DURABILITY FOR LONGER LASTING BEAUTY®

Siding plays a big role in a home's curb appeal. That's why LP® SmartSide® Trim & Siding is built to last and designed to make any home's design vision come to life. Because of its engineered wood strand technology and variety of textures, styles and colors, LP SmartSide products elevate any structure, from traditional homes to modern masterpieces. LP SmartSide products are also available in ExpertFinish® color to add another element of versatile design to your projects.

CEDAR

SMOOTH



CEDAR TEXTURE LAP



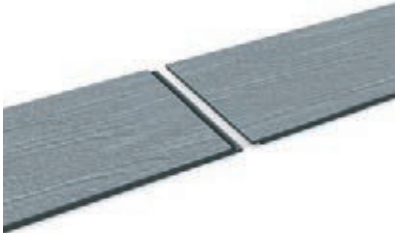
SMOOTH FINISH LAP



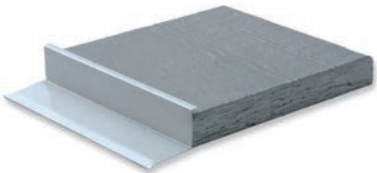
Featured: LP SmartSide ExpertFinish Cedar Texture Lap in Summit Blue, Trim & Fascia in Snowscape White

PREFINISHED COLOR FOR A CLEAN, POLISHED LOOK

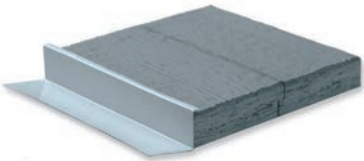
LP® SmartSide® ExpertFinish® Trim & Siding can take your vision to the next level with several exclusive products designed to add style and a clean finish to your home. Siding and trim in colors that pop can make your home stand out, while additional details create a polished look that'll last.



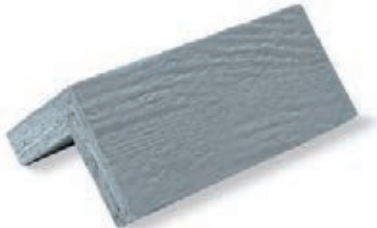
EXPERTFINISH LAP



J-BLOCK



MINI-SPLIT



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- 16’ length can result in faster installation
- May create fewer seams than traditional 12’ siding
- Pre-primed for exceptional paint adhesion
- Self-aligning SmartLock™ option eliminates the need to measure and set lap reveal; eliminating this step in the process is likely to speed up the installation process
- APA-certified lap siding
- Treated engineered wood strand substrate

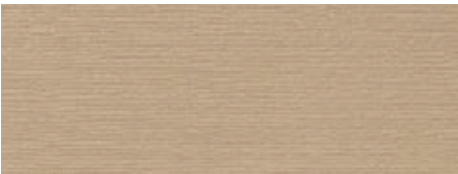


Cedar Texture

SMOOTH FINISH LAP

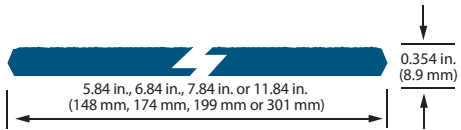
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- Holds up in extreme weather, including moisture, hail, freeze/thaw cycles, and up to 200 mph wind gusts
- Treated with the SmartGuard® process for superior protection against the weather, fungal decay and termites
- 16’ length can result in faster installation and fewer seams
- Pre-primed for exceptional paint adhesion
- Backed by an industry-leading 5/50-year limited warranty
- APA-certified lap siding
- Treated engineered wood strand substrate

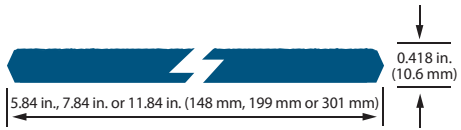


Smooth Finish

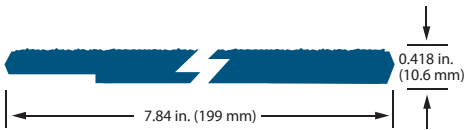
38 SERIES CEDAR TEXTURE LAP



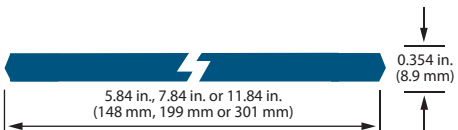
76 SERIES CEDAR TEXTURE LAP



76 SERIES SMARTLOCK CEDAR TEXTURE LAP



38 SERIES SMOOTH FINISH LAP



DESCRIPTION	LENGTH	ACTUAL WIDTH	THICKNESS	PID NUMBER	WEIGHT
38 Series Cedar Texture Lap	12 ft. (144 in.)(3.7 m)	7.84 in. (199 mm)	0.354 in. (8.9 mm)	28869	1.5 PSF
	16 ft. (192 in.)(4.9 m)	5.84 in. (148 mm)	0.354 in. (8.9 mm)	25796	1.5 PSF
	16 ft. (192 in.)(4.9 m)	6.84 in. (174 mm)	0.354 in. (8.9 mm)	40610	1.5 PSF
	16 ft. (192 in.)(4.9 m)	7.84 in. (199 mm)	0.354 in. (8.9 mm)	25797	1.5 PSF
	16 ft. (192 in.)(4.9 m)	11.84 in. (301 mm)	0.354 in. (8.9 mm)	25799	1.5 PSF
76 Series Cedar Texture Lap	16 ft. (192 in.)(4.9 m)	5.84 in. (148 mm)	0.418 in. (10.6 mm)	25785 (Discontinued)	1.5 PSF
	16 ft. (192 in.)(4.9 m)	7.84 in. (199 mm)	0.418 in. (10.6 mm)	25786	1.5 PSF
	16 ft. (192 in.)(4.9 m)	11.84 in. (301 mm)	0.418 in. (10.6 mm)	25787	1.5 PSF
76 Series SmartLock Cedar Texture Lap	16 ft. (192 in.)(4.9 m)	7.84 in. (199 mm)	0.418 in. (10.6 mm)	30317	1.5 PSF

DESCRIPTION	LENGTH	ACTUAL WIDTH	THICKNESS	PID NUMBER	WEIGHT
38 Series Smooth Finish Lap	16 ft. (192 in.)(4.9 m)	5.84 in. (148 mm)	0.354 in. (8.9 mm)	41338	1.5 PSF
	16 ft. (192 in.)(4.9 m)	7.84 in. (199 mm)	0.354 in. (8.9 mm)	41339	1.5 PSF
	16 ft. (192 in.)(4.9 m)	11.84 in. (301 mm)	0.354 in. (8.9 mm)	41340	1.5 PSF

WINDOW SPECIFICATIONS

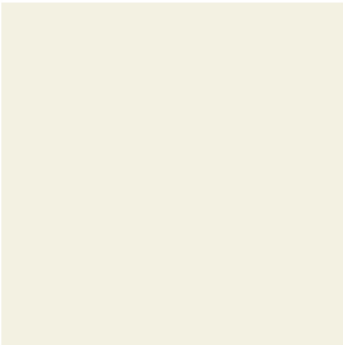


Elevate Double Hung

The Elevate® Double Hung window offers traditional style with superior strength. Tilt the sashes in or remove for easy cleaning. Style meets durability with a low-maintenance Ultrex® fiberglass exterior and warm wood interior.

- Wood interior and fiberglass exterior
- Fits openings up to 4.5' wide by 7' high
- Low-profile, easy-to-operate locking mechanism
- Insert replacement option available to fit seamlessly into existing window openings

Exterior Finish



Stone White

A strong alternative to vinyl, our Ultrex® pultruded fiberglass exterior finish is applied through a patented process to provide a superior, consistent finish. The American Architectural Manufacturers Association (AAMA) awards certifications to materials that pass numerous, rigorous tests. These tests simulate the harsh conditions that a finish will encounter throughout the life of the window or door. Passing these specification tests and achieving AAMA 624 verification gives independent verification that the Ultrex finish is best in class among fiberglass products.

Built for durability and low-maintenance, our Ultrex finish is 3x thicker than competitive finishes, with a smooth consistency and strong finish that resists fading, chalking, peeling and cracking, even in the darkest colors. If a design change calls for a new color down the road, our material can be painted without voiding our warranty. Six colors are available in neutral and dark tones.

Selected: Stone White

Interior Finish

The Elevate collection features rich wood interiors in bare pine that can be stained to match your interiors, or finished in our factory with popular designer black painted interior finish, clear coat, or painted white. Factory finishing means you can expect consistent quality and aesthetics that come from our carefully-perfected finishing process.



Painted White

Selected: Painted White

Exterior Trim



Brick Mould

Get the performance of Ultrex® fiberglass in convenient, factory-cut exterior trim made for easy installation and superior performance over time. Exterior trim is available in colors to match our exterior window finish, and several trim styles. Choose flat-style for a clean, simple look or brick mold-style for a more traditional aesthetic.

Selected: Brick Mould

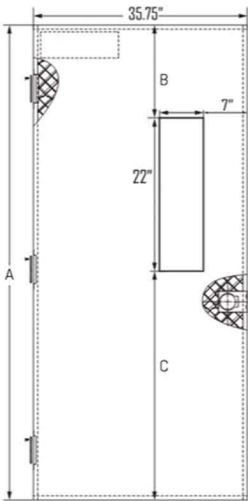
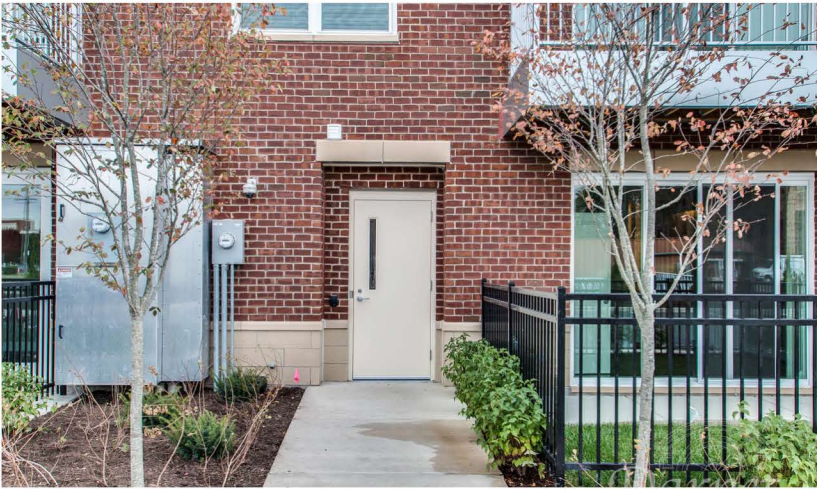
HOLLOW METAL DOOR WITH NARROW VISION LITE

36 in. x 80 in. Gray Flush Exit with 5x20 VL Left-Hand Fireproof Steel Prehung Commercial Door with Welded Frame

★★★★★ (15) Questions & Answers (22)



Hover Image to Zoom



Actual Door Height (in.)	79 in	Actual Door Thickness (in.)	1.75
Actual Door Width (in.)	35.75 in	Door Height (in.)	80 in
Door Width (in.)	35.75 in	Nominal Door Height (in.)	80 in
Nominal Door Thickness (in.)	2 in	Nominal Door Width (in.)	36 in
Rough Opening Height (in.)	86.25 in	Rough Opening Width (in.)	40.25 in

Details

Bore Type	Single Bore	Color Family	Steel
Color/Finish	GRAY	Commercial	Yes
Door Configuration	Single Door	Door Depth (in.)	1.75 in
Door Handing	Left Hand/Outswing	Door Type	Exterior Prehung
Features	No Additional Features	Finish Type	Primed
Frame Material	Steel	Hinge Finish	Chrome
Hinge Type	Spring	Included	Lockset
Material	Steel	Number of Hinges	3
Product Weight (lb.)	125 lb	Returnable	90-Day



Unit and Rough Opening Sizing

Dimensional
Data

Single or M.E.U. - 6/6, 6/8, 7/0, 8/0

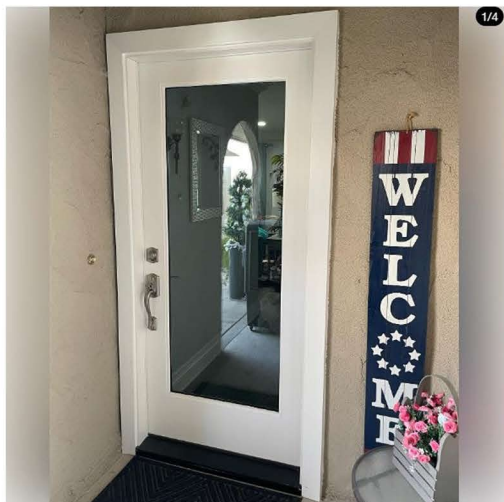
Single or M.E.U. - Inswing

Brickmould Dim.	28 1/8"	32 1/8"	34 1/8"	36 1/8"	38 1/8"	40 1/8"	46 1/8"	
Rough Opening	26 3/8"	30 3/8"	32 3/8"	34 3/8"	36 3/8"	38 3/8"	44 3/8"	
Unit Dimension	25 5/8"	29 5/8"	31 5/8"	33 5/8"	35 5/8"	37 5/8"	43 5/8"	
80 3/4"	80"	80"	80"	80"	80"	80"	80"	79 1/2"
83 1/4"	82 1/2"	82"	82"	82"	82"	82"	82"	81 3/4"
87 1/4"	86 1/2"	86"	86"	86"	86"	86"	86"	85 3/4"
99 1/4"	98 1/2"	98"	98"	98"	98"	98"	98"	97 3/4"
6/6	2/0	2/4	2/6	2/8	2/10	3/0	3/6	78 5/8"
6/8	2/0	2/4	2/6	2/8	2/10	3/0	3/6	80 5/8"
7/0	2/0	2/4	2/6	2/8	2/10	3/0	3/6	84 5/8"
8/0	2/0	2/4	2/6	2/8	2/10	3/0	3/6	96 5/8"
	25 5/8"	29 5/8"	31 5/8"	33 5/8"	35 5/8"	37 5/8"	43 5/8"	Unit Dim.
	26 3/8"	30 3/8"	32 3/8"	34 3/8"	36 3/8"	38 3/8"	44 3/8"	Rough Opening
	28 5/8"	32 5/8"	34 5/8"	36 5/8"	38 5/8"	40 5/8"	46 5/8"	Brickmould Dim.
								Aluminum Composite
								Aluminum Composite
								Aluminum Composite
								Aluminum Composite

*For M.E.U., add actual unit dimension to door rough opening width for total rough opening width.

For units with public access sills, subtract 1" from inswing height. Unit widths will be the same as in the table above.

Single or M.E.U. - Outswing



1/4

J

@JZWINDOWSDOORS

SHOP THIS LOOK



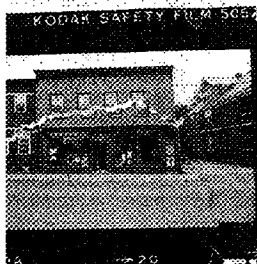
Smooth-Star®











STATE OF VERMONT
Division for Historic Preservation
Rutland, VT 05602

HISTORIC SITES & STRUCTURES SURVEY
Individual Structure Survey Form

COUNTY:	Chittenden
TOWN:	Burlington
LOCATION:	95-97 North St.
COMMON NAME:	
FUNCTIONAL TYPE:	dwelling
OWNER:	Francis A. & Martha J. Jacques
ADDRESS:	
ACCESSIBILITY TO PUBLIC:	Yes ☐ No ☒ Restricted ☐
LEVEL OF SIGNIFICANCE:	Local ☒ State ☐ National ☐

GENERAL DESCRIPTION:

Structural System

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 ☐
 - c. Iron ☐ d. Steel ☐ e. Other:
3. Wall Covering: Clapboard ☐ Board & Batten ☐ Wood Shingle ☐ Shiplap ☐ Novelty ☐ Asbestos Shingle ☐ Sheet Metal ☐ Aluminum ☐ Asphalt Shingle ☒ 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:

Appendages: Porches ☒ Towers ☐ Cupolas ☐ Dormers ☐ Chimneys ☒
Sheds ☐ Ells ☒ Wings ☐ Bay Window ☐ Other:
Roof Style: Gable ☐ Hip ☐ Shed ☐ Flat ☒ Mansard ☐ Gambrel ☐
Jerkinhead ☐ Saw Tooth ☐ With Monitor ☐ With Bellcast ☐
With Parapet ☐ With False Front ☐ Other:

Number of Stories: 2

Number of Bays: 4

Approximate Dimensions:

SURVEY NUMBER:

NEGATIVE FILE NUMBER:

78-A-167
UTM REFERENCES:
Zone/Easting/Northing

U.S.G.S. QUAD. MAP:

PRESENT FORMAL NAME:

ORIGINAL FORMAL NAME:

Vandewater Creamery
PRESENT USE: store/apartment
ORIGINAL USE: store/apartment

ARCHITECT/ENGINEER:

BUILDER/CONTRACTOR:

PHYSICAL CONDITION OF STRUCTURE:

Excellent ☐ Good ☐
Fair ☒ Poor ☐

STYLE: Queen Anne Commercial

DATE BUILT: c. 1895 (1889-1894)

THREAT TO STRUCTURE:

No Threat ☐ Zoning ☐ Roads ☐
Development ☐ Deterioration ☐
Alteration ☐ Other:

LOCAL ATTITUDES:

Positive ☐ Negative ☐
Mixed ☐ Other:

ADDITIONAL ARCHITECTURAL OR STRUCTURAL DESCRIPTION:

Massing - rectangular block with rear ell. Modillian, cornice divides first and second floors. Projecting cornice.

Fenestration - 2/2 sash, plain surround. 2 large store front windows.

Entrance - center, with transom light. Modern metal door.

Enrichments - small brackets spaced between larger ones at cornice.

RELATED STRUCTURES: (Describe)

STATEMENT OF SIGNIFICANCE:

This building dates from the hey day of North Street commercial activity. The flat roofed, bracketed, frame, commercial building is typical of many such structures built in Burlington's North End at the end of the 19th century. Particularly outstanding are the large plate glass windows and bracketed cornice. Built in the 1890's, the first record of its use, in 1900, shows that the commercial space on the first floor was used by Willis Vandewater for a creamery, and a laborer and a shoemaker rented residential apartments upstairs. It is a classic example of an, inexpensive, multi-use real estate investment.

REFERENCES:

Sanborns, directories

MAP: (Indicate North in Circle)



SURROUNDING ENVIRONMENT:

Open Land ☐ Woodland ☐
Scattered Buildings ☐
Moderately Built Up ☐
Densely Built Up ☒
Residential ☒ Commercial ☒
Agricultural ☐ Industrial ☐
Roadside Strip Development ☐
Other:

RECORDED BY:

C. Richard Morsbach

ORGANIZATION:

VT. Div. for Historic Preservation

DATE RECORDED:

7/7/78

DEVELOPMENT REVIEW BOARD

January - December 2025

Adopted Dec 17, 2024

Regularly Scheduled Meetings - 1st and 3rd Tuesdays

Date of Meeting	Day of Week	Time	Location	PH Deadline - Wed 4pm	COA Deadline - Wed 4pm
January 7, 2025	Tuesday	5:00 PM	DPI Conference Room	December 11, 2024	December 18, 2024
January 21, 2025	Tuesday	5:00 PM	DPI Conference Room	December 26, 2024	January 2, 2025
February 4, 2025	Tuesday	5:00 PM	DPI Conference Room	January 8, 2025	January 15, 2025
February 18, 2025	Tuesday	5:00 PM	DPI Conference Room	January 22, 2025	January 29, 2025
March 5, 2025	Wednesday	5:00 PM	DPI Conference Room	February 6, 2025	February 13, 2025
March 18, 2025	Tuesday	5:00 PM	DPI Conference Room	February 19, 2025	February 26, 2025
April 1, 2025	Tuesday	5:00 PM	DPI Conference Room	March 5, 2025	March 12, 2025
April 15, 2025	Tuesday	5:00 PM	DPI Conference Room	March 19, 2025	March 26, 2025
May 6, 2025	Tuesday	5:00 PM	DPI Conference Room	April 9, 2025	April 16, 2025
May 20, 2025	Tuesday	5:00 PM	DPI Conference Room	April 23, 2025	April 30, 2025
June 3, 2025	Tuesday	5:00 PM	DPI Conference Room	May 7, 2025	May 14, 2025
June 17, 2025	Tuesday	5:00 PM	DPI Conference Room	May 21, 2025	May 28, 2025
July 1, 2025	Tuesday	5:00 PM	DPI Conference Room	June 4, 2025	June 11, 2025
July 15, 2025	Tuesday	5:00 PM	DPI Conference Room	June 18, 2025	June 25, 2025
August 5, 2025	Tuesday	5:00 PM	DPI Conference Room	July 9, 2025	July 16, 2025
August 19, 2025	Tuesday	5:00 PM	DPI Conference Room	July 23, 2025	July 30, 2025
September 2, 2025	Tuesday	5:00 PM	DPI Conference Room	August 6, 2025	August 13, 2025
September 16, 2025	Tuesday	5:00 PM	DPI Conference Room	August 20, 2025	August 27, 2025
October 7, 2025	Tuesday	5:00 PM	DPI Conference Room	September 10, 2025	September 17, 2025
October 21, 2025	Tuesday	5:00 PM	DPI Conference Room	September 24, 2025	October 1, 2025
November 4, 2025	Tuesday	5:00 PM	DPI Conference Room	October 8, 2025	October 15, 2025
November 18, 2025	Tuesday	5:00 PM	DPI Conference Room	October 22, 2025	October 29, 2025
December 2, 2025	Tuesday	5:00 PM	DPI Conference Room	November 5, 2025	November 12, 2025
December 16, 2025	Tuesday	5:00 PM	DPI Conference Room	November 19, 2025	November 26, 2025

Please note: The public hearing deadline and submission deadline are the last date that an application can be received to be eligible for inclusion on the scheduled meeting, but inclusion is not guaranteed. If the application is deemed incomplete, it will not be scheduled for a DRB meeting until the application is complete.

If the DRB Meeting already has too many items it may be closed earlier than the public hearing or COA application deadlines and any items received will be scheduled for the following meeting. The final items for the meeting agenda may still be amended after the application date by Zoning staff.

Date adjustment for Town Meeting Day.