Fair Haven Factory Repurposing Feasibility Study

Prepared for the Town of Fair Haven, Vermont

By

I-OSC, LLC

Intelligent
Off-Site
Construction

I-OSC, LLC

Intelligent
Off-Site
Construction

December 4, 2025

Mr. Joe Gunter
Town Manager
Town of Fair Haven, VT
5 North Park Place
Fair Haven VT 05743

RE: Feasibility Study for Re-purposing the Former Skyline Manufactured Housing Factory

Dear Bill:

Pursuant to the Town of Fair Haven's August 2024 "Request for Proposals" under a state grant, award to I-OSC, LLC in October 2024, and consummation of a consulting contract in April, 2025, I-OSC is pleased to submit the accompanying feasibility study as part of that contract.

Sincerely,

Principle
I-OSC, LLC
887 N. High Point Road
Madison, WI 53717
P. 608.556.5166
E. guequierre.j@i-osc.com

Table of Contents

Section	Topic	Page
1	Cover	1
2	I-OSC Letter to Town of Fair Haven	2
3	Table of Contents	3
3	Mission	5
4	Executive Summary	5
6	Property and Structures	6
6a	Brief History	6
6b	Property	6
6c	Structures	7
6d	Condition of Structures	8
6e	Current Equipping	8
7	The Product to be Manufactured	9
7a	Overall Market	9
7b	Targeted Housing Type	9
7c	Modular Product General Specifications	9
7d	Targeted Volume	10
7e	Product Alternatives	10
7f	Product Design Details, Regulatory Design Approval, and Coordination with Site-Work Bidding and Contracting	11
7g	Multi-Family Scope-of-Work at Site	12
8	Required Investment	13
8a	General	13
8b	Facility Acquisition	13
8c	Building and Grounds Improvements	13
8d	Equipping	14
8e	Grant, Loan and Subsidy Opportunities	15
9	Regulatory Environment for the Target Product	16
10	Workforce Availability	17
11	Public Infrastructure	17
12	Financial Viability	18
12a	Modeling	18
12a	Revenue, Expenses and Working Capital	18
12b	EBITDA and Working Capital Model Results	19
12c	Implications of the Model	19
13	Conclusion – The Project is Viable	19
14	Next Steps	20
15	Exhibits	
15a	Arial View with Property Outline	A
15b	Current Building Layout	B
15c	Vermont and New England Housing Demand	C
15d	Product Examples	D

15e	Capital Budget	E
15f	Appraisal	F
15g	LN Consulting Energy Study	G
15h	Naylor and Breen Thermal Envelope Upgrade Cost Estimate	H
15i	Marble Valley Engineering 2018 Structural Analysis	I
15j	Suggested Modular Factory Layout	J
15k	Station by Station Modular Process	K
15l	Subsidy and Grant Programs	L
15m	Financial Model Assumptions	M
15n	Financial Model Results	N

Mission:

The purpose of this study is to determine the feasibility of re-purposing the former Skyline manufactured housing factory in Fair Haven, VT as a manufacturing facility for volumetric modules to be incorporated in multi-family housing developments of up to four stories using wood framing.

Executive Summary

The Skyline property, now owned and operated by an affiliate of Camara Slate, consists of a 90,479 square foot manufacturing plant and adjoining offices situated on a 13.7-acre parcel on the south side of Fair Haven, VT. Built in 1971, it remains in fairly good condition. Importantly, when Skyline closed the operation in 2011, it did not remove the crane rails and bridges, which could be used in a new manufacturing operation at considerable savings in equipping investment.

The Skyline factory design was revolutionary at the time, and similar layouts can be found around the United States and Canada still productively supporting not only manufactured housing operations but also a range of modular housing types. Given current Vermont and New England housing needs and development economics, the factory layout could accommodate multi-family volumetric modular manufacturing at a volume of at least two to three modules per day which could translate into ten to twenty apartment or condominium buildings per year. The plant design is also flexible enough to accommodate other forms of prefabricated housing, providing additional confidence that a profitable volume can be sustained through economic cycles and changing housing needs. This study notes some of the differentiating aspects of the multi-family modular housing market and the resulting desirable capabilities of a future operator.

The Town of Fair Haven has negotiated a lease/purchase option for the property based on a fair market value. This study commissioned an appraisal that arrived at a fair market value of $2.15 million and a market rate annual rental value of $221,674.

This study commissioned a detailed energy modeling of the current building and then developed cost estimates to improve the thermal envelope, replace the current propane-fueled HVAC system with a geothermal-based system, and accommodate a roof-top solar array. The estimated total cost of $7.0 million does not reflect general contractor costs and fees or any of the grants and incentives that are available for such investments. Based on a 2018 engineering analysis, this study also recommends that an eventual operator conduct a thorough analysis to determine what, if any, structural improvements are necessary to accommodate additional roof insulation, a solar array, and the live loads of a re-activated crane system. The total estimate for building improvements, again excluding any grants or incentives, is $10.6 million.

This study also developed a general factory layout for the targeted product and an associated manufacturing process. The layout and process were utilized to derive a cost estimate for re-equipping the plant of $3.3 million.

This study concludes that the regulatory environment for approval and inspection of factory-built multi-family modules is favorable in both Vermont and the rest of New England. It further concludes that workforce availability will support the anticipated third-year employment projection of 100.

This study developed a financial model based on multi-family market characteristics, the tentative factory layout and process. The model produced quarterly estimates of revenue, earnings before interest, taxes, depreciation and amortization (EBITDA) and working capital requirements for three years. A first year EBITDA loss of $1.6 million evolved to a third year positive $20.0 million. Working capital requirements reached a stable $10.8 million.

Considering all of the above conditions and factors, this study concludes that re-purposing and re-developing the Skyline property as a multi-family modular manufacturing operation is practically and financially feasible.

If the Town of Fair Haven finds this study persuasive the next step will be to prepare a "Request for Proposals" to be published to likely factory operators. Also, it should be determined whether title should be acquired and transferred to an eventual operator or the Chamber and Community Development of the Rutland Region should acquire the property and lease it to an operator.

Property and Structures

Brief History

Skyline Corporation, then a publicly owned corporation dedicated to manufacturing recreational vehicles and manufactured homes (once called mobile homes), built its New England manufactured housing factory in 1971. Skyline followed a standard design which it replicated throughout the United States, a design which was revolutionary at the time, a bay for subassembly and another for main assembly, where the individual home sections progressed down the assembly line side-by-side rather than end-to-end. So productive was the design that nearly all modular and manufactured housing factories of under 200,000 square feet built since then follow the same basic flow. As the industry began offering more variety in materials, Skyline added material storage structures.

The industry endured a major contraction beginning in 1999. Skyline closed multiple factories but continued to operate its Fair Haven plant. Over the next decade, there was a major consolidation in the industry, with a few large national companies and a scattering of independents surviving, Skyline merged with Champion Homebuilders. Since there was an overlap in markets, the merged Skyline-Champion chose to close the Fair Haven factory in 2011 and concentrate production in its Sangerfield, NY, facility.

In 2013, the property was purchased by Yorktown Properties, an affiliate of Camara Slate, which operates on the property adjoining on the next lot south along S. Main Street. Camara uses a small part of the main Skyline factory for slate processing, packaging, and shipping and stores a significant amount of slate inventory on the paved portion of the Skyline factory. Other partial uses most notably include a cannabis-raising operation. There is vehicle storage and two tracks for racing remote-controlled model cars as a community event.

Recognizing that re-opening the Skyline factory to again produce housing could be one solution to Vermont's and New England's housing shortage, the Town of Fair Haven with support from the state, Vermont Low Income Trust of Energy, and VEIC/Efficiency Vermont, approached the Camara family, and negotiated a lease/purchase option for the facility in January 2025.

Property

The address of the property is 875 S Main Street, Fair Haven, VT. It is a 13.7-acre L-shaped parcel (Exhibit A). A roughly rectangular segment of approximately 9.7 acres has 600 feet of frontage on Main Steet and contains the main factory structure and appurtenances. Approximately 5 acres are paved.

The other segment is undeveloped and lies behind the neighboring property to the north. Camara Slate has used the parcel for disposing of slate processing waste.

As noted above, the property to the south is Camara Slate. The property to the north is Revive Church. To the west is an extensive cedar swamp. The property across Main Street to the east is undeveloped and forested. The parcel is relatively flat with stormwater flow into a surrounding swale on the east and south. Fair Haven water and sewer serve the property.

<u>Structures</u>
The original 1971 main manufacturing structure is of concrete masonry units with a 20-foot ceiling height. This main building is 450 feet by 170 ft (76,500 square feet outside dimensions) with its long axis running east-west. There is a central line of steel columns supporting steel beams. The roof is framed with conventional steel bar joists bearing on the center column line and beams and the north and south exterior CMU walls. The ceiling consists of B-decking, and conventional built-up roofing. The central column line divides the building into two 85-foot by 450 foot clear-span bays. From west to east, center column line spacing is two of 25 feet followed by 20 of 20 feet. The western 50 feet of the building is separated from the balance of the building by a framed wall. The floor is a flat poured concrete slab. The eastern 40 feet is raised to a height that would roughly match the floor height of the manufactured homes on their permanent steel chassis. Also on this raised portion is a two-story wood-framed production office structure. There are seven overhead doors of various sizes, including two standard truck dock doors.

Also, originally built in 1971 are a brick veneer administrative sales office of 3,250 square feet and a employee cafeteria and break room of 2,886 square feet at the southwestern corner of the main manufacturing building. Framing of interior partitions was not observed but is likely conventional wood framing.

Other 1971 features include a 936 square foot lean-to of pole-barn and metal siding construction on the south wall of the main building and a 772 square foot CMU structure on the north wall of the main building.

As material needs changed, Skyline added a 9,360 square foot warehouse abutting the north wall of the main building with access to the main building through one of the original overhead doors. The warehouse is of a combined CMU and steel framing with overhead doors on the north and south elevations. Also added in later years, probably at the insistence of property insurers, is a 320 square foot CMU room attached to the west wall of the main building and originally housing an air compressor.

There are multiple canopies attached to the north, west, and east walls of the main building originally intended to provide partial protection to materials stored outdoors. Most notable is the 153 foot by 14 foot canopy attached to the west wall of the main building.

Exhibit B is a current layout of the building commissioned by I-OSC.

Paved areas are primarily asphalt or gravel.

Condition of Structures
Well-maintained for fifty years, the buildings remains structurally sound and would benefit from energy efficiency improvements. The current owner re-purposed the office and cafeteria to house its immigrant workforce. They may need to be substantially refitted to again serve their original purpose. Overhead doors may eventually need to be replaced. Some paving needs to be replaced.

Current Equipping

The main building is heated with multiple propane fueled heating units mounted on walls or roof framing. The main building is not air-conditioned, but wall and ceiling fans provide some air circulation. We are advised that the administrative office and employee cafeteria are heated and air-conditioned with conventional appliances.

The main electrical panel, probably original, provides 3-phase 800-amp service. The current owner replaced the original halogen lighting fixtures in the main building with motion sensing LED lighting which provides a relatively bright workplace. However, the energy consultant engaged by I-OSC verbally suggested that some additional lighting may be helpful. There are numerous power drops for equipment.

We are advised that the sprinkler system remains operative and is regularly tested.

Skyline, like most off-site manufacturing facilities, used pneumatic nailing, stapling, and screwing tools. The air compressor has been removed and stored outside. Its condition is suspect. The piping for the compressed air system with drops and fittings appears to be largely in place.

Skyline, again like most off-site manufacturing facilities, built subassemblies like floors, walls, and roofs on various tables and jigs. The current owner removed them, and sections of the steel skeletons are stored outdoors in what manufacturers often refer to as a “bone yard”. It is very likely that a new off-site manufacturer could re-animate some of this material significantly reducing capital needs.

Of greatest potential benefit to a future operator is the presence of major portions of Skyline’s installed crane system for lifting and positioning major subassemblies. When Skyline decommissioned the plant it removed the hoists, hoist controls, and lifting beams. The crane rails and bridges remain in place. Only a few sections have been removed. As will be explained later in this study, a workable layout for manufacturing the targeted multi-family modular product can use this existing crane infrastructure with relatively little modification. VEIC and I-OSC obtained a review of this infrastructure and likely cost of re-activation from an expert local rigger. As will be noted later, the likely investment to use this critical system will be dramatically less than installing a new system.

Currently installed slate processing equipment and the elaborate hydroponic systems for cannabis growing and processing will be removed by the current owner.

The product to be manufactured

Overall market

Overall demand in New England and neighboring New York has been well-researched. The current level of unfulfilled demand is so dramatic that it will not be treated in this study. Exhibit C contains links to state-by-state studies of demand.

Targeted housing type

This study focuses on the feasibility of re-purposing the Skyline facility for multi-family structures of two to four stories and 3 to 60 living units, which would generally translate into 6 to 120 individual modules. This is a category often referred to as “missing middle”, fitting between single-family homes and taller apartment buildings that require steel, concrete, or mass timber framing. Nevertheless, this targeted category is a good fit for the economic and financial conditions that accommodate workforce and affordable housing, especially the typical qualifications for tax credits and state and local support.

The availability of off-site manufacturing capacity in New England is limited. Modular manufacturing is long-established in New England and the Mid-Atlantic states but is focused on single-family housing. The established business model for those established firms limits their ability to devote significant capacity to multi-family projects. Quebec has been an important source of multi-family housing modules, but supply has become unreliable. Canada’s own shortage of housing has become their priority and recent trade relations have not been helpful.

On going contacts between VEIC (a partner in this study) and a range of developers of this category of housing provides considerable confidence that there is a sustainable pipeline of projects to support a profitable level of operations of a facility of the Fair Haven plant’s capacity. This is important. Historically, demand for off-site construction has fluctuated wildly and dramatically, resulting in seasonal and cyclical layoffs. In today’s tight labor markets, the inability of a firm to demonstrate stable employment is a significant obstacle to building a competent and productive workforce. A goal of VEIC and partners is to facilitate the accumulation of one or more years of projects for consideration by a likely operator of the plant.

Modular Product General Specifications

Skyline designed the facility to build modules up to 16 feet wide (with all appurtenances) and up to 76 feet long and up to 14 ft 6 in high (inclusive of 30 inches for a chassis or modular carrier). The logic was straightforward. The cost of trucking permits, routing, and equipping climbs steeply beyond those dimensions. The modular dimensions required for the targeted market are less than the constraints of the plant. The designs reviewed as part of this study range from 12ft to 15ft wide and from 30ft to 70ft long. In developing a financial model to test economic viability, this study used a standardized module of 13ft 9in by 64ft with an 8 ft ceiling height. The large clear spans in this facility accommodate pairing up shorter modules on the assembly line.

To better illustrate the desired product offering, plans and renderings of several examples are included in Appendix D by permission of the designers, GreenStaxx of Cambridge, MA. Note that the module dimensions are all accommodated by the factory layout.

The targeted building dimensions can be accommodated with conventional wood framing. Mechanical systems and envelope specifications are assumed to satisfy EPA’s ENERGY STAR, DOE’s Zero Energy Ready Homes, and other standards for maximum energy efficiency. Interior finish would be conventional drywall, possibly finished and painted in the field or partially finished in the factory. For larger structures, siding and finished roofing are typically completed at the building site. This study assumes that initially cabinetry will be purchased knocked down and assembled at the plant but purchase of finished box cabinets or use of some space to manufacture cabinets is possible. Finished flooring can be partially installed in the factory, although it is often installed at the site for multi-family housing. Some or all appliances, heating, and cooling equipment may be installed, as well as standard plumbing fixtures. Light fixtures and low-voltage fixtures may be installed in the plant, depending on project and contract requirements. The numerous connections between modules in a multi-family structure consisting of many modules means that exterior and interior finishes must be completed in the field. The costs of bringing those trades to the jobsite often means that it is more economical to apply those finishes in the field rather than partially install them in the factory. The decision tends to be design and project specific.

The component materials described above are common building materials. They are therefore readily available from Vermont and New England distributors of building materials. There are some distributors who specialize in the just-in-time and stocking methods typical of modular manufacturing. They exist regionally.

Targeted Volume

Based on these market assessments and on financial analysis presented later in this report, this facility, when properly equipped, should be able to achieve profitability in the multi-family market at an average production rate of two to three modules per day. Assuming a 240 work-day year, that's 480 to 720 modules per year which might translate into anywhere from 10 to 20 multi-family buildings per year, depending on their size. The original Skyline operation was probably capable of producing at a rate of 8 to 10 manufactured home sections per day. Those early designs were much less labor intensive than the targeted products discussed here.

Even so, the plant is probably capable, if a sufficient labor force can be recruited, of producing as many as 5 or 6 modules per day.

This may be a good point to address the question of whether the Fair Haven facility could accommodate advanced robotics and automation. Some limited robotics for floor or wall panel assembly could be accommodated. There has been much news coverage of west coast facilities with truly impressive levels of automation. However, the Autovol plant in Nampa, Idaho is about 700,000 square feet and the VBC plant in Tracy, California is about 600,000 square feet. That's the size required to amortize the investment in advanced automation. Whether they can ultimately sustain the required production volume and retain the core of automation specialists remains somewhat uncertain. The Fair Haven facility, requiring a far smaller investment, can have a positive impact on the housing shortage in Vermont and New England while achieving profitability at a modest volume.

Product Alternatives

As noted above, it appears that the factory could be opened and brought to profitable capacity while limiting its offering to the above specifications. Over the past two decades it has been demonstrated that this factory configuration can be easily adpated for other products and specifications or even to mix multiple product and specification types. Such flexibility is an advantage. Mixing products hurts productivity, but stability of the workforce is usually a priority.

The plant will be capable of producing single-family and commercial structures. The plant could produce products framed with light-gauge steel. In fact, the availability of modern affordable compact and automated rolling mills means the factory could roll its own floor, wall, and roof components in the exact sequence of assembly. At this date it is unclear whether modules incorporating mass timber and mass plywood can be mixed with other specifications but is theoretically possible.

Modular factories focused on multi-family products often include panelized components for those sections of the building not easily designed as modules. The Skyline factory has the capacity and capability to do so. In fact, Devoting the entire factory to panels is a possibility, although contributing less to speed of construction and cost savings.

The ability to mix modular structures and manufactured homes on the same line as well as a mixture of single-family, multi-family, and commercial structures has been proven possible, albeit not as profitable as a more constrained offering.

Product Design Details, Regulatory Design Approval, and Coordination with Site-Work Bidding and Contracting

Offsite construction, and especially modular construction, presents the promise of some savings in total construction cost but especially in an accelerated pace of construction with less exposure to today's chronic shortages of on-site labor. Reaping those advantages requires more than a successful modular manufacturer. The developer, architects, engineers, general contractors, and on-site subcontractors all need to be attuned to the unique characteristics of off-site construction, which differ from conventional construction.

There are two design approval authorities involved in a modular project. In most of the US and Canada, the states and provinces have reserved to themselves a preemptive authority to approve the design of what is built in the factory. Local municipalities retain the right to regulate zoning, site conditions, and portions of the structure built on-site. Historically, modular manufacturers developed a gallery of single-family home designs, and a few duplex and townhome designs with plans and specifications fine-tuned for optimal efficiency. They could then obtain state approvals for their unique offering, allowing them to quickly go into production after obtaining a firm order.

Multi-family modular projects can be more complicated. It is certainly possible to develop a catalogue of unit designs for a range of modular buildings of the type targeted for the Fair Haven facility. Fortunately, there are developers, architects, and design-build contractors in New England with modular experience and an understanding of focusing on a stable of proven designs. Even for these experienced players, accommodating specific site conditions and tuning the unit mix and specifications to the local market and financing mandates will usually require significant design changes. Even if a particular building is designed by an architect with modular knowledge, expediting approval of final design and specifications will require requisite capability by the factory operator.

It appears that the factory can be opened with a pre-committed volume of business that supports a rapid start-up and attainment of profitable volume. For the longer run, given the acute shortage of housing, the factory will ultimately want to work with developer teams that do not have years of modular experience. That means, it will be desirable to recruit a factory operator that has the experience and staffing to carry out the educational process with developers, architects, engineers, and contractors that is essential to operational success.

Compared to traditional construction, modular construction requires a different style of plans and specifications that clearly delineate work in the plant vs work at the site. It requires different contract details, because the timing of some product decisions and the sequence of work is different. For instance, the developer and/or architect cannot wait until the building is nearly completed before making final decisions on lighting fixtures or flooring, if those are going to be installed in the factory. The site subcontractor installing the finish roofing must be ready to perform its work as soon as the modules are erected – not within the week, but within hours.

Particular effort needs to be devoted to coordinating with the electrical, plumbing, and HVAC contractors which are most likely to confront scope-of-work requirements that are dramatically different than their estimating, purchasing, and manning formulae are accustomed to.

Multi-Family Scope-of-Work at Site

This study assumes that feasibility includes assessing the likelihood that there are potential operators of the facility that can successfully manage a manufacturing facility but also adhere to a business model appropriate to the targeted multi-family market segment. Particularly for the multi-family market segment, a successful operator must attend to what happens to the modules after they leave the factory.

For sixty years, the most prevalent business model for modular manufacturers has been to accept no or minimal responsibility for their product's transportation to and installation at the jobsite. This has been possible by concentrating on single-family housing, and small duplex and townhouse projects. The manufacturer may subcontract transport of the modules to the jobsite, typically with all risk of in-transit damage borne by the independent trucking firm. The manufacturer might rely on the builder/developer to install the modules, which is not too complicated for a one-to-four module structure. Where state sales tax statutes make it more desirable for the manufacturer to appear to be the installer, the manufacturer may subcontract the site installation to an independent installation firm under a contract that leaves most risk with the subcontractor and builder/developer. That has been acceptable for simpler structures.

For multi-family structures, the manufacturer must build and store a sufficient number of modules at the factory to support the erection of the entire building. Given the vagaries of trucking capacity, weather, and contractor work schedules it is also common to establish a marshalling yard near the jobsite, where most or all of the modules for the structure are received for the project so that there is certainty that the modules can be erected in a continuous campaign. From arrival at the jobsite until the modules are lifted by crane into their position in the structure, care must be taken at all times to protect them from inclement weather and from unduly rough handling. Finish roofing needs to be completed as quickly as possible. Regrettably, there are too many examples of poor site management and scheduling of on-site trades resulting in damage and major re-work on multi-family modular projects, all of which were avoidable with proper knowledge and planning.

Sustained success for a manufacturer of multi-family modular structures requires a business model that includes a deep involvement in every phase of a project from manufacture through transportation through managing the movement of modules at the site, erection, and weathering in, or even beyond. The point here is that the product goal for the Fair Haven project is feasible, but a firm recruited to operate the plant needs to adopt and implement the proper business model.

Suggested Investment:

General

This study includes an estimate of the investment necessary to prepare the facility to operate as a multi-family modular manufacturing facility. Please see Exhibit E for an overall capital budget. These are estimates based on recent projects and several site-specific studies as noted. These estimates only, have not been the result of formal requests for bids, are for general determination of feasibility and should not be relied upon by any candidate to operate the plant.

Facility Acquisition

The Town of Fair Haven has negotiated an option to lease or purchase the property (Exhibit F "The Option"). The exact lease terms and purchase price have not been determined but a process for establishing them is provided. Section 1a of the Option specifies that the purchase price will be the "fair market value" at closing which is to be determined by a mutually agreeable Vermont-licensed appraiser. I-OSC engaged Foster Sargeant Appraisal Service, a licensed and certified commercial appraiser to develop a fair market value. The appraiser submitted a 57-page report (Exhibit G) arriving at $2,150,000 as a fair market value. The report also concludes that a market rate triple-net lease would be $221,674 per year ($2.45/sf/yr).

A reasonable time is being allowed for current tenants to vacate. Of potential financial impact, terms have not been established for the condition in which the current owner must leave the buildings and grounds upon vacating.

It is understood that the most likely transaction would be the transfer of the Option to Purchase or Lease to a future owner/operator or to The Chamber & Economic Development of the Rutland Region (CEDRR) who could purchase the property and then provide a long-term lease to the future operator.

Building and Land Improvements

As noted earlier in this report, the buildings are in relatively good condition. Some specific upgrade and refurbishing costs have been estimated. Following are comments on major recommendations

- This study assumes that it is in the financial interest of all parties to replace the existing propane heaters with modern geothermal and/or electrical heat pump systems, upgrade the thermal envelope and install a solar array. I-OSC engaged LN Consulting of Burlington, Vermont to model replacement systems (Exhibit G). The following estimates do not reflect potential incentives and grants.
    - Estimated geothermal heat pump system exterior costs based on thirty wells - $700,000.
    - Interior air handling, piping and ductwork - $2,500,000.
    - Rooftop solar array estimate from Catamount Solar - $1,100,000
    - LN Consulting recommended improving the thermal envelope with 4 inches of additional wall insulation, 4 inches of additional roof insulation, and greater air tightness. I-OSC engaged Naylor and Breen Builders, Inc. to estimate the cost of the envelope improvement (Exhibit H). $2,722,540 was the portion of their estimate for the building envelope improvement.

- Some enhancement of the roof structure may be necessary to accommodate the dead loads of the additional insulation and solar array in addition to the live loads of a re-activated and re-purposed crane system. The current owner investigated the addition of a roof-top solar array in 2018 in connection with which Marble Valley Engineering of Rutland provided a structural analysis (Exhibit I). They concluded that the existing conventional bar joist structure was adequate. That study did not consider the impact of more insulation or re-activation of the crane system. It could be inferred from the Marble Valley report that at minimum, some additional cross-bracing and possibly some additional trusses or enhancements of the existing trusses may be necessary. Since the need is likely to be very specific to the actual crane system use of a selected factory operator, I-OSC has not engaged an expert to estimate possible improvements or their cost.
- Mezzanines (raised steel platforms) were removed by Skyline. Their purpose is to provide staging for roofing and ceiling insulation material and for workforce access to the scaffolds used for the installation of roofing and ceiling insulation. Their location is indicated on Exhibit J and Exhibit E includes an estimated cost of $100,000.
- Obligations of the current tenant upon vacating the premises have not been negotiated. Allowances for refurbishing the various spaces are provided, but highly speculative. Of likely greatest need may be the restoration of the north two bays of the main building which have been used for cannabis growing and processing. Half this space will be used for inspecting and repairing the transportation equipment (modular carriers) and half for material storage.
- As noted above, targeting the multi-family sector typically requires more finished unit storage than a single-family focus. It may prove desirable to prepare the undeveloped parcel to the north for storage. That would require grading, supplementing the accumulated slate waste with gravel or paving, and the installation of security fencing and systems. Exhibit E includes an estimated cost of $50,000.
- The total cost of building and grounds improvements in Exhibit E is $10,614,766 assuming the property is purchased rather than leased and not reflecting possible incentives and grants.
- Some of the list of suggested investments above may be amenable to completion in phases even subsequent to the commencement of manufacturing operations. Some of the suggested investments could be undertaken by the selected operator with its own workforce.

<u>Equipping</u>

A factory layout for equipping the plant to produce the targeted product at the targeted production rate is presented in Exhibit J with the location of major items of equipment noted. This layout makes maximum use of the original Skyline plant design and remnants of that system. The manufacturing process utilizing this equipment is presented in Exhibit K. The recruited operator of the facility may well choose a somewhat different layout and equipping scheme. The purpose here is to generate a general estimate of investment as part of the overall assessment of feasibility. The total estimated equipping budget in Exhibit E is $3,276,000. Following are general comments on the major equipment groups.

- Cranes, scaffolds, and fall protection: Refurbishing of the existing crane rails and minor additions, installation of hoists and lifting beams and their controls, is feasible for a fraction of the investment required for a new system. NE Transport provided an estimate for re-activating the crane system. Ground mounted scaffolds with hoists to raise them above the height of modules during movements among the workstations will probably be needed at six locations beginning with the installation of the roof assembly. While carefully managed placement of scaffolds can provide an OSHA-compliant catch platform for eave and roof work, a more dependable system is a fall arrest system with lanyards connected to worker body straps. There appears to be some remnants of such a system in several locations. Total investment is estimated at $681,000.

- Assembly tables, jigs, and racks: Major subassembly operations take place on purpose-designed tables with associated traveling bridges. Bulk materials are stored on forklift-accessible racks and small materials on compartmentalized racks. Major elements of the original equipping for the Skyline plant are located in a "bone yard" on the property perimeter and may provide savings compared to the estimated budget of $279,400.
- Powered manufacturing systems: This category includes several systems somewhat unique to offsite construction. The most significant is the compressed air system for pneumatic hand tools such as nail, staple, and screw guns. Much of the piping for Skyline's system remains in place and can probably be activated with minimal investment. The budget item is for new compressors and a dryer. The other line items include glue, paint, and insulation dispensing equipment. For this study it is assumed that the existing cyclone sawdust collection system is not refurbished or replaced, but that sawdust and gypsum dust can be managed with collections systems associated with individual saws and sanders. There is a line item for welding equipment for repairs to modular transport equipment. As noted previously, robotics are not budgeted because of the modest scale of the factory. The selected operator may choose to invest in some robotics for the framing operations. The estimated total budget for this category is 576,700.
- Miscellaneous Machinery and Equipment: This category includes saws, sanders, and smaller systems. The estimated budget is $219,800.
- In-plant material and modular movement: This category includes forklifts, twenty sets of caster wheels for moving the modules on the main assembly line, and two pairs of powered movers of the type used for moving small aircraft. The estimated budget is $244,000. The selected operator of the plant may choose to lease the forklifts.
- Yard and over-the-road transportation equipment: A yard tractor with hitch is needed to re-position completed modules stored in the yard. It's usually helpful to have one or two stake trucks for pick-up of miscellaneous materials. The major investment is the fleet of modular transport "carriers" that are used to deliver modules to the jobsite and then are returned and repaired as needed. Equipping and regular inspection of the carriers is regulated under state and federal statutes. The estimated budget assumes an inventory of 40 carriers based on the anticipated size of individual buildings. While warranty work at jobsites may be partially subcontracted, it is assumed necessary for the factory to have one or more vehicles for field service work and for job site consulting. The estimated total budget is $1,275,000, although trucks and tractors can be leased.
- Investment by others: This study assumes that the selected operator will make arrangements to lease or purchase powered hand tools and provide all computer and communications equipment and software.

<u>Grant, Loan and Subsidy Opportunities</u>

Vermont state and local authorities have expressed considerable interest in facilitating more housing across the state in general and re-opening the Fair Haven factory in particular. On July 16, 2025, Governor Scott chose Fair Haven for a ceremonial signing of the Community Housing Infrastructure Program (CHIP) which allows TIF funding supporting affordable housing in rural Vermont. The infrastructure component of the CHIP Act might be one route of support for the Fair Haven factory.

The Chamber and Economic Development of the Rutland Region (CEDRR) has facilitated multiple meetings introducing the Fair Haven factory opportunity to relevant department staff and connecting to VEIC and I-OSC during this study. Exhibit L presents links to a variety of programs for which the selected operator of the plant is encouraged to apply. Opportunities range from refunded employment taxes to loans and grants. Here is a short list.

- Northern Borders Regional Commission – provides funds up to $1million.
- Rural Industrial Development Program (RIDP)
- Vermont Employment Growth Incentive (VEGI)
- Vermont Training Program (VTP)
- Brownfields Revitalization Fund
- International Trade – for interested offshore operators.

The regulatory environment for the target product:

Vermont's Division of Fire Safety regulates the approval of multi-family volumetric modular designs and the inspection of modular products in the plant. It accomplishes these two tasks by licensing independent firms with expertise in these matters. There are several national engineering firms that compete for this type of regulatory review with modular manufacturers and there are several choices for a selected operator. A manufacturer can engage with separate companies for design approval and inspection or use the same firm. Most of these specialized firms can perform the same functions for all New England states and even Canadian provinces. Unlike other New England states, Vermont does not regulate single-family and attached modular housing at the state level.

While a manufacturer can obtain design approval on a project-by-project basis, it is usually more cost-effective to build up a catalogue of design components that have achieved previous approval.

By its nature, the manufacture of volumetric modules involves the covering up of components and assemblies that can no longer be inspected at the jobsite by local building inspectors. Under Vermont regulations and those of almost all other states, the manufacturer is required to establish and document a quality control system that assures conformance to the approved design and provides for specific actions when a deviation or defect is discovered in the factory or at the jobsite. The independent inspection firm licensed by the state is actually monitoring the efficacy of the manufacturer's quality control system, and controls whether each module can be certified as meeting the building code and the design.

During initial factory start-up the Vermont-licensed independent firms will monitor operations intensively until satisfied that the manufacturer's operations are performing properly, after which inspections are performed periodically.

Some potentially interested parties in applying to become the operators of the plant may already have experience in the design approval and inspections systems, which they could then easily modify to match the Fair Haven plant and products. Those applicants without Vermont-specific experience can be assisted by the independent design approval and inspection firms or by engaging one of the consultants with expertise in the regulatory process. Some people employed by Skyline before the plant was closed may be available and interested in joining a resuscitated operation, bringing with them some helpful knowledge of the regulatory infrastructure.

The regulatory oversight of over-the-road movement of modules and the inspection and maintenance of modular carriers has already been addressed earlier. Like any operation, the Fair Haven facility would be subject to state and federal environmental, workplace safety, and wage and hour regulations. The building process does not involve expensive and difficult permitting for toxic and dangerous materials.

In summary, it will be important to recruit an operator that is capable of conforming to the applicable regulations but is not a formidable obstacle.

Work Force Availability:

One of the well-documented obstacles to building more housing in Vermont and across the US is the shortage of construction workers, which deepened during the pandemic. An advantage of offsite construction is that working conditions tend to be more attractive to today's workforce than typical conditions for conventional construction work. Also, the controlled environment in a factory with close supervision and repetitive tasks accommodates the use of a less skilled workforce that can be rapidly trained.

While that is generally true, there are manufactured and modular housing factories in the Northeast and elsewhere that operate at less than capacity because of an inadequate labor supply and/or high turnover.

When Skyline closed the Fair Haven factory in 2011, it employed 76 people. In previous, more prosperous years, it probably employed considerably more. The recent unemployment rate in Rutland County was 2.7%, somewhat higher than the state average. County unemployment is estimate in the 800 range. The factory is only a few miles from the New York border. The unemployment rate in Washington County has recently been 4.1% with nearby Whitehall particularly needing more employment opportunities. Interestingly, the labor participation rate in Rutland County was relatively low, about 58%, considerably lower than the rest of the state, which may indicate a dearth of workforce jobs with reasonable compensation.

The financial model discussed later in this study assumes a conservative sustained output of 2,640 square feet per day and a conservative productivity assumption predicts a workforce of about 110 in the third year of operations. Anecdotally, the possibility of the factory re-opening is producing stories of former employees eager to return. The Stafford Technical Center in nearby Rutland has an established course offering in construction technology and has already indicated willingness to assist a new factory operator in building and training its workforce.

In summary, building a workforce to operate a modular factory will require some effort but it appears to be achievable.

Public Infrastructure:

The public infrastructure (roads, water, storm and sanitary sewers, and utilities) which supported successful operation of the Skyline factory for decades, remains intact and would be sufficient to support a modular factory. Unless Town of Fair Haven officials are aware of any non-obvious deficiencies, a major public investment is not necessary.

Financial Viability:

Modeling

This study includes the construction of a financial model for the first three years of operation. The model is built using a standard Microsoft Excel spreadsheet. It will be available to interested parties. A relatively long set of assumptions (Exhibit M) drives quarterly estimates of income and expenses as well as working capital requirements (Exhibit N). The initial assumptions are intentionally conservative in order to encourage potential operators to carefully consider the financial resources that may be needed.

The profit-and-loss schedule based on initial assumptions computes earnings before interest, taxes, depreciation, and amortization (EBITDA). At this point, there are too many unknowns about how the project might be financed to provide a pre-tax or net income bottom line. Working capital requirements are modeled because offsite multi-family manufacturing can require a more demanding level of working capital than the traditional focus of modular manufacturers on the single-family market.

Revenue, expenses, and working capital.

Here are some of the saliant initial assumptions in the model, the results, and sensitivity.

- Earnings before interest, taxes, depreciation and amortization (EBITA) is negative for the first year of operation as the work force is trained, the assembly line is filled, the arduous process of regulatory certification of the plant is achieved, and productivity improves. Cumulative negative EBITDA at the end of the first twelve months is $0.3 million. However, earnings improve steadily thereafter. Cumulative EBITDA is positive after 15 months. At assumed stable revenue, EBITDA is averaging $8.9 million per quarter.
- Modules are assumed to average 880 square feet (13-3/4 feet x 64 feet) – some smaller, some larger with very small modules paired in assembly line stations.
- The model is driven by an assumption about the pace of production measured as the number of times the assembly line is indexed per production day. It starts very slowly until it stabilizes in the third year at 3 line moves per day. That is a conservative assumption. Presented with a sufficiently uniform product, the assumed assembly line design is probably capable of 6 line moves per day. Sustaining that kind of selling effort is challenging, hence the conservatism. Also note that the plant layout assumes eighteen assembly line stations, and those must be filled before completed modules exit from the factory door.
- The average sales value of each module is driven by an assumption of material content per square foot and a markup on material. Obviously, the market determines pricing, but this is a convenient way to drive revenue and the material component of cost-of-goods-sold. As initial assumptions, material content is set at $104 per square foot, and price at $190 per square foot after a 183% markup on material. That yields an invoice value of $167,482 per completed module. They were drawn from bids for a recent Vermon modular project. These costs per square foot may seem low compared to known averages of finished costs or recently completed multi-family projects. Keep in mind that the model does not include modular manufacturer project-specific engineering costs, transportation to the jobsite, and module installation fees as explained further below. Also finished project costs include land, site preparation, foundation, utilities, permit fees, construction period financing costs, other site work not provided by the modular manufacturer, general contractor general conditions, developer fees, and more. When a modular project is well-designed with relatively simple module layouts and the developer, general contractor, and subcontractors are all attuned to how to reap maximum advantages from offsite construction, overall cost savings are possible. Savings of 5% to 10% are frequent, although savings of as much as 15% have been known in

high-cost markets. The most dependable benefit of off-site construction is the faster pace of development.
- Revenue is recognized based on likely contract provisions – the pace of agreed invoicing. In these initial assumptions, a deposit of 10% is invoiced with acceptance of the order, another 50% is invoiced as modules are completed and stored in the yard, with the remaining 40% invoiced upon shipment. These assumptions have a large impact on working capital as well.
- Labor content is driven by an assumption of labor productivity expressed as the square feet of product produced per labor hour. Productivity improves over the three years, plateauing at 3 square feet per labor hour in the third year. Resulting labor hours is multiplied by an assumed average wage ($24/hour) plus an assumed payroll tax and benefit load (30%). The average wage in the model is initially higher because it is assumed that key skilled employees are recruited early in the ramp-up.
- The overhead component of cost-of-goods-sold assumptions are broken into variable and fixed elements. Among the variable elements, there is a learning curve for third-party inspection costs. In the beginning, inspectors are in the plant every day, inspecting every module. Eventually that pace falls to one day per week. Fixed overhead is primarily staff compensation and a fixed portion of utilities.
- Selling, general, and administrative expenses are largely staff compensation, insurance, and rent. Staffing increases somewhat with volume. Warranty service has a learning curve assumption, with cost per module falling as quality education and culture improve.
- Project specific engineering (design, shop drawings, and regulatory submittals), transportation of modules to the jobsite, and jobsite installation services are not included in the model. In general, pricing of these services is aimed at break-even.
- Also not included in the model are possible refunds of payroll taxes available under Vermont incentives.

<u>EBITDA and Working Capital Model Results:</u>
Revenue and EBITDA from the initial model assumptions are summarized in the following table.

Year	Total Annual Revenue ($millions)	Total Annual EBITDA ($millions)
Year 1	$18.6	$(0.3)
Year 2	$65.3	$14.7
Year 3	$110.5	$47.0

Working capital from the initial model assumptions reaches a stable $16.9 million. Common commercial bank formulae for working capital credit lines would likely cover $7 to $9 million of this, requiring the operator to cover the remaining $7 to $9 million.

<u>Implications of the Model</u>:
To reiterate, the assumptions in the financial model are intentionally conservative. The selected factory operator may be able to achieve break even earlier and hit or exceed the targeted output sooner. Even so, it would be reasonable to assume that there may be multiple respondents to an RFP with the financial capability to manage start-up period losses and working capital demands.

Conclusion – The Project is Viable

The principal findings of this study can be summarized as follows:

- The fifty-four-year-old Skyline factory in the Town of Fair Haven is in relatively good condition, meaning that the investment necessary to restore or upgrade a few problematic elements is manageable.
- The layout of the factory was revolutionary for the industrialized housing industry in its time, but has proven advantageous not only for manufactured housing, but also for volumetric modular housing in the targeted range of output. This is validated by the possible factory layouts and manufacturing processes explored in this study.
- The targeted output of three modules per day is well below the overall demand for multi-family housing in Vermont and New England. There are a variety of reasons why the ecosystem for offsite construction in the United States has lagged that in Canada and Europe, but the national shortage of housing is encouraging more architects, engineers, developers and the enabling sources of funding to learn the requirements for taking maximum advantage of offsite construction.
- Skyline did not dismantle and remove the crane system that a modular plant requires. This greatly reduces the necessary investment in preparing the plant to produce multi-family modules that meet current building codes plus enhanced sustainability features. Furthermore, the State of Vermont appears willing to provide a range of funding support for a qualified operator, further reducing the initial capital costs of re-opening the plant.
- The regulatory structure already exists in Vermont for the authorization of the factory and its products to be incorporated into buildings throughout the state. Other New England states and New York have similar achievable requirements.
- While labor shortages persist in some Vermont regions, there appears to be an available workforce in Rutland County and neighboring New York.
- An initial financial modeling of the factory suggests financial viability.

Next Steps

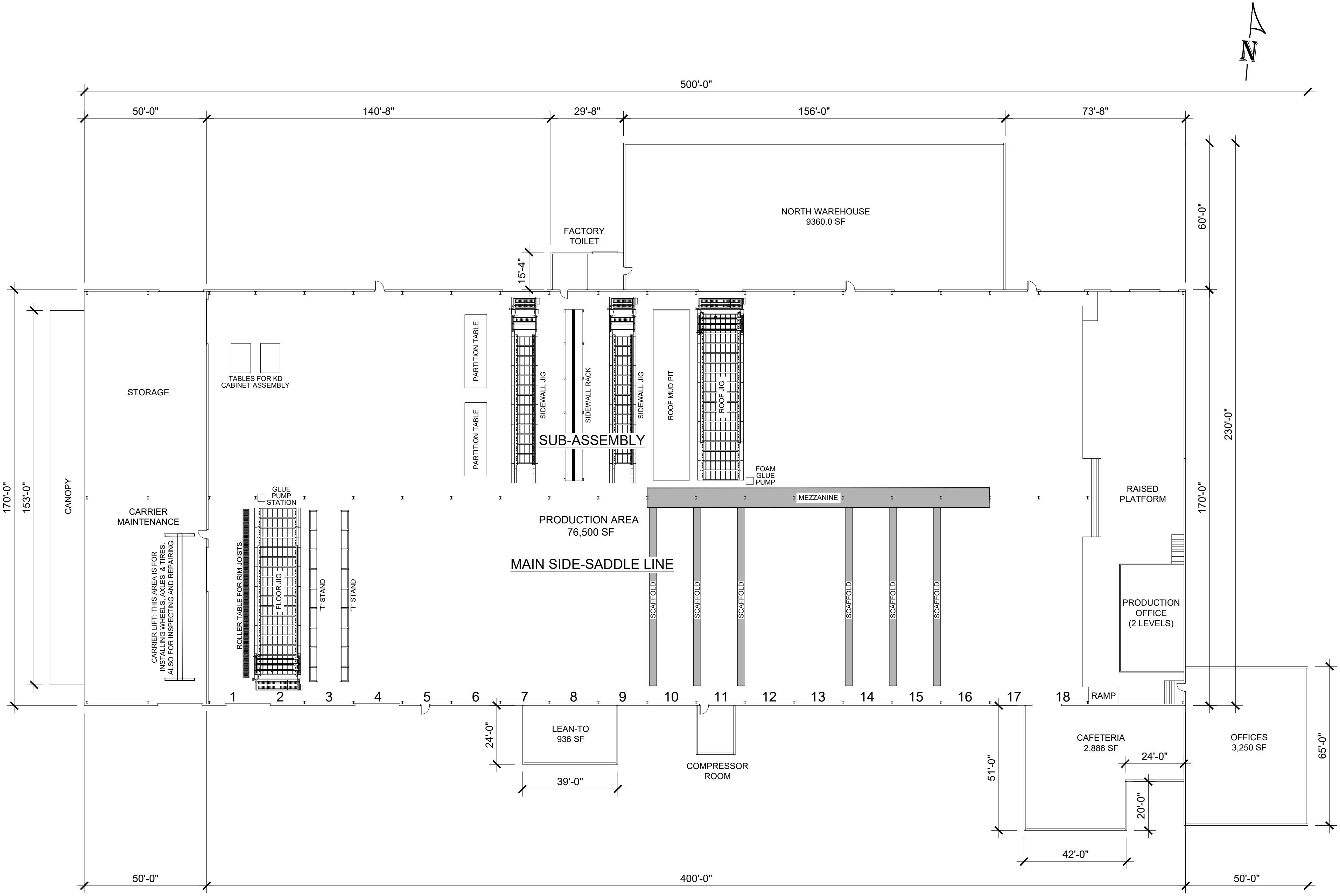
- This report will be reviewed by the Town of Fair Haven Manager
- If accepted, a Request for Proposals will be prepared which incorporates the material in this study and submitted to parties which may have an interest in becoming the operator of the facility
- A final determination must be made by the Chamber and Community Development of the Rutland Region as to whether it would have an interest in acquiring the factory and leasing it to a prospective operator. This is not essential but might broaden the interest of potential operators, who would prefer leasing to a fee-simple purchase.

Fair Haven Skyline Feasibility Study

Exhibit A: Arial View with Property Outline

Fair Haven Skyline Feasibility Study

Exhibit B: Current Building Layout



DATE DRAWN: 4/8/25	SCALE: NA	875 S Main St, Fair Haven, VT 05743	CUSTOMER: John Guequierre, I-OSC, LLC	PAGE DESCRIPTION: .	JOB NO:
REV. DATE:	DRAWN BY: DCS		PROJECT: Proposed Plant Layout		PAGE NO:

Fair Haven Skyline Feasibility Study

Exhibit C: Vermont and New England Housing Demand

Vermont, New England and New York Housing Demand
Links to Relevant Studies and Reports

Vermont: **StateOfVTHousingNeeds.pdf** - 30,000 units needed by 2030

New Hampshire: **2023-NH-Statewide-Housing-Needs-Assessment.pdf** - the state is in need 90,000 more units of all housing between 2020 and 2040, with an immediate need of 23,000 more units.

Massachusetts: **MA_HousingNeedsAssessment_Feb2025.docx** - Even with no population growth, Massachusetts needs 73,000 additional homes to accommodate that demographic demand. An additional 116,000 homes are needed to accommodate overcrowded & doubled-up families, young adults living with parents or roommates, and families and individuals currently living in shelters; and to achieve a healthy vacancy rate of about 2.6%. If the state can retain 10% of the young adults moving out of state, it can prevent declines in the resident labor force, but it will need an additional 36,000 homes.

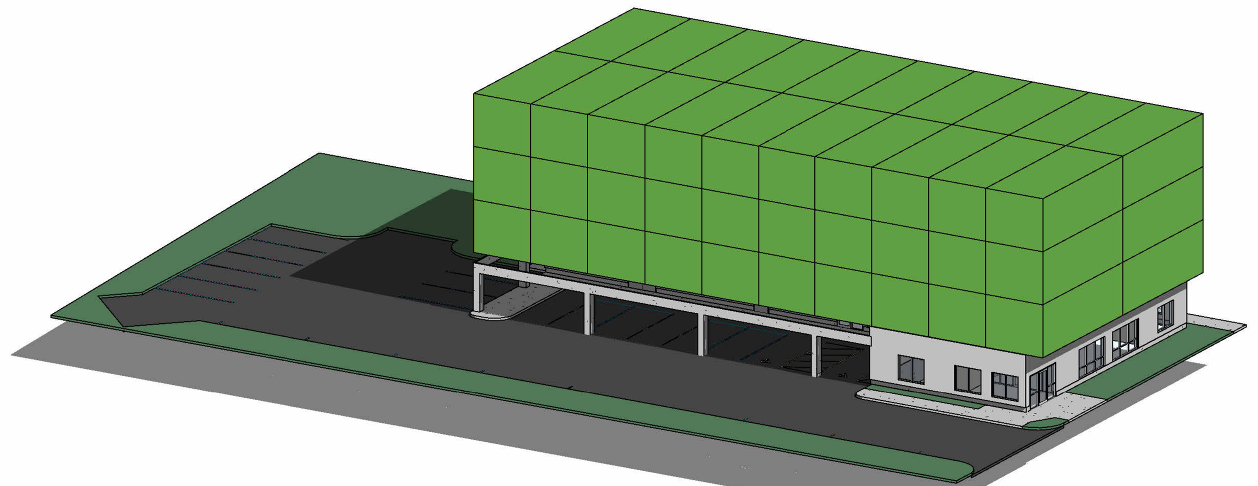
Maine: **State of Maine Housing Production Needs Study** - To address these needs and meet the State's policy priorities, Maine needs approximately 38,500 homes to remedy historic underproduction and will need an additional 37,900 to 45,800 homes to meet expected population growth and household change by 2030.

New York: **https://hcr.ny.gov/system/files/documents/2024/11/2025-annual-action-plan-discussion-draft.pdf** - annual action plan discussion draft.

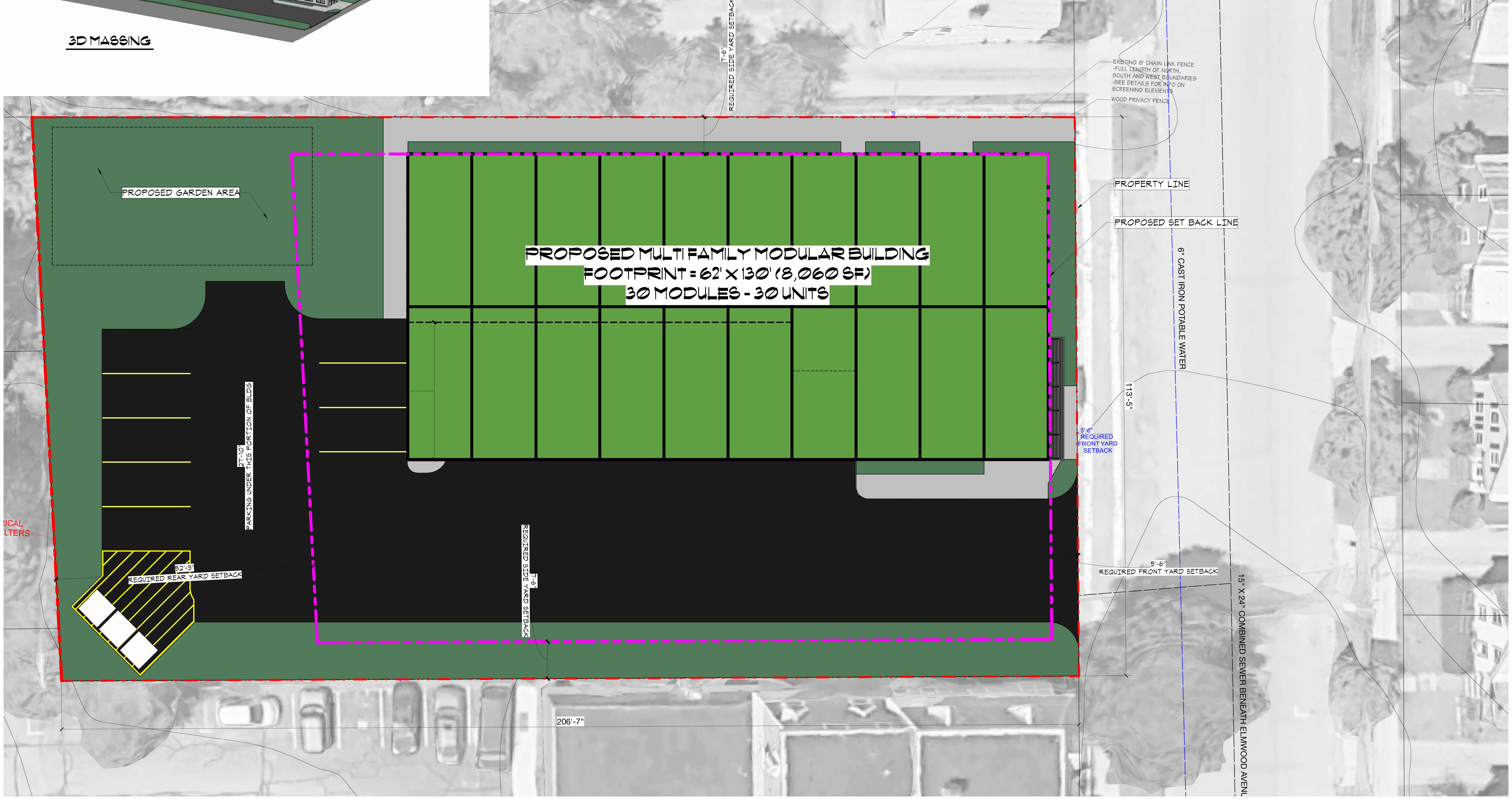
Fair Haven Skyline Feasibility Study

Exhibit D: Product Examples

By Permission of
GreenStaxx
84 Sherman Street
Cambridge, MA 01240
www.greenstaxx.com

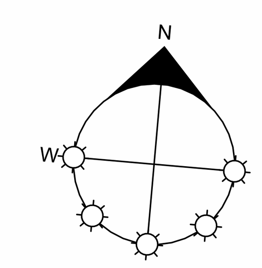


3D MASSING



SCHEMATIC SITE PLAN

SCALE - 1" = 10'-0"



GSX - ELMWOOD AVE

51 Elmwood Ave
Burlington, VT 05401

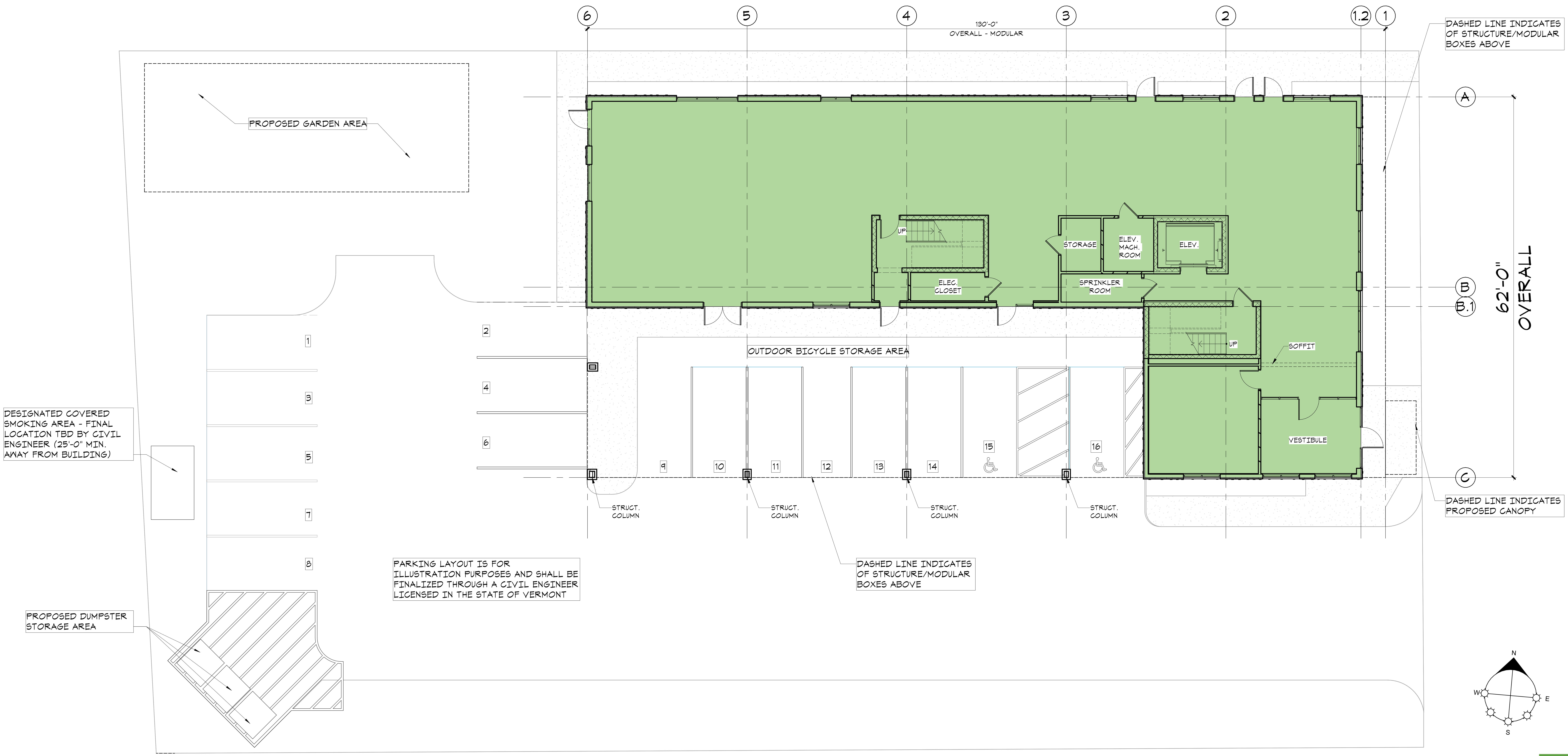
NOVEMBER 8, 2024

green STAXX

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071



= COMMON AREA - 5,445 SF

FIRST FLOOR PLAN - PHASE I

0 2' 4' 8'

GSX - ELMWOOD AVE

51 Elmwood Ave
Burlington, VT 05401

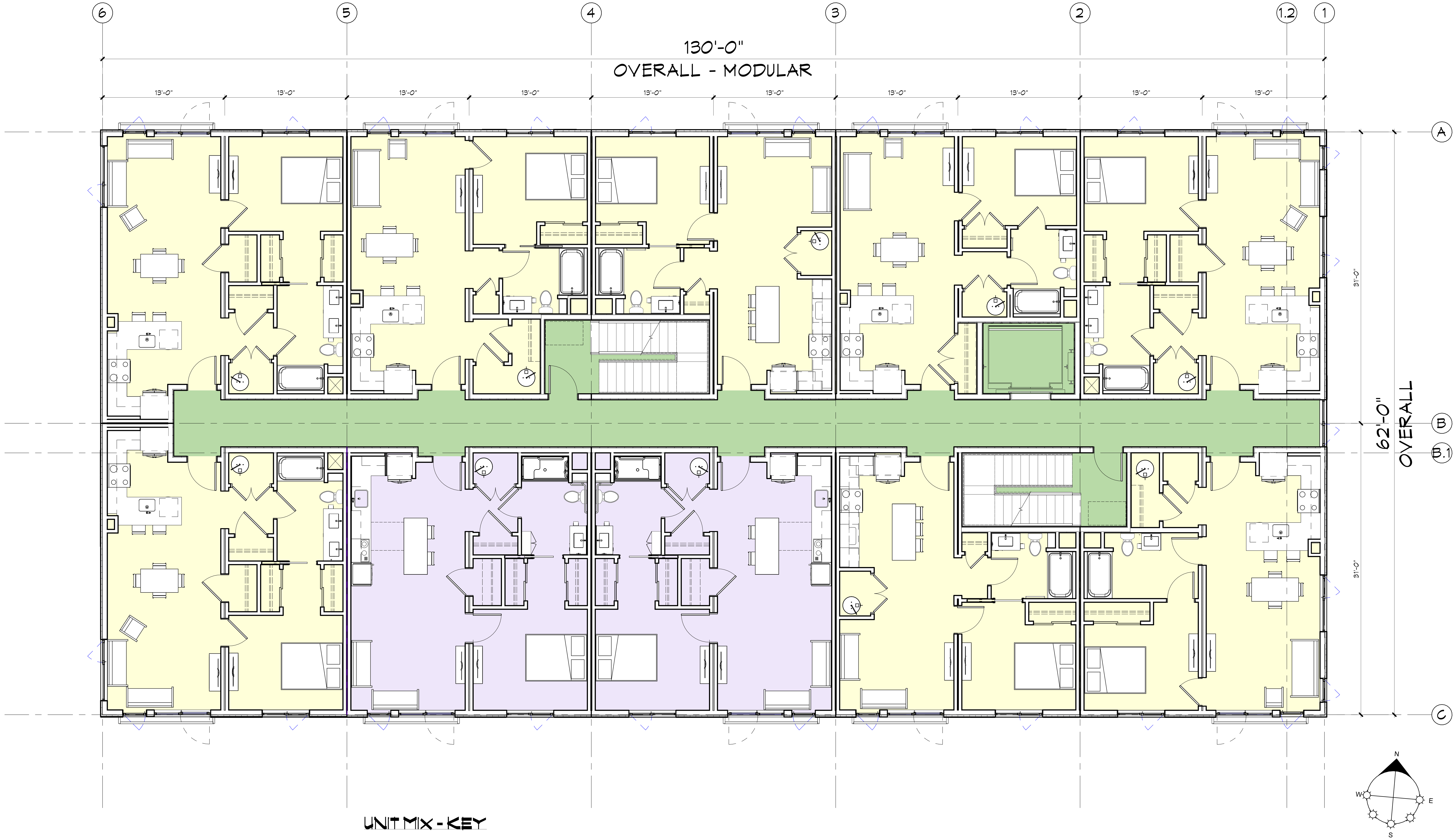
NOVEMBER 8, 2024

green STAXX

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071



UNIT MIX - KEY

- 1 BEDROOM
- 1 BEDROOM - ADA
- COMMON AREA

UNIT MATRIX - DETAILS

	2ND FLOOR	3RD FLOOR	4TH FLOOR	TOTAL
1 BEDROOM UNITS	8	9	10	27 = 90%
1 BEDROOM UNITS - ADA	2	1	0	3 = 10%
			OVERALL TOTAL	30

SECOND/TYPICAL RESIDENTIAL LEVEL(S) FLOOR PLAN

0 1' 3' 5'

GSX - ELMWOOD AVE

51 Elmwood Ave
Burlington, VT 05401

NOVEMBER 8, 2024

green STAXX

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

EAST ELEVATION
1/8" = 1'-0"

NORTH ELEVATION
1/8" = 1'-0"

WEST ELEVATION
1/8" = 1'-0"

SOUTH ELEVATION
1/8" = 1'-0"

EXTERIOR ELEVATIONS

0 2' 4' 8'

GSX - ELMWOOD AVE

51 Elmwood Ave
Burlington, VT 05401

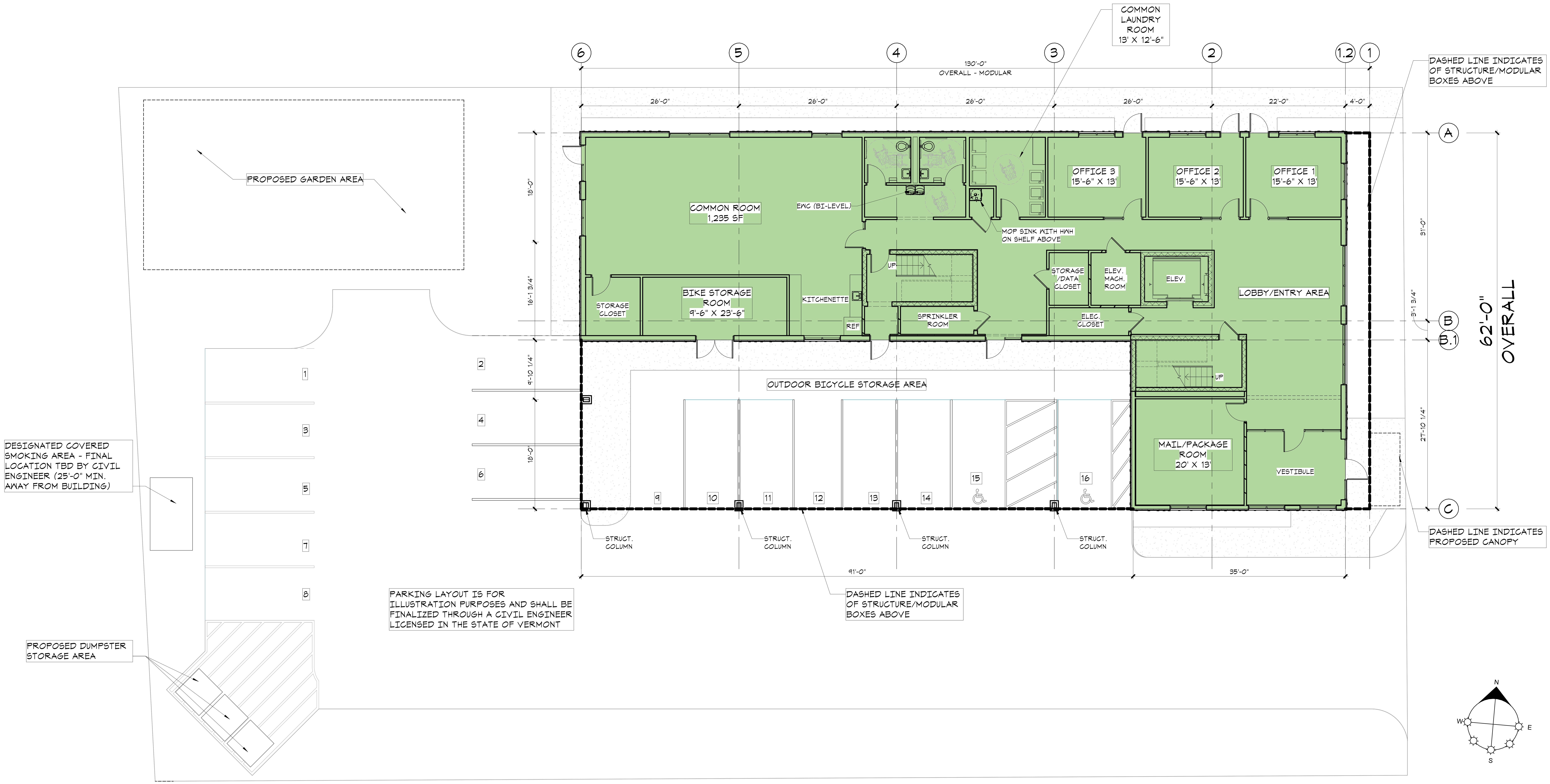
NOVEMBER 8, 2024

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

green STAXX

BRUCE
RONAYNE
HAMILTON
ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071



= COMMON AREA - 5,445 SF

FIRST FLOOR PLAN - PHASE II

0 2' 4' 8'

GSX - ELMWOOD AVE

51 Elmwood Ave
Burlington, VT 05401

NOVEMBER 8, 2024

green STAXX

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

COLORED MARKETING GROUND FLOOR PLAN

0 1' 3' 5'

TD - PROUTY: PHASE I PLANS

209 AUSTINE DRIVE
BRATTLEBORO, VT 05301

DECEMBER 18, 2024

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

greenSTAXX

Bruce Ronayne Hamilton Architects

COLORED MARKETING SECOND FLOOR PLAN

0 1' 3' 5'

TD - PROUTY: PHASE I PLANS

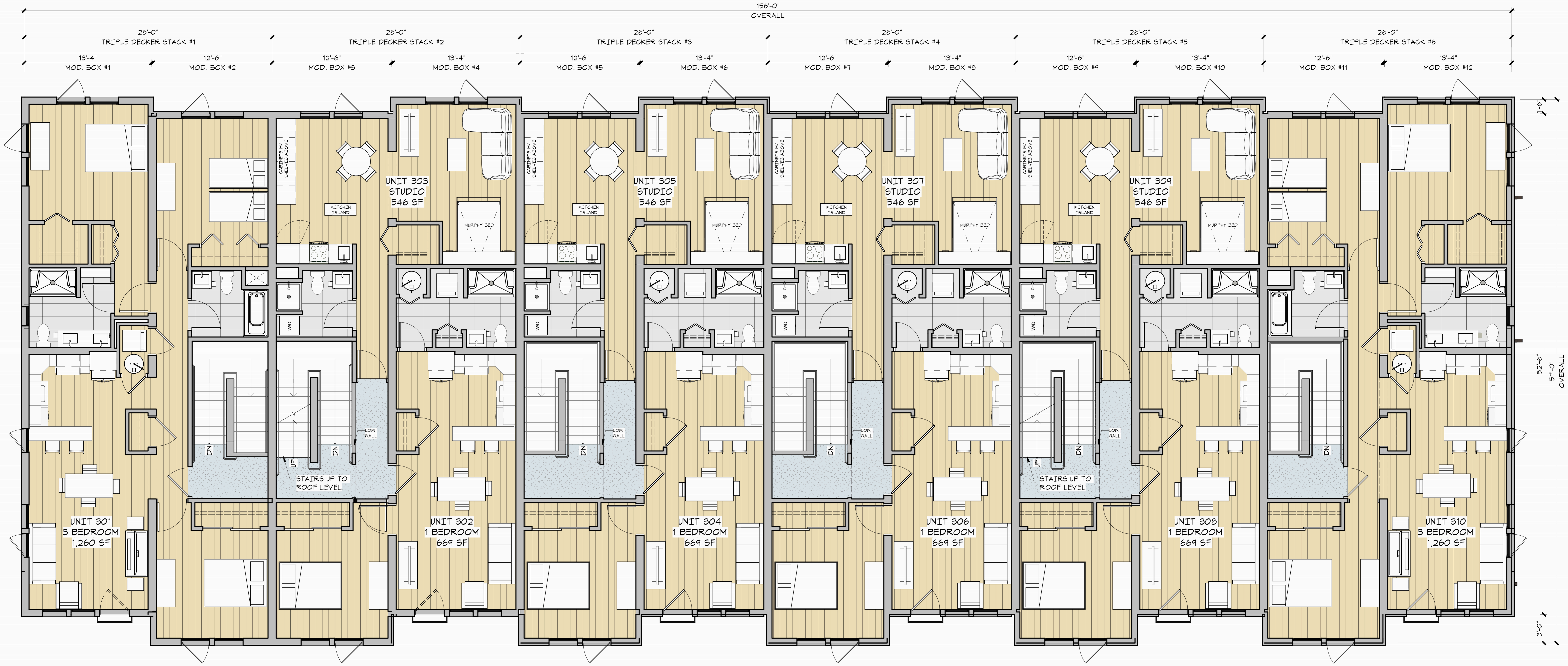
209 AUSTINE DRIVE
BRATTLEBORO, VT 05301

DECEMBER 18, 2024

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

Bruce Ronayne Hamilton Architects



COLORED MARKETING THIRD FLOOR PLAN

0 1' 3' 5'

greenSTAXX

TD - PROUTY: PHASE I PLANS

209 AUSTINE DRIVE
BRATTLEBORO, VT 05301

DECEMBER 18, 2024

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

FRONT ELEVATION
3/16" = 1'-0"

REAR ELEVATION
3/16" = 1'-0"

COLORED EXTERIOR ELEVATIONS

0 1' 3' 5'

TD - PROUTY: PHASE I PLANS

209 AUSTINE DRIVE
BRATTLEBORO, VT 05301

DECEMBER 18, 2024

greenSTAXX

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

BRUCE RONAYNE HAMILTON ARCHITECTS

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

LEFT SIDE ELEVATION

3/16" = 1'-0"

RIGHT SIDE ELEVATION

3/16" = 1'-0"

COLORED EXTERIOR ELEVATIONS

0 1' 3' 5'

TD - PROUTY: PHASE I PLANS

209 AUSTINE DRIVE
BRATTLEBORO, VT 05301

DECEMBER 18, 2024

ARCHITECTURE
LAND PLANNING
INTERIOR DESIGN
3D VISUALIZATION

833 TURNPIKE ROAD P.O. BOX 104
NEW IPSWICH NEW HAMPSHIRE 03071

green STAXX

BRUCE RONAYNE HAMILTON ARCHITECTS

Fair Haven Skyline Feasibility Study

Exhibit E: Capital Budget

Skyline Fair Haven Plant Re-commissioning
Capital Expenditure Estimates (2025-11-28)

Item	U M	Total Needed	Cost Each	Vermont Budget	Comments
Property Acquisition					
Purchase of existing land and building	EA	1		$ 2,150,000	Appraised value (market annual rent = $22,674)
Legal and title	EA	1		$ 20,000	
Subtotal, property acquisition				**$ 2,170,000**	
Building improvements					
Upgrading main building envelope					
Demolish wall interferences and prep	EA	1		84,740	Naylor-Breen estimate
Add exterior 4 inch insulated panels	EA	1		880,000	Naylor-Breen estimate
Replace overhead doors with insulated doors	EA	1		116,900	Naylor-Breen estimate
Add 4 inch roof insulation and replace membrane	EA	1		1,640,900	Naylor-Breen estimate
Solar rooftop array	EA	1		1,100,000	Catamount Solar
Modernize HVAC - Geothermal field of 30 wells	EA	1		700,000	LN Consulting
Modernize HVAC - Air handling, piping, ductwork	EA	1		2,500,000	LN Consulting
Equipment power: Use or upgrade existing drops where possible	EA	1		47,600	
Sructural enhancements - roof	EA	1		-	Marble Valley Engineering 2018 analysis implies some upgrades needed
Lighting upgrades	EA	1		-	LN Consulting verbally suggests additional lighting may be needed
Steel mezzanines and railings	SF	1,680	60	100,800	
Carrier maintenance room refurbishing	EA	1		150,000	
Plant restroom refurbishing	EA	1		20,000	
Plant offices refurbishing	EA	1		30,000	
Plant employee common area refurbishing	EA	1		25,000	

Skyline Fair Haven Plant Re-commissioning
Capital Expenditure Estimates (2025-11-28)

Item	U M	Total Needed	Cost Each	Vermont Budget	Comments
Property Acquisition					
Tool crib and locked storage 400 sq. ft.	EA	1		38,000	
First aid center 100 sq.ft.	EA	1		9,500	
Hazardous material storage refurbishing	EA	1		10,000	
Compressor room refubishing	EA	1		20,000	
Main office					
Offices and cafeteria areas insulation upgrade and refurbishing	EA	1		502,385	Naylor-Breen estimate
Yard					
Prepare north parcel for unit storage	EA	1		50,000	
Repair pavement	EA	1		25,000	
Clean-up "bone yard"	EA	1		25,000	
Project expenses					
General conditions and safety	EA	1		484,550	Naylor-Breen 6%
Permiting	EA	1		75,000	
Builder Risk insurance	EA	1		214,009	2.5%
General liability insurance	EA	1		85,604	Naylor-Breen 1%
Contingency	EA	1		893,499	Naylor-Breen 10%
General contractor fees and overhead	EA	1		786,279	Naylor-Breen 8%
Subtotal, buildings improvements				**10,614,766**	
Equipping					
Cranes, scaffolds and fall arrest					
Crane system: Refurbish existing rails and bridges + hoists, trollys and controls	EA	1	277,700	277,700	NE Transport estimate
Lifting beams, with hooks & straps or chains	EA	4	3,350	13,400	
Scaffolds, steel, floor mounted, 60' x 3'	EA	6	20,000	120,000	
Scaffold hoists & controls, 2T	EA	12	5,000	60,000	
Fall arrest system for roofers, rails and cables	EA	1	180,000	180,000	some infrastructure remains and may be salvagable

Skyline Fair Haven Plant Re-commissioning
Capital Expenditure Estimates (2025-11-28)

Item	UM	Total Needed	Cost Each	Vermont Budget	Comments
Property Acquisition					
Carrier maintenance bridge and hoists	EA	1	30,000	30,000	
Subtotal, cranes, scaffolds and fall arrest				681,100	
Assembly tables, jigs, and storage racks					
Floor framing jig/table, steel, 70 x 14'-9", 2-1/2' high	EA	1	25,000	25,000	
Floor "T" stand, steel, 70' x 14'-9", 6' high	EA	1	25,000	25,000	
Wall-build jigs/tables, steel, 70' x 9', 2-1/2' high	EA	2	25,000	50,000	
Partition tables, steel, 30' x 9', 2-1/2' high	EA	2	6,500	13,000	
Roof-build jig/table	EA	1	25,000	25,000	
Roof tape/mud stand, steel, 56' x 13' 9", 6' high	EA	1	25,000	25,000	
Rolling material bridges	EA	3	9,000	27,000	
KD cabinet assembly tables	EA	4	2,000	8,000	
Trash dumpsters	EA	20	1,900	38,000	
Wheeled steel racks	EA	20	1,000	20,000	
Pallet racks, steel, 24'	EA	20	1,000	20,000	
Kanban racks, 5'	EA	20	170	3,400	
Subtotal tables, jigs, and racks				279,400	
Powered manuafacturing systems and equipment					
Air compressors and piping system	EA	1	209,900	209,900	
Glue dispensing systems	EA	1	37,100	37,100	
Painting systems	EA	1	22,200	22,200	
Insulation systems	EA	1	69,500	69,500	
Lincoln Idealarc MIG welders for carrier maintenance	EA	2	16,000	32,000	
Sawdust collection system	EA	1	90,000	90,000	
Drywall residue disposal system	EA	1	25,000	25,000	May not be needed
Trash compactor	EA	1	75,000	75,000	
Triad or similar nail/screw bridges	EA	1	16,000	16,000	
Subtotal systems				576,700	

Skyline Fair Haven Plant Re-commissioning
Capital Expenditure Estimates (2025-11-28)

Item	U M	Total Needed	Cost Each	Vermont Budget	Comments
Property Acquisition					
Miscellaneous M&E					
Gang-nail press	EA	2	8,000	16,000	
Industrial floor sander	EA	1	3,500	3,500	
Bottom board, carpet, and vinyl flooring carousels	EA	3	6,000	18,000	
Plumbing & electrical testing systems	EA	8	1,000	8,000	
Blower door testing system	EA	1	3,800	3,800	
Ladders, mix of sizes, allowance	EA	1	10,000	10,000	
Tool crip equipment	EA	1	30,000	30,000	
Cutoff saws and tables	EA	4	12,000	48,000	
Dado saw	EA	1	12,500	12,500	
Panel saws for 4 x 8 sheets	EA	2	35,000	70,000	
Subtotal miscellaneous M&E				219,800	
In-plant movement					
Forklifts	EA	5	30,000	150,000	
Heavy-duty caster wheels	EA	160	150	24,000	
Powered aircraft like movers, 4	EA	4	17,500	70,000	
Subtotal in-plant movement				244,000	
Yard and over-the-road transit equipment					
Yard tractor (moving completed homes)	EA	1	55,000	55,000	
Stake truck	EA	2	60,000	120,000	
Modular carriers	EA	40	25,000	1,000,000	
Service vehicles	EA	2	50,000	100,000	
Subtotal yard and over-the-road transit				1,275,000	
By Others					
All small tools by operator	EA	-	-	-	

Skyline Fair Haven Plant Re-commissioning
Capital Expenditure Estimates (2025-11-28)

Item	U M	Total Needed	Cost Each	Vermont Budget	Comments
Property Acquisition					
All computer equipment and software by operator	EA	-	-	-	
All communications equipment and softwware by operator	EA	-	-	-	
Subtotal IT				-	
Subtotal equipping				**3,276,000**	
Total building, grounds, and equipping				**$ 16,060,766**	

Fair Haven Skyline Feasibility Study

Exhibit F: Appraisal

Skyline Factory

875 South Main Street
Fair Haven, VT 05743

PREPARED BY:

Foster Sargeant Appraisal Service

Effective Date of Valuation
September 24, 2025

Date of the Report
October 27, 2025

Report Type
Appraisal Report

Prepared For
Mr. John Guequierre
Principal
I-OSC LLC

Client File Number
N/A

Internal File Number
25FH875MainSt

Letter of Transmittal

77 Grove Street Suite 108
Rutland, VT 05701

www.802appraisals.com
P: 802-622-3312

October 27, 2025

Mr. John Guequierre
Principal
I-OSC LLC
887 N. High Point Road
Madison, WI 53717

RE: Appraisal Report for the property located at 875 South Main Street, Fair Haven, VT 05743

Dear Mr. Guequierre:

At your request, we have conducted the investigation necessary to form an opinion of value in the above captioned subject property for the aforementioned client. The appraisal report that follows sets forth the identification of the property, the assumptions and limiting conditions, pertinent facts about the area and the subject property, comparable market data, the results of the investigation, and the reasoning leading to the conclusions set forth. The report that follows is considered to be a summary of our analysis and conclusions. Supporting documentation concerning the data, reasoning, and analyses is retained in our file. The depth of discussion contained in this report is specific to the needs of the client and for the intended use stated in the report. We are not responsible for unauthorized use of this report. Please take special note of any assumptions used in this assignment as they may have affected the results of the assignment. This letter is invalid as an opinion of value if detached from the report, which contains the text, exhibits, and Addenda.

Value Conclusions

Description	Perspective	Type of Value	Premise	Property Interest	Effective Date	Indicated Value
N/A	Current	Market Value	As Is	Leased Fee	09/24/2025	$2,150,000

Sincerely,
Foster Sargeant Appraisal Service

Michael Foster Farbman
Certified General Real Estate Appraiser, VT No. 080.0134516
mike.farbman@802appraisals.com

Table of Contents

Letter of Transmittal 2
Table of Contents 3
Executive Summary 4
Introduction 7
  Subject of the Appraisal 7
  Property Rights Appraised 7
  Pertinent Dates 7
  Definition of Value 7
  Most Probable Buyer 7
  Fee Disclosure 7
Site Description 8
Improvement Description 10
  Summary 10
  Main Factory Building+Warehouse 10
  Offices & Employee Breakroom 12
  Ratios 12
Zoning 13
  Main Site 13
Taxes and Assessment 14
Subject Photos 15
Regional Overview 24
Neighborhood 26
  Neighborhood Overview 26
Demographics 27
Highest and Best Use 32
Land Valuation 35
Sales Comparison Approach 37
Income Approach 45
  Existing Contract Leases 45
  Market Rental Data 45
  Direct Capitalization 47
  Base Rate (Safe Rate) 47
  Equity Risk Premium 47
  Market and Property-Specific Risk Premium 47
  Total Indicated Capitalization Rate (Build-Up) 47
  Market Corroboration and Reconciliation 48
  Income Approach Conclusions 48
Reconciliation 49
  Final Estimate of Value 49
  Exposure Time and Marketing Period 49
General Underlying Assumptions and Limiting Conditions 50
  Special Assumptions 53
Certification - Michael Foster Farbman 54
Addenda 55
  1. Competency of Appraiser 55
  2. Qualifications & License 56

Executive Summary

Prepared for I-OSC LLC

Skyline Factory

Property Overview

Address

875 South Main Street, Fair Haven, VT 05743

Property Class/Type

Industrial, Manufacturing

Site Characteristics

Site Characteristics	
SF / Acres	596,772 / 13.7000

Zoning Characteristics

Zoning Characteristics	
Zoning Codes	C

Improvement Characteristics

Improvement Characteristics			
Gross Building Area (SF)	90,479	Rentable Area (SF)	90,479
# of Units	1	Year Built (Weighted Average)	1971

Sales History

To the appraiser’s knowledge, the subject property is not currently for sale, or under contract for sale or option to purchase.

Scope of Work

Scope of Work Information	
Client Name	I-OSC LLC
Report Type	Appraisal Report
Intended Use	This report is intended to provide information to the client and intended user for Asset Analysis purposes.
Intended User	This appraisal report was prepared for the exclusive use of Client Company. Other intended users are the Town of Fair Haven, VEIC, and any potential sources of funding.

To appraise the subject property, I:

- Performed a public records search for the subject property including its assessment, property tax, and a deeded description of the property that included a limited search for any private covenants, conditions, or restrictions (CC&R) that may affect marketability or value. However, I do not certify title.
- Performed a personal inspection of the subject's immediate neighborhood. Noted traffic patterns, external influences, and land uses in the immediate area that may affect the subject's utility, marketability, and/or or value.
- Performed a readily apparent personal inspection[1] of the subject site, noted its specific access points, collected data on site improvements such as driveways, landscaping, access to municipal water and sewer and standard overhead or underground utilities.
- Researched the subject site in the Vermont Agency of Natural Resources (ANR) on-line Geographic Information System (GIS) that provides information on hazardous waste sites and generators, soils, topography, community tax maps, FEMA Flood Hazard and Flood Way maps, and other geographic information that may affect the utility, appeal, value, and marketability of the subject property.
- Performed a readily apparent personal inspection of the subject's building improvements. Researched public sources such as Lister's records, MLS, and other public services. Collected data on the age, quality, condition, layout, physical deterioration, functional obsolescence, and any items of deferred maintenance that may affect the utility, appeal, value, and marketability of the subject building improvements.
- Confirmed the zoning determination. However, no study to determine if the property meets all minimal setback distances, height requirements, water and/or sewer regulations, subdivision permits, other rules or regulations required by the state or municipality where the property is located and that might affect its legal use, marketability, or value was completed. It is beyond the scope of this valuation study to determine if the subject property is in compliance with all state and local laws and regulations and has a valid certificate of occupancy or other required permit.
- Completed a fundamental or inferred analysis of demand, depending on the type of data available in the market. Reconciled an opinion of its exposure time, marketing time, and identified those comparable sales most likely to compete against the subject property.
- Completed a highest and best use analysis of the property both as-if-vacant and as-improved to help identify external influences and functional obsolescence that may affect the subject property and identify its most likely user (buyer).
- Developed an opinion of the value of the underlying land using either comparable land sales or an equalized assessment approach depending on the quantity and quality of the comparable land sales data.
- Considered all three approaches to value. Any approach, which was applicable and had a reliable database was developed and reported.
- Performed research and analysis on total cost new including direct cost, indirect cost, and entrepreneurial incentive; investigated sources of depreciation from physical deterioration, functional obsolescence and external obsolescence that may affect the subject property. Concluded the cost approach to value, which is not required to report a credible assignment result, is not supportable within the scope of work employed in this assignment.
- Performed research on market rental rates, operating expenses, overall capitalization rates and the price paid for leased fee estates. Concluded the income approach to value does describe an operating market for the subject

property and constructed a direct capitalization model based on those most recent and comparable data.

- Completed a study of those most comparable sales in the subject's market area. Confirmed the comparable sales with an exterior inspection and at least one disinterested source, typically, the State of Vermont Property Transfer Record. Analyzed these data to determine both units of comparison and elements of comparison important to the market and constructed a comparable sales grid to form an indication of the subject's value.
- Reconciled the value indications into a single point value based on the quantity, quality, and reliability of the data, as well as the appropriateness of each valuation technique to the subject property and its most likely user.
- Completed this appraisal report.

---

[1] A 'readily apparent' inspection is a visual inspection made without an extraordinary effort to expose covered or hidden areas such as behind drop ceilings or inside crawl spaces. I did not perform an 'engineering inspection' because I am not a licensed civil engineer. The client is strongly encouraged to hire a licensed engineer if they need an opinion of the quality, condition, code compliance or integrity of any of the property's systems such as structural, heating, plumbing, septic, potable water or electrical.

Introduction

Subject of the Appraisal

The subject site's location is 875 South Main Street in Fair Haven, Vermont.

Property Rights Appraised

The property rights appraised are the Fee Simple ownership of the real property. The Fee Simple interest is defined as:

Fee Simple Estate: Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power and escheat.

Pertinent Dates

The property was inspected by Michael Foster Farbman on September 24, 2025; the effective date of the value conclusion is September 24, 2025. This report was written on October 27, 2025.

Definition of Value

The definition of value is market value. For the purpose of this assignment, market value is the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition are the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- Buyer and seller are typically motivated
- Both parties are well informed or well advised
- Both act in what they consider to be their own best interest
- A reasonable time is allowed for exposure in the open market
- Payment is made in terms of cash in U.S. dollars or in terms of financial arrangement comparable thereto
- The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale

Most Probable Buyer

The most probably buyer is an owner-occupant who uses the property in support of their business, or a regional investor looking for a manufacturing facility.

Fee Disclosure

Under 26 V.S.A. § 3322 I must disclose the total fee I was paid to prepare this specific analysis and report was $8,000.

Site Description

Location	
Market Type	Small
Legal Description	See Deed
Location Classification	Average
Parcel Identifier	090109
Location of Parcel	Mid-Block
Size	
SF / Acres	596,772 / 13.7000
Number of Lots	1
Access	
Primary Frontage Curb Cuts	2
Access Classification	Good
Access Description	The property has good access from the primary roadway.
Encumbrances	
Flood Zone	X
Flood Plain Description	The property is located in flood zone X (unshaded), defined by FEMA as an area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.
Environmental Description	We observed no evidence of toxic or hazardous substances during our inspection of the site. However, we are not trained to perform technical environmental inspections and recommend the hiring of a professional engineer with expertise in this field.
Encumbrances Easements Description	We were not given a title report to review. We do not know of any easements, encroachments, or restrictions that would adversely affect the site's use. However, we recommend a title search to determine whether any adverse conditions exist.
Site Characteristics	
Shape	L-shaped
Topography	Basically Level
Grade	At Grade
Drainage	Adequate
Soil Type Description	We were not given a soil report to review. However, we assume that the soil's load-bearing capacity is sufficient to support existing and/or proposed structure(s). We did not observe any evidence to the contrary during our physical inspection of the property. Drainage appears to be adequate.
View / Appeal	Good
Utilities Description	All public utilities are available and deemed adequate.
Site Improvements	Site improvements include asphalt paved parking areas, curbing, signage, landscaping, and drainage.
Site Utility	Good

As referenced in the Assumptions and Limiting Conditions to this report, we are not considered experts nor competent to assess environmental issues. Given this limitation, it is noted that our physical inspection of the subject property did not reveal any indication of an environmental hazard.

We were not provided a current title report to review. We do not know of any easements, encroachments, or restrictions that would adversely affect the use of the site. However, we recommend a title search be completed to determine whether any adverse conditions exist.

Improvement Description

Summary

Improvements Summary Totals	
Gross Building Area (SF)	90,479
Rentable Area (SF)	90,479
# of Units	1
Year Built (Weighted Average)	1971

Main Factory Building+Warehouse

CLASS: Industrial	PUCS TYPE: Manufacturing
Size	
Gross Building Area	84,343
Rentable Area	84,343
Efficiency	100.00
# of Units	1
General	
Year Built	1971
Year Built Details (1971)	SF Built: 84,343, Comments: ---
Year Built Details (Totals)	Year Built: 1971, SF Built: 84,343
Structural	
Construction Quality	Good
Building Condition	Average
Construction Class	S
Building Frame	Steel Frame
Foundation Type	Concrete Slab
Basement Type	None
Roof Material	Built up with Tar and Gravel
Floor Structure	Concrete
Interior	
Lighting	LED/Incandescent
Floor Cover	Polished Concrete

M.E.P.	
Heating Type	HVAC
Cooling Type	None
HVAC Comments	Propane
Electrical Metering	The building has a master meter, although some units are metered directly.
Electrical Supply	The electrical system is assumed to be adequate for the existing use and in compliance with local law and building codes.
Plumbing	The plumbing system is assumed to be adequate for the existing use and in compliance with local law and building codes.
Restrooms Description	The property features adequate restrooms.
Site Improvements	
Type of Parking	Surface
Landscaping Description	The site is landscaped with a variety of trees, shrubbery and grass.
Drainage and Retention	The property site has adequate water drainage and retention for the existing use.

Offices & Employee Breakroom

CLASS: Office	PUCS TYPE: General Purpose
Size	
Gross Building Area	6,136
Rentable Area	6,136
Efficiency	100.00
General	
Year Built	1971
Year Built Details (1971)	SF Built: 6,136, Comments: ---
Year Built Details (Totals)	Year Built: 1971, SF Built: 6,136
Structural	
Construction Quality	Average
Building Condition	Average
Construction Class	D
Building Frame	Wood-Framing
Foundation Type	Concrete Slab
Roof Material	Built up with Tar and Gravel
Floor Structure	Wood
Window Type	Double Hung
Glass Type	Double Pane

Ratios

Improvements Ratios	
Land to Bldg Ratio (x:1)	6.60

Zoning

Main Site

General Zoning Information	
Current Use	Legally Permitted
Zoning Jurisdiction	Town of Fair Haven
Zoning Code	C
Zoning Description	Commercial
Permitted Uses	Industrial, Commercial, Retail

Conformity Conclusion

Conforming

Conformity Comments

We analyzed the zoning requirements in relation to the property, and considered the compliance of the existing or proposed use. We are not experts in the interpretation of complex zoning ordinances but based on our review of public information, the property appears to be a conforming use.

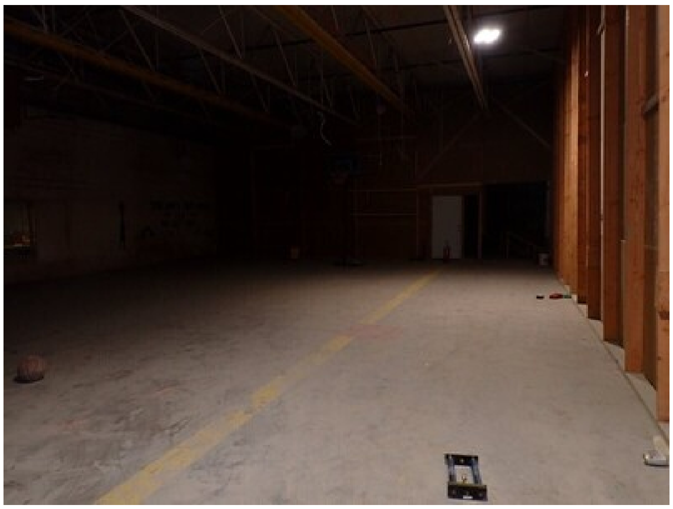
Taxes and Assessment

2025 Real Estate Taxes	
Total Taxes	$0

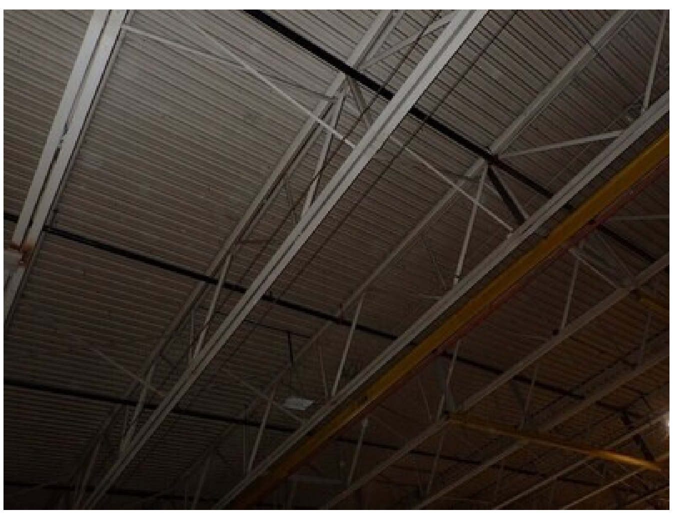
The Total Assessed Value from the Town of Fair Haven was $956,300 in 2025. The Land Value was $135,800.

Subject Photos

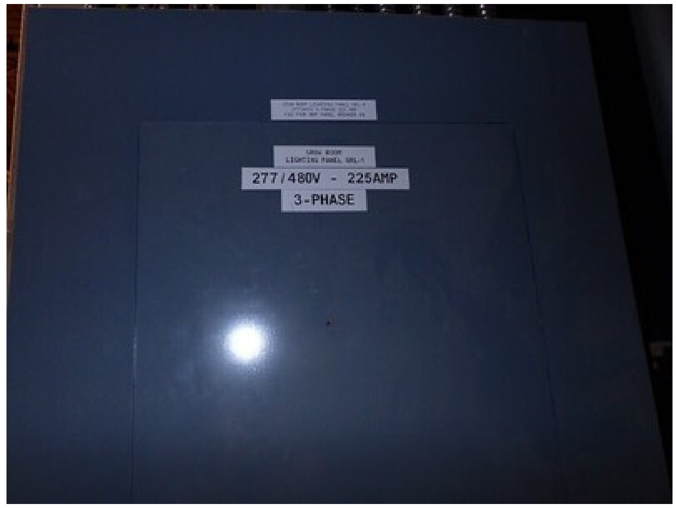

1
2
3



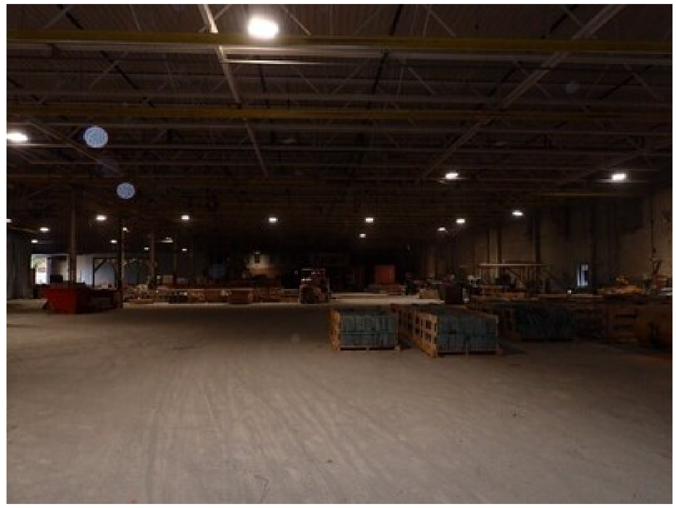

QUALITY



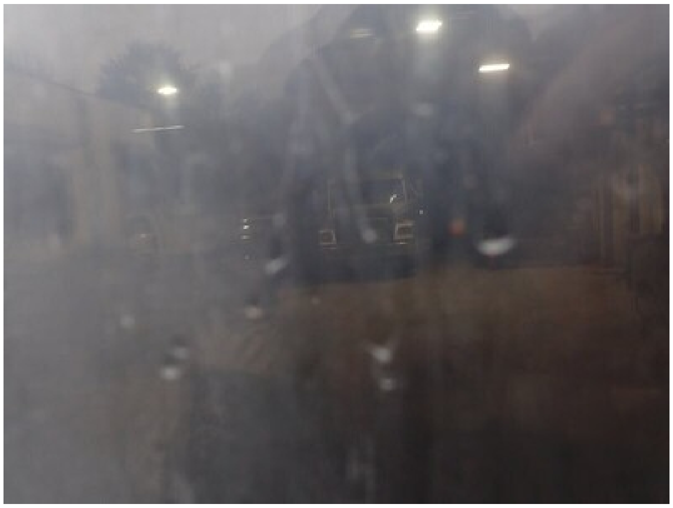

SAMSUNG


277/480V - 225AMP
3-PHASE


casella
casella




USED OIL

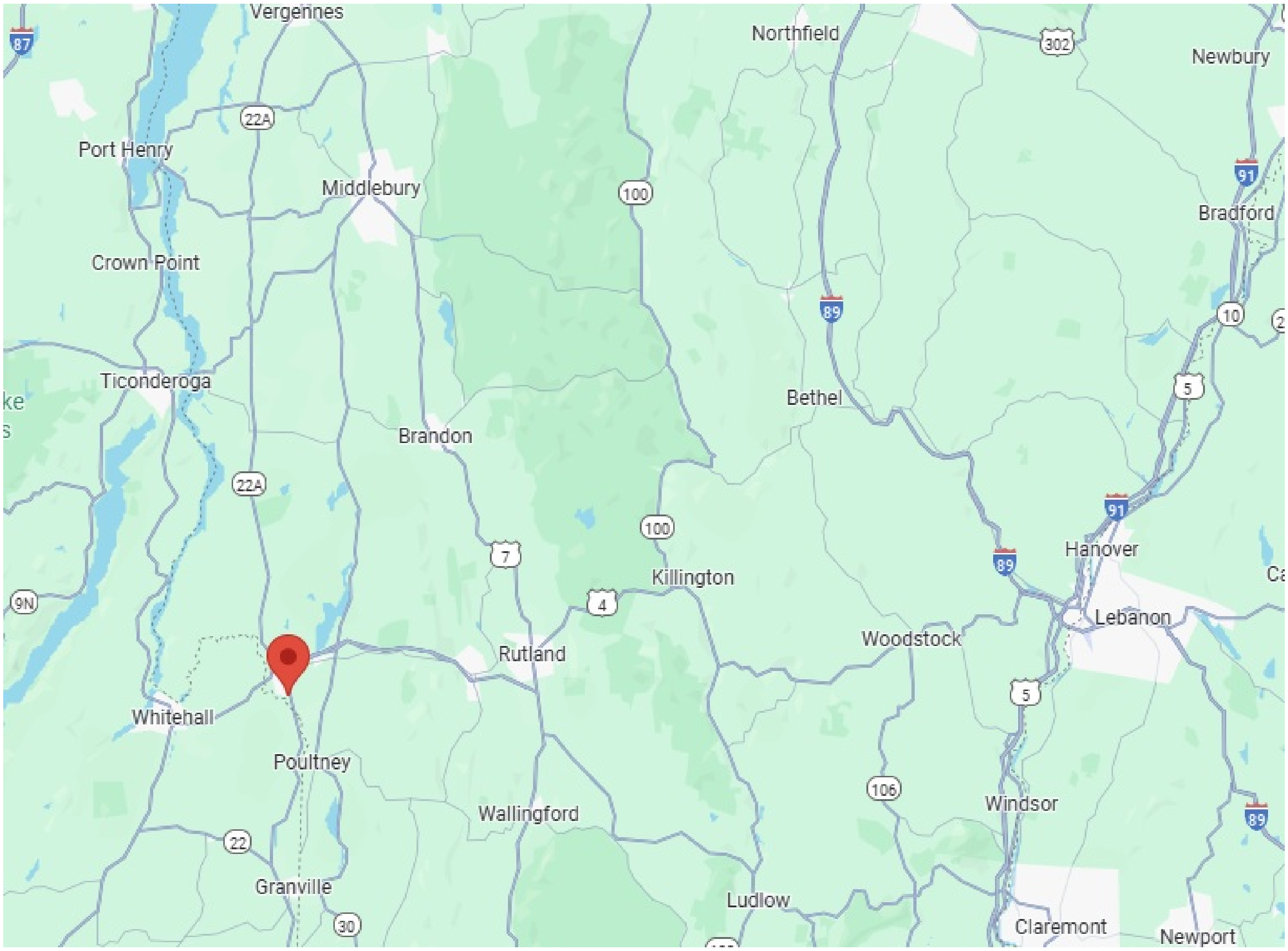


Regional Overview

The subject property is located in Fair Haven, 17 miles west of Rutland City. Rutland is Vermont's fourth largest city, the largest south of the Burlington/South Burlington MSA, and the county seat. Rutland was initially developed C-1770 as a crossroad of local highways and rivers. The early development of Rutland is closely linked to the 'Rutland & Burlington' and the 'Rutland & Whitehall' Railroads, established in the mid 1800's to export marble and slate from local quarries to population centers along the east coast of the United States. The regional population peaked C-1920 as the Vermont Marble Company, established C-1880 in nearby Sunderland Falls, created demand for stone-working, tools and equipment that resulted in the region becoming a center of excellence in precision tooling, stone-working machinery, and architectural stone. Rutland was a rail-centered transportation hub from C-1850 to C-1950 when the interstate highway system bypassed the region entirely. Interstate 87 now passes north to south through New York, 45 miles west; Interstate 89 passes north to south through the Connecticut River valley, 45 miles east.

After WWII, the demand for architectural stone waned along with the fortunes of the region. Rutland re-invented itself as an industrial center around a variety of light-manufacturing industries and as a regional center for services and retail shopping. Several local downhill ski areas including Killington, Okemo and Pico were established in the early 1950's as the first sources of demand for seasonal recreation in the region. The regional industrial base was a steady source of local employment through 1980 when national manufacturers with operations in the Rutland region began to close local facilities and consolidate their operations in more central locations as a way to control production and supply chain costs. Over the past 35 years this trend resulted in the slow loss of manufacturing employment in the region, from an estimated 25% of all regional employment in 1980 to only 13% in 2017. At the same time employment in the service industry grew from 50% of all regional employment to 70% on the near doubling of demand generated by seasonal visitors to nearby downhill ski areas.

Today Rutland is a center of regional employment and commerce for ~ 80,000 year-round residents in the Rutland economic area covering a radius of 20 miles around the city. Its economy benefits from the Killington, Pico and Okemo ski resorts in the Green Mountains to the east and Lake Bomoseen and Lake St. Catherine to the west. In addition, Castleton University, in the western portion of the region, has grown enrollment over the past decade and their students are becoming an additional driver of economic growth in the area. However, the base demand for retail and services comes from the year-round residents in the Rutland economic area who live within driving distance of the city and use Rutland as a center of commerce.

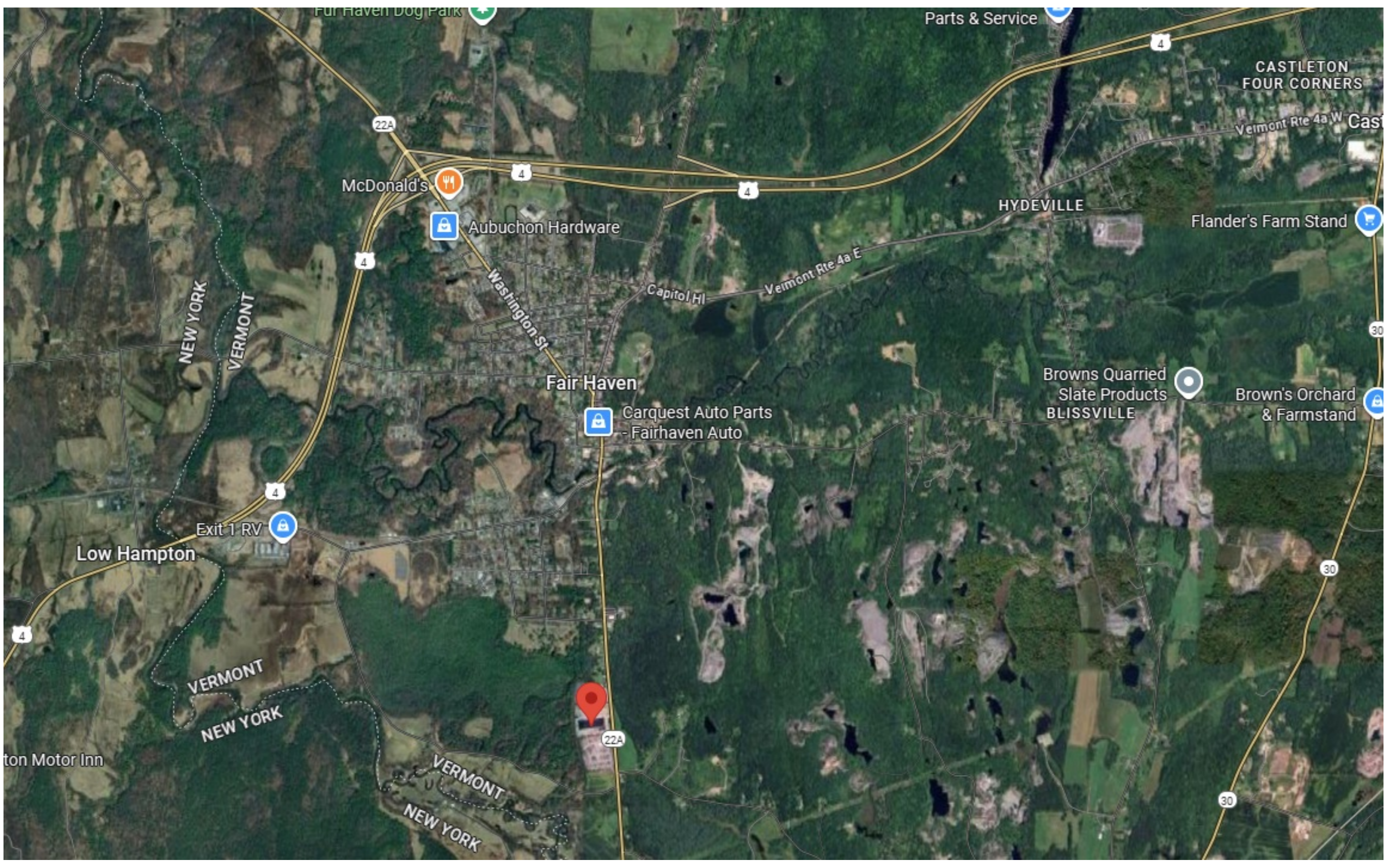

Vergennes
Northfield
Newbury
Port Henry
Middlebury
Bradford
Crown Point
Ticonderoga
Bethel
Brandon
Hanover
Killington
Lebanon
Woodstock
Rutland
Whitehall
Poultney
Windsor
Wallingford
Granville
Ludlow
Claremont
Newport

Neighborhood

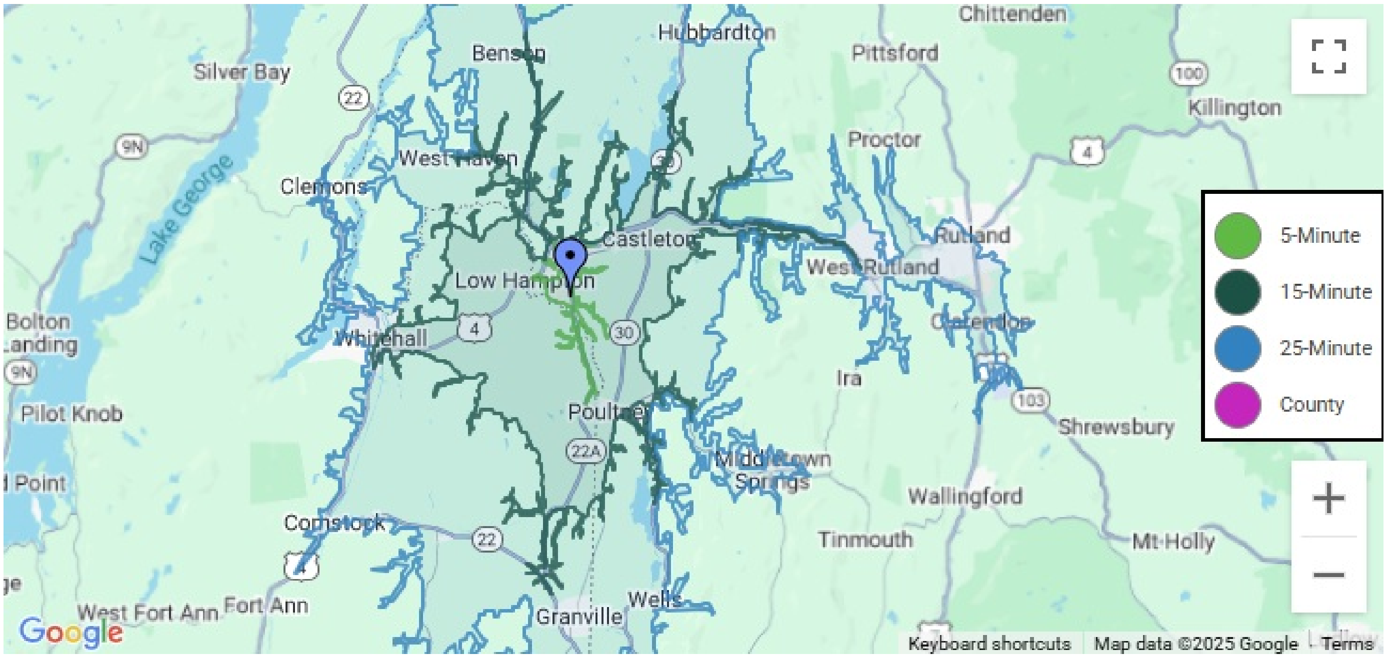
Neighborhood Overview

The subject property is located along South Main Street that is also VT Route 22A in the Fair Haven village center. The Fair Haven center was originally developed between 1850 and 1900 as a center to serve the growing slate quarries in the local area. The predominate land use in this neighborhood is commercial with legally zoned retail stores, service stations, restaurants, churches and professional offices. There are also a few notable 'marble mansions' which have been converted into inns, and legally zoned residential uses in the neighborhood. Most are located along the side streets off of Route 22A and 4A.

Vermont State University at Castleton, a four-year, public college located four miles east in Castleton. In addition to education, recreation, cultural and employment opportunities this provides a demand for housing, retail shops, restaurants, and professional services in the region. However, many residents still travel to Rutland, 15 miles east, for these needs.



Demographics



Areas

5-Minute **15-Minute** **25-Minute** **County** **Vermont** **USA**

Age Distribution of Population

Population Distribution	Age Group	2010		2023		2028		Annual Growth Rate 2010-2028
		Number	Percent	Number	Percent	Number	Percent	
5 - Minute Drive Time								
	0-4	350	4.03%	295	3.74%	312	4.05%	-0.64%
	5-9	368	4.24%	338	4.28%	310	4.03%	-0.95%
	10-14	466	5.36%	368	4.66%	341	4.43%	-1.72%
	15-19	1,214	13.97%	930	11.79%	894	11.62%	-1.69%
	20-24	1,405	16.17%	1,006	12.75%	986	12.81%	-1.95%
	25-34	779	8.97%	779	9.87%	739	9.60%	-0.29%
	35-44	856	9.85%	756	9.58%	742	9.64%	-0.79%
	45-54	1,112	12.80%	773	9.80%	707	9.19%	-2.48%
	55-64	1,105	12.72%	1,150	14.57%	973	12.64%	-0.70%
	65-74	580	6.68%	948	12.01%	939	12.20%	2.71%
	75-84	349	4.02%	455	5.77%	618	8.03%	3.23%
	85+	104	1.20%	93	1.18%	134	1.74%	1.42%

15 - Minute Drive Time							
0-4	1,242	4.69%	1,025	4.10%	1,082	4.44%	-0.76%
5-9	1,342	5.07%	1,179	4.72%	1,074	4.41%	-1.23%
10-14	1,603	6.06%	1,351	5.41%	1,239	5.08%	-1.42%
15-19	2,358	8.91%	1,863	7.46%	1,804	7.40%	-1.48%
20-24	2,390	9.03%	1,890	7.57%	1,902	7.80%	-1.26%
25-34	2,596	9.81%	2,686	10.75%	2,518	10.33%	-0.17%
35-44	3,120	11.79%	2,686	10.75%	2,640	10.83%	-0.92%
45-54	4,039	15.26%	2,865	11.47%	2,604	10.68%	-2.41%
55-64	3,818	14.43%	4,029	16.13%	3,436	14.10%	-0.58%
65-74	2,215	8.37%	3,429	13.73%	3,413	14.00%	2.43%
75-84	1,311	4.95%	1,577	6.31%	2,107	8.64%	2.67%
85+	426	1.61%	403	1.61%	556	2.28%	1.49%
25 - Minute Drive Time							
0-4	2,937	4.69%	2,421	4.05%	2,601	4.40%	-0.67%
5-9	3,250	5.19%	2,849	4.77%	2,616	4.43%	-1.20%
10-14	3,623	5.79%	3,011	5.04%	2,796	4.73%	-1.43%
15-19	4,645	7.42%	3,946	6.60%	3,858	6.53%	-1.03%
20-24	4,683	7.48%	4,033	6.75%	4,077	6.90%	-0.77%
25-34	6,857	10.96%	7,048	11.80%	6,746	11.42%	-0.09%
35-44	7,891	12.61%	6,850	11.47%	6,818	11.55%	-0.81%
45-54	10,017	16.01%	7,137	11.95%	6,607	11.19%	-2.29%
55-64	8,815	14.09%	9,257	15.49%	8,015	13.57%	-0.53%
65-74	5,184	8.28%	7,981	13.36%	8,009	13.56%	2.45%
75-84	3,233	5.17%	3,902	6.53%	5,163	8.74%	2.63%
85+	1,449	2.32%	1,312	2.20%	1,746	2.96%	1.04%
County							
0-4	2,832	4.59%	2,464	4.07%	2,674	4.52%	-0.32%
5-9	3,208	5.20%	2,960	4.89%	2,693	4.55%	-0.97%
10-14	3,552	5.76%	3,070	5.07%	2,859	4.83%	-1.20%
15-19	4,246	6.89%	3,777	6.24%	3,594	6.07%	-0.92%
20-24	4,081	6.62%	3,603	5.95%	3,577	6.04%	-0.73%
25-34	6,106	9.91%	6,601	10.91%	6,369	10.75%	0.23%
35-44	7,387	11.98%	6,603	10.91%	6,557	11.07%	-0.66%
45-54	10,399	16.87%	7,224	11.94%	6,587	11.12%	-2.50%
55-64	9,576	15.53%	9,920	16.39%	8,341	14.08%	-0.76%
65-74	5,559	9.02%	8,914	14.73%	8,748	14.77%	2.55%
75-84	3,257	5.28%	4,105	6.78%	5,466	9.23%	2.92%
85+	1,441	2.34%	1,274	2.11%	1,757	2.97%	1.11%

Vermont							
0-4	31,948	5.11%	28,441	4.39%	30,341	4.69%	-0.29%
5-9	34,654	5.54%	32,223	4.97%	30,288	4.68%	-0.75%
10-14	37,638	6.02%	34,790	5.37%	32,120	4.96%	-0.88%
15-19	46,003	7.35%	42,815	6.61%	42,244	6.53%	-0.47%
20-24	43,853	7.01%	45,530	7.03%	42,918	6.63%	-0.12%
25-34	69,610	11.13%	77,989	12.04%	75,590	11.68%	0.46%
35-44	78,346	12.52%	77,868	12.02%	77,459	11.97%	-0.06%
45-54	102,594	16.40%	78,006	12.04%	75,482	11.66%	-1.69%
55-64	89,958	14.38%	96,554	14.90%	85,418	13.20%	-0.29%
65-74	49,533	7.92%	82,837	12.78%	85,123	13.15%	3.05%
75-84	28,730	4.59%	37,691	5.82%	52,015	8.04%	3.35%
85+	12,797	2.05%	13,215	2.04%	18,184	2.81%	1.97%
United States							
0-4	20,201,271	6.54%	18,963,188	5.67%	19,797,995	5.76%	-0.11%
5-9	20,348,143	6.59%	20,438,069	6.11%	19,809,150	5.77%	-0.15%
10-14	20,676,261	6.70%	21,602,528	6.46%	20,597,569	6.00%	-0.02%
15-19	22,039,828	7.14%	21,707,682	6.49%	22,517,332	6.56%	0.12%
20-24	21,585,764	6.99%	21,666,339	6.48%	22,159,970	6.45%	0.15%
25-34	41,064,090	13.30%	45,816,722	13.71%	43,547,304	12.68%	0.33%
35-44	41,070,386	13.30%	43,712,137	13.08%	45,018,194	13.11%	0.51%
45-54	45,006,760	14.58%	40,977,356	12.26%	41,842,382	12.18%	-0.40%
55-64	36,482,665	11.82%	43,109,314	12.90%	41,660,404	12.13%	0.74%
65-74	21,713,560	7.03%	33,907,258	10.14%	36,813,715	10.72%	2.98%
75-84	13,060,992	4.23%	16,319,442	4.88%	21,896,538	6.37%	2.91%
85+	5,493,490	1.78%	6,013,288	1.80%	7,848,331	2.28%	2.00%

Demographic Summary

Population Statistics	5.0 Minute Drive Time	15.0 Minute Drive Time	25.0 Minute Drive Time	County	Vermont	United States
2000	8,480	26,404	63,883	63,399	608,821	281,398,967
2010	8,688	26,451	62,573	61,643	625,746	308,745,560
2023	7,891	24,983	59,747	60,515	647,959	334,233,323
2028	7,695	24,375	59,052	59,222	647,182	343,508,884
Compound Annual Change						
2000-2010	0.24%	0.02%	-0.21%	-0.28%	0.27%	0.93%
2010-2023	-0.74%	-0.44%	-0.35%	-0.14%	0.27%	0.61%
2023-2028	-0.50%	-0.49%	-0.23%	-0.43%	-0.02%	0.55%
Household Statistics						
2000	2,989	9,957	24,198	25,675	240,623	105,471,508
2010	3,048	10,263	24,548	25,984	256,439	116,716,199
2023	3,080	10,410	24,873	26,889	277,014	129,306,407
2028	2,860	9,742	23,542	25,008	270,135	133,044,029
Compound Annual Change						
2000-2010	0.20%	0.30%	0.14%	0.12%	0.64%	1.02%
2010-2023	0.08%	0.11%	0.10%	0.26%	0.60%	0.79%
2023-2028	-1.47%	-1.32%	-1.09%	-1.44%	-0.50%	0.57%
Avg Household Income						
2000	$34,556	$37,320	$36,178	$36,944	$40,947	$42,305
2010	$41,703	$45,010	$45,064	$44,999	$49,448	$50,021
2023	$61,843	$65,334	$62,087	$66,158	$76,435	$75,421
2028	$64,258	$67,379	$63,831	$68,178	$79,341	$78,648
Compound Annual Change						
2000-2010	1.90%	1.89%	2.22%	1.99%	1.90%	1.69%
2010-2023	3.08%	2.91%	2.50%	3.01%	3.41%	3.21%
2023-2028	0.77%	0.62%	0.56%	0.60%	0.75%	0.84%
% Owner Occupied						
2010	66.96%	74.05%	68.80%	69.84%	70.74%	65.10%
2023	73.41%	77.51%	72.25%	74.22%	72.53%	65.61%
2028	69.65%	74.54%	69.47%	70.25%	71.07%	65.78%
% Renter Occupied						
2010	33.04%	25.94%	31.18%	30.16%	29.26%	34.90%
2023	26.59%	22.49%	27.75%	25.78%	27.47%	34.39%
2028	30.35%	25.46%	30.53%	29.75%	28.93%	34.22%

Distribution of Household Income

Population Statistics	5.0 Minute Drive Time	15.0 Minute Drive Time	25.0 Minute Drive Time	County	Vermont	United States
$150,000 or more	4.11%	4.95%	5.79%	7.16%	9.99%	11.34%
$125,000 to $149,999	6.89%	9.80%	7.71%	7.39%	8.08%	7.03%
$100,000 to $124,999	9.48%	10.91%	9.70%	9.94%	10.65%	9.68%
$75,000 to $99,999	17.10%	13.23%	13.41%	13.67%	13.67%	12.42%
$50,000 to $74,999	9.37%	8.50%	8.82%	8.91%	8.09%	7.79%
$35,000 to $49,999	3.48%	3.89%	3.99%	3.86%	3.33%	3.30%
$25,000 to $34,999	4.27%	4.27%	4.51%	4.29%	3.69%	3.60%
$15,000 to $24,999	4.27%	4.15%	4.45%	3.93%	3.24%	3.31%
Under $15,000	6.03%	5.33%	5.04%	4.42%	3.79%	4.45%

Consumer Expenditures in 1000s

Area	2023	2028	CAGR 2023-2028
5.0 Minute Drive Time	$179,950	$186,576	0.73%
15.0 Minute Drive Time	$649,666	$675,370	0.78%
25.0 Minute Drive Time	$1,544,261	$1,608,043	0.81%
County	$1,757,165	$1,822,893	0.74%
State of Vermont	$20,540,548	$21,496,076	0.91%
United States	$10,002,425,169	$10,610,253,265	1.19%

Highest and Best Use

In appraisal practice, the concept of highest and best use is the premise upon which value is based.

Highest and Best Use *The reasonably probable and legal use of vacant land or an improved property that is physically possible, appropriately supported, financially feasible, and that results in the highest value.*

In order to accurately identify a property's highest and best use, two studies are typically conducted: an analysis of the site, as if vacant, and an analysis of the property as improved.

The highest and best use of land or site **as though vacant** is, among all reasonable alternative uses, the use that yields the highest present land value, after payments are made for labor, capital, and coordination. Use of a property assumes that the parcel of land is vacant or can be made vacant by demolishing any improvements.

To accomplish this analysis as if vacant, the following four criteria must be considered in order:

1. Is the use legally permitted?
2. Is the use physically possible on the site?
3. Is the use economically and financially feasible under current market conditions?
4. Is the use estimated to be the most profitable and return the highest land value?

What uses are legally permitted?

Legal uses are only limited to the Town of Fair Haven zoning ordinance described above in the Zoning section.

Is the use physically possible on the site?

The subject's site, topography and the general character of the land are typical of the primary market area and without functional or external obsolescence. Municipal water and sewer, overhead utilities, and standard municipal services such as schools, police and fire protection are all available at the subject site. As a result, all legal uses that rationally fit on the site are considered physically possible.

Is the use economically and financially feasible under current market conditions?

There are some uses that can be ruled out as financially infeasible, these include single-unit residential uses. Despite an increase in single-unit residential sales pace and median sales price due to demand after the COVID pandemic, inflation in residential construction costs outpaced market value upon completion. There is no evidence of the financial feasibility of new prospective single-unit construction in the subject's primary market area. Those new single-unit homes being built are in direct response to the needs and desires of an owner-occupant for their own use. At completion there is external (economic) obsolescence between 5% and 30% depending on the size, quality, and customization of the home. Therefore, there is no entrepreneurial incentive in new single-unit development.

Construction of new multi-unit residential uses is not commonly financially feasible at this time as in most areas market rent is well below the feasibility rent required to support new construction. While a few micro-neighborhoods of superior residential demand (e.g. White River Junction, Manchester, Morristown, Stowe, …) have evidence of new private market-rate construction, this is driven by developer's expectations that market rents will rise due to demand and are financed at a rate to their equity below the rate to the mortgage. These private investors report construction pricing between $200 and $300/ft^2 and complete the project expecting to increase their return on equity by holding the asset and managing the property over the foreseeable future. In addition, throughout the market area several regional housing trusts are actively involved in new multi-unit residential construction and the conversion of older and functionally obsolete buildings into multi-unit residential properties. These activities are not financially feasible under private market investment criteria and are funded with housing grants, tax incentives, and no interest loans. In return, the inventory they add is rarely market rate and these units are constructed to help close a large gap between the need for affordable housing and the availability of affordable housing; tenancy is commonly limited to households below 80% of the median area household income. Therefore, because all evidence of new market rate construction in those few communities of superior demand indicate a negative return to the equity position, there is no evidence of entrepreneurial incentive in new private multi-unit residential development.

There is no new *speculative* commercial construction even at locations with an AADT over 20,000 and a superior commercial appeal. Construction and holding costs over an extended lease up period exceed feasibility rent. Recent calculations indicate a 30% external (economic) obsolescence in prospective commercial construction. While there is limited new commercial construction in the market area these are only built under two scenarios; bespoke buildings constructed to a specific tenant's brand image in direct response to a contract to lease or buy the real estate at the end of construction, or owner-occupied buildings constructed to house a growing business. While new construction in the first group is only completed when the project meets national investment criteria, new construction in the second group is often financed through existing banking relationships and based upon net cash flow generated by the business.

There is very limited evidence of real estate speculators buying raw land. In general, these sites are marketed as 'built to suit' sites and are not being prospectively developed. This is additional evidence of economic obsolescence in new commercial construction. This market will wait for vacancy rates to hold at a frictional 5%, commercial lease rate increases, or tenants pre-leasing new space before any prospective commercial space is constructed.

Is the use estimated to be the most profitable and return the highest land value?

There are no financially feasible uses as vacant. The maximally productive use would be to hold the land awaiting a return in demand. As-if-vacant the most likely user (buyer) is equally an owner-occupant who will develop the property with a building that suits their needs or an investor willing to hold the property until a demand develops and they can generate a return on their investment by selling the land or developing it in response to a specific contract for construction and leaseback. There are several examples of this type of development in the market area, but none was prospective.

The highest and best use of property **as improved** is the use that should be made of a property as it exists. An existing property should be renovated or retained, as is, so long as it continues to contribute to the total market value of the property, or until the return from a new improvement would more than offset the cost of demolishing the existing building and constructing a new one.

In the as-improved analysis the answer to the first question; "What uses are legally permitted?" is the same as in the as-vacant analysis. The answer to the second question, "Is the use physically possible on the site?" is yes, as the improvements described in this report existed on the effective date of this analysis.

Is the use economically and financially feasible under current market conditions?

Four alternatives are commonly considered under this question, and for any of these four options to be financially feasible the change must add at least as much value to the property as it costs, including entrepreneurial incentive, holdings costs, and the cost of capital.

1. Demolition of the existing improvements and redevelopment of the site to a new use
2. Conversion of the existing improvements to an alternate use
3. Renovation of the existing improvements
4. Alteration of the existing improvements

Demolition and redevelopment of the subject's existing improvements is not financially feasible. There is no evidence of a demand in any other type of use and the existing improvements are recently renovated and well maintained. They contribute to value and should be retained.

Conversion of the existing improvements to an alternate use does not appear to be financially feasible as there is no pattern of a change in use in the subject's market area; much less one that would generate a higher market rent.

A renovation to improve the quality and condition of the building improvements is not prospectively financially feasible. This would only be completed in response to a lease contract calling for renovation and returning a rental income that makes the renovation feasible under typical investment criteria.

A prospective alteration of the existing improvements is also not financially feasible and like a renovation, would only be completed in response to a lease calling for alteration.

Is the use estimated to be the most profitable and return the highest land value?

Holding the existing improvements as-is, renovating in response to the needs of an owners' business or in response to a lease contract at a financially feasible rate is the only financially feasible use and therefore the highest and best use of the site as improved.

Land Valuation

Method Explanation

To calculate the equalized assessed value of a property, you divide its current assessed value by the town's Common Level of Appraisal (CLA). The CLA is the ratio of the total assessed value of all property in a town to the total fair market value of that property. This calculation helps determine the estimated market value of a property based on its assessed value. The formula used is:

Calculation
Given the land assessed value of **$135,800** and the Fair Haven CLA of **62.20%** (or **0.6220** as a decimal), the equalized assessed land value is calculated as follows:

Answer:
The equalized assessed land value is approximately **$218,327.97**.

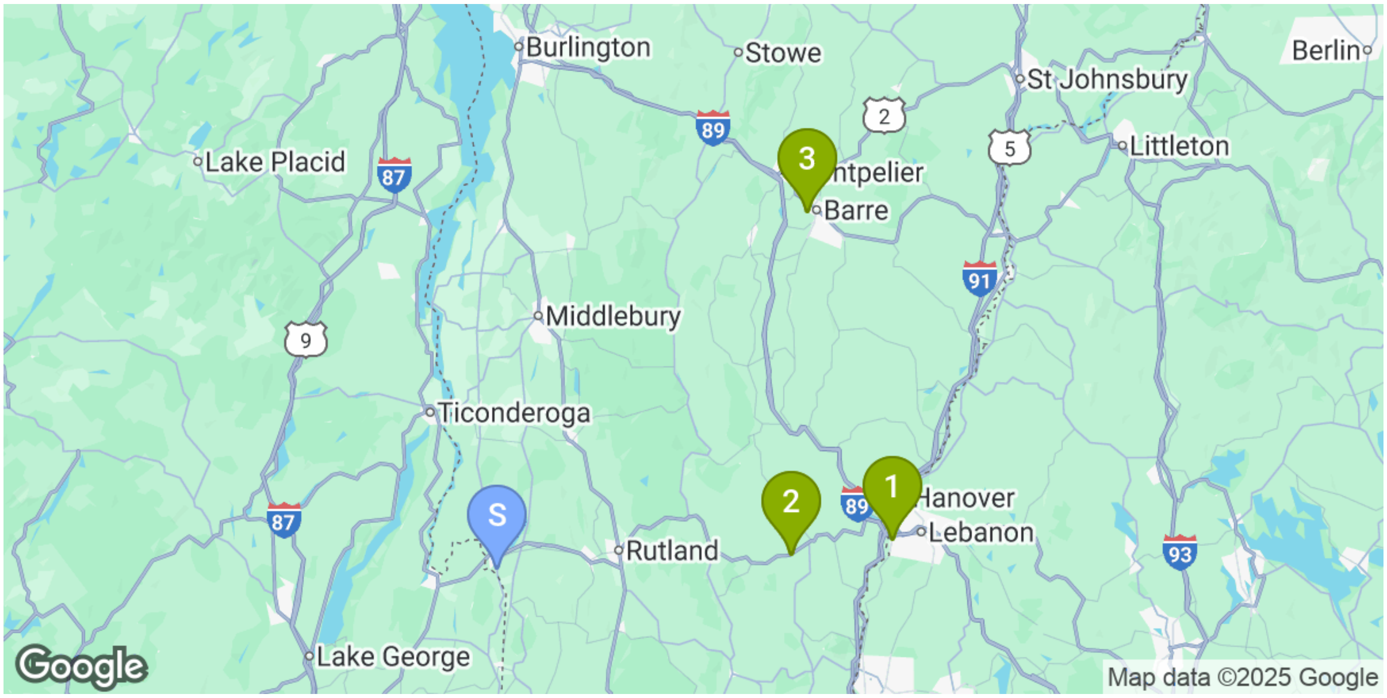
This method yields a Rounded Land Value of $220,000 for the entire 13.7 Acre parcel. While potential development opportunity could be extracted from the surplus land away from the Factory Improvements, the Highest & Best Use of the site as vacant as explained in the HBU section, reduces the feasibility and likelihood that the land would sell at premium value much beyond a portion of the above concluded value.

The Concluded Land Value as of the effective date of value is summarized below.

Indicated Values	
Units	596,772
Unit of Comparison	Land SF
Indicated Value / Unit of Comparison	$0.37
Land Indicated Value	$220,806
Rounded	$220,000

Sales Comparison Approach

We have valued the subject according to its highest and best use, as improved. A summary of the sales follows. In evaluating the comparable sales, we selected Sales Price per square foot of gross building area as the primary unit of comparison. This is the unit of comparison most commonly quoted by brokers, sellers, and purchasers when discussing sales transactions and is considered the most relevant for the subject.



#	Property Name	Year Built	GBA SF	RA SF	Units	Sale Date	Sale Price	Sale Price / Unit	Sale Price / SF	Analysis Sale Price	Analysis SP / Unit	Analysis SP / SF
1	24 Interchange Drive	1986	30,734	30,734	1	3/17/2022	$2,425,000	$2,425,000	$78.90	$2,425,000	$2,425,000	$78.90
2	2513 W. Woodstock Road	1996	27,716	27,716	1	2/1/2022	$1,612,000	$1,612,000	$58.16	$1,612,000	$1,612,000	$58.16
3	277 Morrison Road	1986	52,100	52,100	1	12/17/2021	$2,680,000	$2,680,000	$51.44	$2,680,000	$2,680,000	$51.44

Sale #1 - 24 Interchange Drive

Property Information	
Property Name	24 Interchange Drive
Property Class	Industrial
Address	24 Interchange Drive, West Lebanon, NH 03784
County	Grafton
Property Type & Sub-Type	Flex Space / ---
Site Information - Main Site	
SF / Acres	105,851 / 2.4300
Improvement Information - Main	
Gross Building Area	30,734
Rentable Area	30,734
Year Built	1986
Construction Quality	Good
Building Condition	Good
# of Units	1
Improvements Ratios	
Land to Bldg Ratio (x:1)	3.44
Transaction Information	
Sale Status	Closed
Sale Date	03/17/2022
Property Rights Convey Method	Leased Fee
Seller	Valley Publishing Corp
Buyer	EJB Holdings LLC
Sale Price	$2,425,000
Analysis Sale Price	$2,425,000
Sale Price per SF GBA	$78.90
Analysis Sale Price per SF GBA	$78.90
Sale History	There have been no sales of the property in the past three years.
Sale Remarks	The sale is arm's length, but was not openly marketed. The sale price was intended to be at market.

Sale #2 - 2513 W. Woodstock Road

Property Information	
Property Name	2513 W. Woodstock Road
Property Class	Industrial
Address	2513 W. Woodstock Road, Woodstock, VT 05091
County	Windsor
Property Type & Sub-Type	Business Park / ---
Site Information - Main Site	
SF / Acres	166,835 / 3.8300
Improvement Information - Main	
Gross Building Area	27,716
Rentable Area	27,716
Year Built	1996
Construction Quality	Good
Building Condition	Good
# of Units	1
Improvements Ratios	
Land to Bldg Ratio (x:1)	6.02

Transaction Information	
Sale Status	Closed
Sale Date	02/01/2022
Property Rights Convey Method	Leased Fee
Seller	Wild Apple Properties LP
Buyer	Zilian LLC
Sale Price	$1,612,000
Analysis Sale Price	$1,612,000
Sale Price per SF GBA	$58.16
Analysis Sale Price per SF GBA	$58.16
Sale History	There have been no sales of the property in the past three years.
Sale Remarks	The property was listed on the open market.

Sale #3 - 277 Morrison Road

Property Information	
Property Name	277 Morrison Road
Property Class	Industrial
Address	277 Morrison Road, Barre Town, VT 05641
County	Washington
Property Type & Sub-Type	Manufacturing / Light
Site Information - Main Site	
SF / Acres	265,716 / 6.1000
Improvement Information - Main	
Gross Building Area	52,100
Rentable Area	52,100
Year Built	1986
Construction Quality	Good
Building Condition	Good
# of Units	1
Improvements Ratios	
Land to Bldg Ratio (x:1)	5.10

Transaction Information	
Sale Status	Closed
Sale Date	12/17/2021
Property Rights Convey Method	Leased Fee
Seller	Bond Warehouse LLC
Buyer	Metro Development LLC
Sale Price	$2,680,000
Analysis Sale Price	$2,680,000
Sale Price per SF GBA	$51.44
Analysis Sale Price per SF GBA	$51.44
Sale History	There have been no sales of the property in the past three years.
Sale Remarks	The property was listed on the open market.

Elements of Comparison -- Related to the Transaction

We have evaluated the comparable sales based on differences in various elements of comparison. The first of these are elements that must be compared in every analysis and are related to the property rights conveyed, the terms/financing, conditions of the sale, expenditures after the sale, excess land value, and market conditions.

Property Rights

The property rights involved in the sales did not appear to have a significant impact on the prices, and no adjustments were required.

Terms / Financing

The terms/financing involved in the sales did not appear to have a significant impact on the prices, and no adjustments were required.

Conditions of Sale

Sale #2 had some Pre-Paid Rent which affected the cash-equivalent sales price.

Expenditures After Sale

The expenditures after sale involved in the sales did not appear to have a significant impact on the prices, and no adjustments were required.

Excess Land Value

The excess land value involved in the sales did not appear to have a significant impact on the prices, and no adjustments were required.

Market Conditions

As can be seen, the sales have occurred relatively recently. Available market data does not indicate any significant change in prices of comparable properties during this period, and no adjustments for market conditions were required.

Elements of Comparison -- Related to the Property

Quality

There were no adjustments needed for differences in quality.

Condition

All sales were adjusted -10% for their superior condition at the time of sale.

Location

All Sales have been adjusted -10% to account for their premium locations closer to the I89/I91 interstate corridor.

Size-Improvements

The market price per square foot follows an exponential decay function where higher square footage properties receive a "discount" on a per SF basis.

Sale Adjustments				
	Subject	**Sale #1**	**Sale #2**	**Sale #3**
Name	**Skyline Factory**	24 Interchange Drive	2513 W. Woodstock Road	277 Morrison Road
Street Address	**875 South Main Street**	24 Interchange Drive	2513 W. Woodstock Road	277 Morrison Road
City	**Fair Haven**	West Lebanon	Woodstock	Barre Town
Sale Price		$2,425,000.00	$1,612,000.00	$2,680,000.00
Unit of Comp.	**Gross Building Area**	Gross Building Area	Gross Building Area	Gross Building Area
UoC Value	**90,479 sf**	30,734 sf	27,716 sf	52,100 sf
Sale Price / UoC		$78.90	$58.16	$51.44
Transactional Adjustments *(calculated cumulatively)*				
Property Rights		*Leased Fee*	*Leased Fee*	*Leased Fee*
		Similar	Similar	Similar
Terms/Financing		*$0.00*	*$0.00*	*$0.00*
		Similar	Similar	Similar
Cond. of Sale		*$0.00*	*$0.00*	*$0.00*
Adjustment		$0.00	$2.27	$0.00
Expend. After Sale		*$0.00*	*$0.00*	*$0.00*
		Similar	Similar	Similar
Excess Land Val.		*$0.00*	*$0.00*	*$0.00*
		Similar	Similar	Similar
Market Cond.		*3/17/2022*	*2/1/2022*	*12/17/2021*
		Similar	Similar	Similar
Adj. Price per UoC		*$78.90*	*$60.43*	*$51.44*
Property Adjustments - Quantitative *(not cumulative)*				
Condition	*Average*	*Good*	*Good*	*Good*
Adjustment		-10.00% -$7.89	-10.00% -$6.04	-10.00% -$5.14
Location	*Average*	*Good*	*Good*	*Good*
Adjustment		-10.00% -$7.89	-10.00% -$6.04	-10.00% -$5.14
Quality	*Average and Good*	*Good*	*Good*	*Good*
		Similar	Similar	Similar
Size - Improvement , Gross Building Area	*90,479 sf*	*30,734 sf*	*27,716 sf*	*52,100 sf*
Adjustment		-50.00% -$39.45	-50.00% -$30.22	-35.00% -$18.00
Total Adjustments				
Gross % Adj's	N/A	70.00%	76.63%	54.98%
Gross $ Adj's	N/A	$55.23	$44.57	$28.28
Net % Adj's	N/A	-70.00%	-68.83%	-54.98%
Net $ Adj's	N/A	-$55.23	-$40.03	-$28.28
Net Adj Price / UoC	N/A	$23.67	$18.13	$23.16

Adjusted Price Indications	
Minimum	$18.13
Maximum	$23.67
Average	$21.65
Median	$23.16
Standard Deviation	2.50

The adjustments are summarized in the above adjustment grid. Comment on reconciliation of value.

Sales Comparison Value	
Units	90,479
Unit of Comparison (UoC)	Gross Building Area
Sales Comparison Value / UoC	$23.00
Sales Comparison Value	$2,081,017
Rounded	$2,080,000

Income Approach

Operating Income

The subject's potential gross income is a function of rental payments under the terms of current and anticipated leases. This can include base rent as well as expense reimbursements and escalations.

Existing Contract Leases

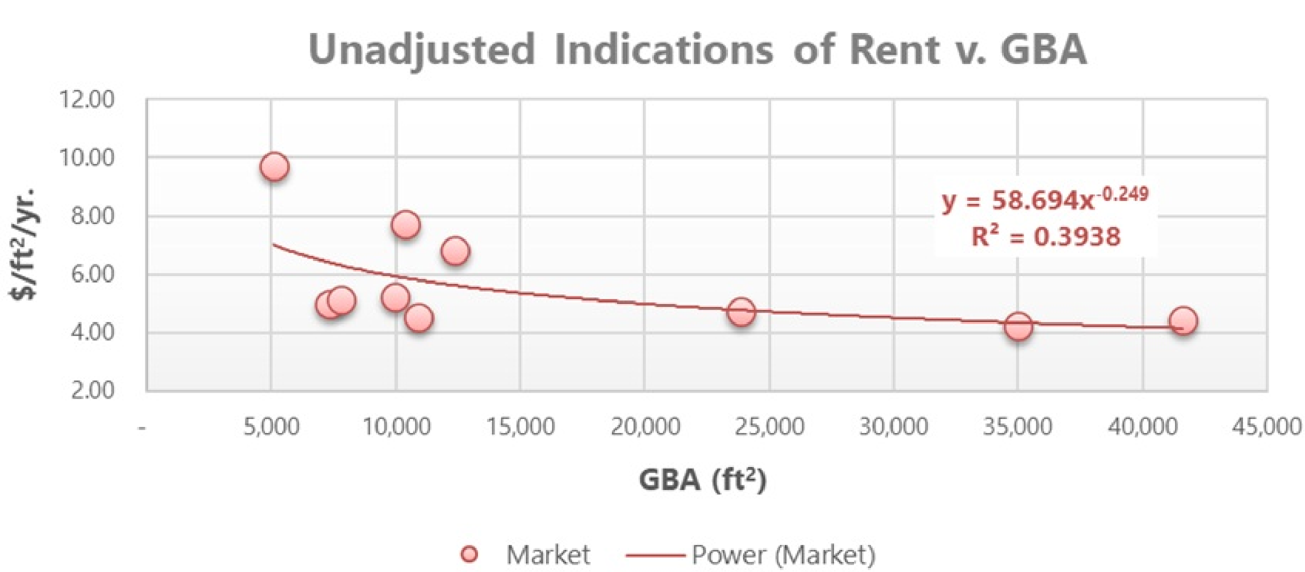
The current rent roll has not been provided or examined by the appraiser and instead market rents have been extracted from recent market data.

Market Rental Data

Below is NN Lease Terms for light industrial market rents.

Property	Town	Location	GBA	Layout	Tenant Credit Quality	NN Rental Rate ($/ft^2/yr)	Lease Year Ending	Lease Term	Rental Rate Pattern	Cap	Stop
Rent. Comparable 1	Hartford	Ind. Park	5,085	Warehouse	Unrated	9.72	9/1/2023	3-Year	+ 2%/yr	N/A	N/A
Rent. Comparable 2	Rutland	Ind. Park	7,310	Service / Office	Unrated	4.97	11/1/2023	MtM	Fixed	N/A	N/A
Rent. Comparable 3	Rutland	Ind. Park	7,800	Warehouse / Office	Unrated	5.13	2/28/2023	5-Year	+Δ CPI	None	None
Rent. Comparable 4	Hartford	Ind. Park	9,976	Service / Office	Unrated	5.23	7/1/2023	3-Year	Fixed	N/A	N/A
Rent. Comparable 5	Manchester	Ind. Park	10,371	Warehouse / Office	Unrated	7.73	11/1/2023	5-Year	+ 3%/yr	N/A	N/A
Rent. Comparable 6	West Rutland	Ind. Park	10,880	Warehouse / Office	Unrated	4.55	3/32/2023	3-Year	Fixed	N/A	N/A
Rent. Comparable 7	Hartford	Ind. Park	12,372	Warehouse	Unrated	6.83	11/1/2023	5-Year	+ 3%/yr	N/A	N/A
Rent. Comparable 8	Randolph	Ind. Park	23,868	Service / Office	Government	4.72	7/30/2023	1-Year	Fixed	N/A	N/A
Rent. Comparable 9	Rutland	Ind. Park	35,000	Warehouse / Office	Unrated	4.25	8/8/2023	7-Year	Fixed	N/A	N/A
Rent. Comparable 10	Randolph	Ind. Park	41,632	Warehouse / Office	Unrated	4.44	9/30/2023	3-Year	Fixed	N/A	N/A

Graphing them we notice a trend in Price PSF of GBA:



Given our large GBA footprint, we conclude NN Rental rates for our subject as $3.50/sf/yr. Then adding back the Nets to get to triple net, we use a 30% expense ratio for Taxes, Insurance, Management, and Maint. Repair expenses. This implies a NNN lease rate for the subject property of $2.45/sf/yr. Multiplied by the GBA of the subject 2.45 X 90,479 yields a Potential Gross Income (PGI) of $221,673.55.

No significant other income is anticipated for the subject and none was included in the forecast for this analysis.

It is also prudent to consider the potential loss due to bad credit and collection problems. Based on these indications, we have estimated stabilized vacancy and collection loss for the subject at 10% of potential gross income.

Pro Forma				
	Total	Per SF	Per Unit	% of EGI
Income				
Rental Income	$221,674	$2.45	$221,674	111.11%
Potential Gross Income (PGI)	$221,674	$2.45	$221,674	111.11%
Less Vacancy & Credit Loss	$22,167	$0.24	$22,167	11.11%
Effective Gross Income (EGI)	$199,506	$2.21	$199,506	100.00%
Net Operating Income	**$199,506**	**$2.21**	**$199,506**	**100.00%**

Direct Capitalization

In order to capitalize the estimated net operating income into a value estimate for the property, we used direct capitalization. Direct capitalization involves the capitalization of anticipated net operating income for the next year at an overall rate of return. This rate is also commonly referred to as the 'going-in' capitalization rate. When adequate data is available, the overall rate is best derived from the comparable sales. The capitalization rates from comparable sales are shown in the table below.

Capitalization Rate Derivation – Build-Up Method

The overall capitalization rate (OAR) represents the relationship between a property’s net operating income and its market value. Due to the limited number of industrial property transactions in the Fair Haven area, the appraiser developed a capitalization rate using the build-up method and compared the result to market-derived rates from similar small industrial assets in southern Vermont.

Base Rate (Safe Rate)

The starting point is the yield on a risk-free investment. As of the valuation date, the 10-year U.S. Treasury yield was approximately **4.5%**, which serves as the base rate of return.

Equity Risk Premium

Investors require additional yield to compensate for risks inherent to real estate ownership, including management, illiquidity, and tenant credit risk. An **equity risk premium of 2.0%** is considered appropriate for stabilized industrial investments.

Market and Property-Specific Risk Premium

Industrial properties in tertiary markets such as Fair Haven exhibit limited buyer pools, less diverse tenant bases, and lower liquidity compared to those in larger regional markets. However, industrial assets tend to offer more stable occupancy and lower turnover risk than small offices or retail properties. Balancing these factors, a **market and property-specific risk premium of 2.5%** is applied.

Total Indicated Capitalization Rate (Build-Up)

Component	Rate
Safe rate (10-year Treasury)	4.5%
Equity risk premium	2.0%
Market/property-specific risk	2.5%
Indicated OAR (Build-Up)	**≈ 9.0%**

Market Corroboration and Reconciliation

Sales data and investor surveys for small industrial and flex properties in Vermont's secondary and tertiary markets (Rutland, Springfield, St. Johnsbury) indicate overall capitalization rates typically ranging from **8.0% to 10.0%**, depending on age, condition, and tenant stability.

Given the subject's:

- Rural Fair Haven location (elevated market risk),
- Functional, utilitarian design suited to local demand, and
- Stable tenancy with modest lease term remaining,

the appraiser reconciles toward the lower end of the risk-adjusted range. Accordingly, a **final overall capitalization rate of 9.0%** is concluded for application to the subject's stabilized net operating income.

Direct Capitalization	OAR	Amount	Per Rentable Area SF
Net Operating Income		$199,506	$2.21
Capitalized Value	**9.00%**	**$2,216,736**	**$24.50**
Low Range	9.00%	$2,216,736	$24.50
High Range	9.00%	$2,216,736	$24.50

Income Approach Conclusions

The results from the income approach are summarized in the table below:

Direct Capitalization		Discounted Cash Flow		Income Approach	
Amount	Per SF of Rentable Area	Amount	Per SF of Rentable Area	Amount	Per SF of Rentable Area
$2,220,000	$24.54	N/A	$0.00	$2,220,000	$24.54

Reconciliation

Indicated Values

Description	Indicated Value
Land Value	**$220,000**
Cost Approach	N/A
Sales Comparison Approach	**$2,080,000**
Income Approach	**$2,220,000**

Final Estimate of Value

Cost Approach

The cost approach was not utilized given the age of the subject property.

Sales Comparison Approach

The Sales Approach was used and is seen as valid market participatory data. However, transactions in the market of a property this size and large light industrial buildings in general, leads to a lag in market response in the comparable data, though still valid and accurate to the valuation picture. Therefore, the Sales Comparison approach is weighted 50% of the total value.

Income Approach

The Income Approach was used and is seen as valid as an investor would might view the market valuation. However, a property this size, leads to a difficulty in estimating lease rates, though still valid and accurate to the valuation picture. Therefore, the Income Capitalization Approach is weighted 50% of the total value.

Reconciliation Conclusion

See the table below for the blended value conclusion.

Exposure Time and Marketing Period

Based on statistical information about days on market, escrow length, and marketing times gathered through national investor surveys, sales verification, and interviews of market participants, marketing and exposure time estimates of 12 months, respectively, is considered reasonable and appropriate for the subject property
assuming aggressive professional marketing.

Value Conclusions

Description	Perspective	Type of Value	Premise	Property Interest	Effective Date	Indicated Value
N/A	Current	Market Value	As Is	Leased Fee	09/24/2025	$2,150,000

General Underlying Assumptions and Limiting Conditions

This appraisal is subject to the following general assumptions and limiting conditions.

1. The legal description used in the report is assumed correct. No responsibility is assumed in connection with a survey, or for encroachments, or overlapping, or other discrepancies that might be revealed thereby. Any sketches included in the report are only for the purpose of aiding the reader in visualizing the property.
2. No responsibility is assumed for an opinion of a legal nature, such as to ownership of the property or condition of title. The appraiser assumes the title to the property to be marketable; that, unless stated to the contrary, the property is appraised as an unencumbered fee, which is not used in violation of acceptable ordinances, statutes or other governmental regulations.
3. The appraiser assumes there are no hidden or unapparent conditions on the property, subsoil or structures, which would render it more or less valuable than otherwise comparable property. The appraiser is not an expert in determining the presence or absence of hazardous substance, defined as all hazardous or toxic materials, waste, pollutants or contaminants, (including but not limited to asbestos, PCB, UFFI, or other raw materials or chemicals) used in construction or otherwise present on the property. The appraiser assumes no responsibility for the studies or analysis, which would be required to conclude the presence or absence of such substances or for loss in value as a result of the presence of such substances. The client is urged to retain an expert in this field, if desired. The value estimate in this report is based on the assumption that the property is not so affected.
4. Information, estimates and opinions furnished to the appraiser and contained in this report, were obtained from sources considered reliable and believed to be true and correct. However, no responsibility for accuracy of such items furnished the appraiser can be assumed by the appraiser.
5. All mortgages, liens, encumbrances and servitudes have been disregarded unless so specified within the appraisal report. The subject property is appraised as though under responsible ownership and competent management.
6. It is assumed that all applicable zoning and use regulations and restrictions have been complied with, unless a nonconforming use has been stated, defined and considered in the valuation. It is assumed that the subject property complies with all applicable federal, state and local environmental regulations and laws, unless noncompliance is stated, defined and considered in the valuation.
7. It is assumed that the information relating to the location of or existence of public utilities is correct. No warranty has been made regarding the exact location or capacities of public utility systems.
8. It is assumed that all licenses, consents or other legislative or administrative authority from local, state or national governmental or private entity or organizations have been, or can be, obtained or renewed for any use on which the value estimate contained in the valuation report is based.
9. The appraiser will not be required to give testimony or appear in court due to preparing the appraisal with reference to the subject property in question, unless prior arrangements have been made.
10. Possession of the report does not carry with it the right of publication. Out-of-context quoting from or partial reprinting of this appraisal report is not authorized. Further, neither all nor any part of this appraisal report shall be disseminated to the general public by the use of media for public communication without the prior consent of the appraiser signing the report.
11. Disclosure of the contents of this report is governed by the By-Laws and Regulations of the Appraisal Institute. Neither all nor any part of the contents of this report shall be disseminated to the public through advertising media, public relations media or any other public means of communication without the prior written consent and approval of the author, particularly as to valuation, conclusions, the identity of the appraiser or firm with which the appraiser is connected, or any reference to the Appraisal Institute, MAI or SRA designation.
12. The distribution of the total value in this report, between land and improvements, is applicable only as a part of

the whole property. The land value, or the separate value of the improvements, must not be used in conjunction with any other appraisal or estimate and is invalid if so used.

13. No environmental or concurrent impact studies were either requested or made in conjunction with this appraisal report. The appraiser, thereby, reserves the right to alter, amend, revise or resend any of the value opinions based upon subsequent environmental or concurrent impact studies, research or investigation as of the effect date of the value opinion.
14. An appraisal related to an estate in land that is less than the whole fee simple estate applies only to the fractional interest involved. The value of this fractional interest plus the value of the other fractional interests may or may not equal the value of the entire fee simple estate considered as a whole. The appraisal report related to a geographical potion of a larger parcel is applied only to such geographical portion and should not be considered as applying with equal validity to other portions of the larger parcel or tract. The value for such geographical portions plus the value of all other geographical portions may or may not equal the value of the entire parcel or tract considered as an entity.
15. If the appraisal is subject to any proposed improvements or additions being completed as set forth in the plans, specifications and representations referred to in this report it is assumed that this work would be performed in a good and workmanlike manner. If the appraisal is further subject to the proposed improvements or additions being constructed in accordance with the regulations of the local, county and state authorities. The plans, specifications, and representations referred to are an integral part of the appraisal report when new construction or new additions, renovations, refurbishing or remodeling applies.
16. If the appraisal is used for mortgage loan purposes, the appraiser invites attention to the fact that (1) the equity cash requirements of the sponsor have not been analyzed, (2) the loan ratio has not been suggested and (3) the amortization method and term have not been suggested.
17. The function of the report is not for use in conjunction with a syndication of real property. This report cannot be used for said purposes and therefore, any use of this report relating to syndication activities is strictly prohibited and unauthorized. If such an unauthorized use of this report takes place, it is understood and agreed that Foster Sargeant, LLC & Foster Sargeant Appraisal Service have no liability to the client and/or parties.
18. It is assumed that the property has all the necessary state and local permits to be used as configured.
19. It is assumed that the subject building(s), when present, are in compliance with the Americans with Disability Act that went into effect on January 26, 1992 for all public buildings. If any building is not in compliance and the owners are not making the necessary changes to satisfy the law, then the value in this report may not be valid.
20. It is assumed that the rental information supplied by others and quoted in this report is accurate. The appraiser assumes no responsibility for independently verifying this information. If the client has any questions regarding this data, it is the client's responsibility to seek whatever independent verification is deemed necessary.
21. It is assumed that the date of value to which the opinions expressed in this report apply is set forth in the letter of transmittal. The appraiser assumes no responsibility for economic or physical factors occurring at some later date, which may affect the opinions herein stated.
22. No ‘engineering survey’ has been made by the appraiser. All engineering is assumed to be correct. Except as specifically stated, data relative to size and area were taken from sources considered reliable, and no encroachment of real property improvements is assumed to exist.
23. It is assumed that the appraiser has personally inspected the subject property and finds no obvious evidence of structural deficiencies except as stated in the report. However, no responsibility for hidden defects or conformity to specific governmental requirements, such as fire, building and safety or occupancy codes, can be assumed without provisions of specific professional or governmental inspections.
24. It is assumed that no opinion is expressed as to the value of subsurface oil, gas or mineral rights and that the property is not subject to surface entry for the exploration of removal of such materials except as expressly stated.
25. It is assumed that there is full compliance with all applicable federal, state and local environmental regulations and laws unless noncompliance is stated, defined and considered in the appraisal report.
26. It is assumed that all applicable zoning and use regulations and restrictions have been complied with, unless a non-conformity has been stated, defined and considered in the appraisal report.

27. It is assumed that all licenses, certificates of occupancy, consents, or other legislative or administrative authority from any local, state or national government or private organization have been or can be obtained or renewed for any use on which the value estimate contained in this report is based.
28. It is assumed that no opinion is intended to be expressed for legal matters or that would require specialized investigation or knowledge beyond that ordinarily employed by real estate appraisers, although such matters may be discussed in this report.
29. Information concerning sale transactions has been confirmed by either the buyer, seller or a third party. Every attempt has been made to verify this information by the appraiser and it is assumed to be reliable. It is specifically assumed that the sales information noted herein is correct.
30. No detailed soil studies covering the subject property were available to the appraiser. Therefore, premises as to soil qualities employed in this report are not conclusive but have been considered consistent with information available to the appraiser.
31. That septic system information, when present, is provided by the Realtor, seller or other party and is assumed to be adequate unless otherwise noted. The appraiser is not qualified to determine the capacity, condition or legal use of the system. This information is difficult to find and may represent opinion rather than fact.
32. Although no termite inspection report was available, the appraiser personally inspected the subject property and found no significant evidence of termite damage or infestation. A professional inspection is suggested.
33. Acceptance and/or use of this appraisal report constitutes acceptance of the foregoing Statements and Conditions. The appraisers' duties, pursuant to the employment to make the appraisal are complete upon delivery and acceptance of the appraisal report. However, any corrections or errors should be called to the attention of the appraiser within 60 days of delivery of the report.
34. In addition to all other terms and conditions agreed to at the time of engagement, appraiser and client agree that the appraiser's services under the agreement, this appraisal report, and any use of the information developed as part of this assignment will be subject to the statements, limiting conditions and other terms set forth in this appraisal report. The appraiser's standard appraisal statements, limiting conditions and terms are incorporated herein. The appraiser may determine additional conditions and terms affecting the appraisal during performance of this assignment which may be identified in this report.
35. The liability of Foster Sargeant, LLC and Foster Sargeant Appraisal Service is limited to the client only and only up to the amount of the fee actually received for the assignment. Furthermore, there is no accountability, obligation, or liability to any third party. If this report is delivered to anyone other than the client, the client shall make such party aware of all limiting conditions and assumptions of the assignment and any related discussions.
36. This appraisal report and all of the appraiser's work in connection with this assignment are subject to the limiting terms and conditions stated in this report. Any use of the appraisal by any party, regardless of whether such use is authorized or intended by the appraiser, constitutes acceptance of all such limiting conditions and terms.
37. Unless the time frame is shorter under applicable law, any legal action or claim relating to the appraisal or Appraiser's services shall be filed in court (or the applicable arbitration tribunal, if the parties to the dispute have executed an arbitration agreement) within two (2) years from the date of delivery to the Client of the appraisal report to which the claims or causes of action relate or, in the case of acts or conduct after delivery of the report, two (2) years after the date of alleged acts or conduct. The time frame stated in this section shall not be extended by any delay in the discovery or accrual of the underlying claims, causes of action or damages. The time frame stated in this section shall apply to all non-criminal claims or causes of action of any type.
38. Legal claims or causes of action relating to the appraisal are not transferrable or assignable to a third party, except; (1) as the result of a merger, consolidation, sale or purchase of a legal entity, (2) with regard to the collection of a bona fide existing debt for services but then only to the extent of the total compensation for the appraisal plus reasonable interest, or (3) in the case of an appraisal performed in connection with the origination of a mortgage loan, as part of the transfer or sale of the mortgage before an event of default on the mortgage or note or its legal equivalent.
39. The only intended user of this appraisal is the client. There is no other intended user. No purchaser, seller, or borrower are intended users of this report. No party, other than the intended user, should rely upon this appraisal

for any purpose whatsoever. The fact that some party, other than the client, paid for the appraisal, either directly, or indirectly, does not make them an intended user.

40. The only intended user of this appraisal is the client. There is no other intended user. No purchaser, seller, or borrower are intended users of this report. No party, other than the intended user, should rely upon this appraisal for any purpose whatsoever. The fact that some party, other than the client, paid for the appraisal, either directly, or indirectly, does not make them an intended user. Parties such as a purchaser, borrower or seller are advised to obtain an appraisal from an appraiser of their own choosing if they require an appraisal for their own use. Any reference to or use of this appraisal report by a purchaser, borrower, or seller for their own purposes, including without limitation for the purposes of a property purchase decision or an appraisal contingency in a purchase agreement, is at such party's own risk and is not intended or authorized by the appraiser.

Special Assumptions

This appraisal is subject to the following significant assumptions that could reasonably be expected to influence the decisions of users of this appraisal. These significant assumptions include Extraordinary Assumptions and Hypothetical Conditions.

Certification - Michael Foster Farbman

I certify that to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions and are my personal, impartial and unbiased professional analyses, opinions, and conclusions.
- I have no present or prospective interest in the property that is the subject of this report, and no personal interest with respect to the parties involved.
- I have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice.
- Michael Foster Farbman performed the following type of inspection of the subject property: Interior and Exterior Inspection
- No one provided significant real property appraisal assistance to Michael Foster Farbman.
- Michael Foster Farbman has not provided prior services, as an appraiser or in any other capacity, within the three-year period immediately preceding acceptance of this agreement.

Michael Foster Farbman
Certified General Real Estate Appraiser, VT No. 080.0134516
Effective Date of Appraisal: September 24, 2025
Date of Report: October 27, 2025

Addenda

1. Competency of Appraiser

Michael Foster Farbman, has the ability to properly identify the valuation problem(s) the client would like addressed and has the knowledge and experience to complete this assignment competently in recognition of and in compliance with all rules and laws that apply to the appraiser and to this assignment including the Uniform Standards of Professional Appraisal Practice.

Michael F. Farbman is a credentialed Certified General Real Estate Appraiser in Vermont and Massachusetts. He began his appraisal career covering exclusively hospitality properties in New York City and throughout the East Coast and Midwest of the United States. Michael purchased the going concern of Sargeant Appraisal Service in 2023. He has developed the geographic and property type competency to complete this assignment and assignments similar to this assignment within the State of Vermont with additional hands-on training and guidance from Sean A. Sargeant, MAI, SRA beginning in January 2024.

The professional competency of the appraiser should not be presumed to include the knowledge or experience of a professional surveyor, architect, engineer, title lawyer, hazardous waste engineer or other specialist. It is normal for the appraiser to rely on reports from these types of professionals that are commonly available during the appraisal process and cannot be held liable for their errors or judgments.

2. Qualifications & License

Michael F. Farbman

Certified General Real Estate Appraiser

Foster Sargeant Appraisal Service

77 Grove Street Suite 108 | Rutland, VT 05701

Office: 802-622-3312

Mobile: 802-622-3312

mike.farbman@802appraisals.com

Education:

B.S. Hotel Administration

Cornell University May 2015

Recent Experience:

Revantage: A Blackstone Company 2022-2023

Chicago, IL

HVS: New England 2019-2022

Burlington, MA

Cushman & Wakefield 2017-2018

New York, NY

Recent Appraisal Education:

Basic Appraisal Principles

Basic Appraisal Procedures

15 Hr USPAP National Course

General Appraiser Income Approach 1

General Appraiser Income Approach 2

Real Estate Finance, Statistics, and Valuation Modeling

General Appraiser Sales Comparison Approach

General Appraiser Report Writing and Case Studies

General Appraiser Site Valuation and Cost Approach

Expert Witness for Commercial Appraisers

General Appraiser Market Analysis and Highest & Best Use

2024 7 Hr USPAP Update Course

Vermont Energy Goals for Professionals

State of Vermont

Real Estate Appraisers
Certified General Real Estate Appraiser

Michael Farbman
8006 Us Route 4
Killington ,Vermont 05751-9521

Credential #:
080.0134516
Status:
Active
Effective:
Jun 01,2024
Expires:
May 31, 2026

Secretary of State

For the most accurate and up to date record of licensure, please visit https://sos.vermont.gov/opr/online-services/

Fair Haven Skyline Feasibility Study

Exhibit G: LN Consulting Energy Study

LN CONSULTING

Fair Haven Manufacturing Renovation

Energy study

Fair Haven, VT
August 2025
By: Greg Estep and Jon Watts

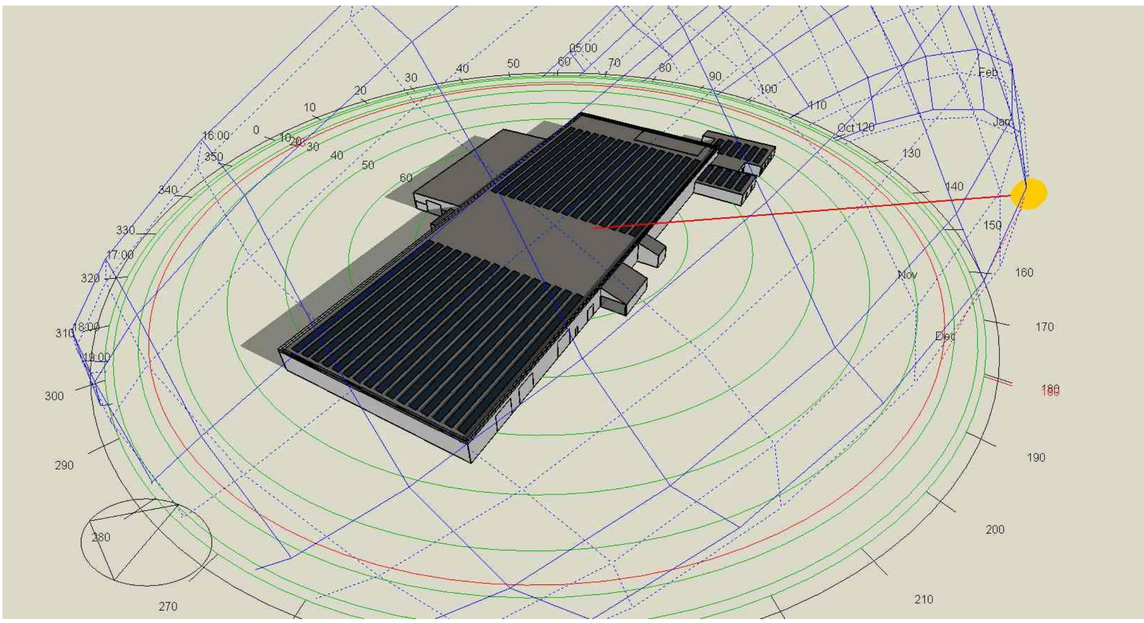


Figure 1 Energy model rendering of sun path diagram at 12pm on December 21.

Vermont | 208 Flynn Avenue #2J | Burlington, VT 05401 | (802) 655-1753 | Fax (802) 655-7628
Massachusetts | 32 Masonic St., Unit E | Northampton, MA 01060 | (413) 776-9580
lnconsulting.com

Contents

Revision history 4
Executive summary 5
Building envelope analysis 5
Recommendation 7
Architectural and HVAC comparison 8
Recommendation 9
Summary of Recommendations 10
Introduction and intent 11
Project overview 11
Simulation tool 12
Phase 1: Uncertainty and sensitivity analysis (UA/SA) 13
Input variables, outputs, and analysis information 14
1. Input Variables 14
2. Outputs 22
3. Analysis Information 22
Uncertainty analysis results 30
Sensitivity analysis results 35
Phase 2: Detailed comparison of alternatives 53
Existing conditions model 53
Existing HVAC system description 53
Photovoltaic design 55
Architectural and HVAC comparisons 57
Proposed building envelope alternatives 57
Proposed HVAC system alternative descriptions 58
Results 62
Efficiency Vermont incentive modeling 72
Appendix 1: Site plan, building elevations, and floor plans 73
Appendix 2: Renderings (Model data visualization) 73
Appendix 3: Heating and cooling design loads 76
Appendix 4: Model inputs, HVAC performance and quality control 78
Solar performance graphs 80
GSHP graphs 82
HVAC Performance graphs 84
ASHP graphs 89
VAV RH graphs 91

Natural ventilation 93
Appendix 5: Purchased energy rates 95
Electricity 95
Propane 95

Revision history

Revision	Date	Change
0	8/13/25	UA/SA results delivery and proposed building envelope recommendation
1	9/10/25	Complete report initial delivery
1a	9/10/2025	Fixed three broken links to tables.

Executive summary

This report evaluates strategies to optimize building performance, reduce energy costs, and maximize economic incentives. This report was conducted in two phases. The first phase carried out an **uncertainty and sensitivity analysis**, which quantified the range of possible future outcomes and identified the building envelope components and occupant behaviors with the greatest influence on performance. The second phase provided a **detailed comparison of alternatives**, including building envelope and HVAC system options, the integration of onsite solar generation, and the implications of cooling the main production area. The following sections highlight the key findings and their relevance for design decisions.

Building envelope analysis

The uncertainty and sensitivity analysis (UA/SA) clearly indicates that enhancing infiltration control, wall insulation, and roof insulation significantly improves the building's energy performance. For conciseness, only total site energy results are shown in this section. The remaining results are presented in more detail further in this report.

The results of the total site energy consumption uncertainty histogram are shown in Figure 2. These results show that it is likely the building will consume around 1,047,000 kWh of energy with a spread of 92,000 kWh (RSD = 8.7%), which is low variability.

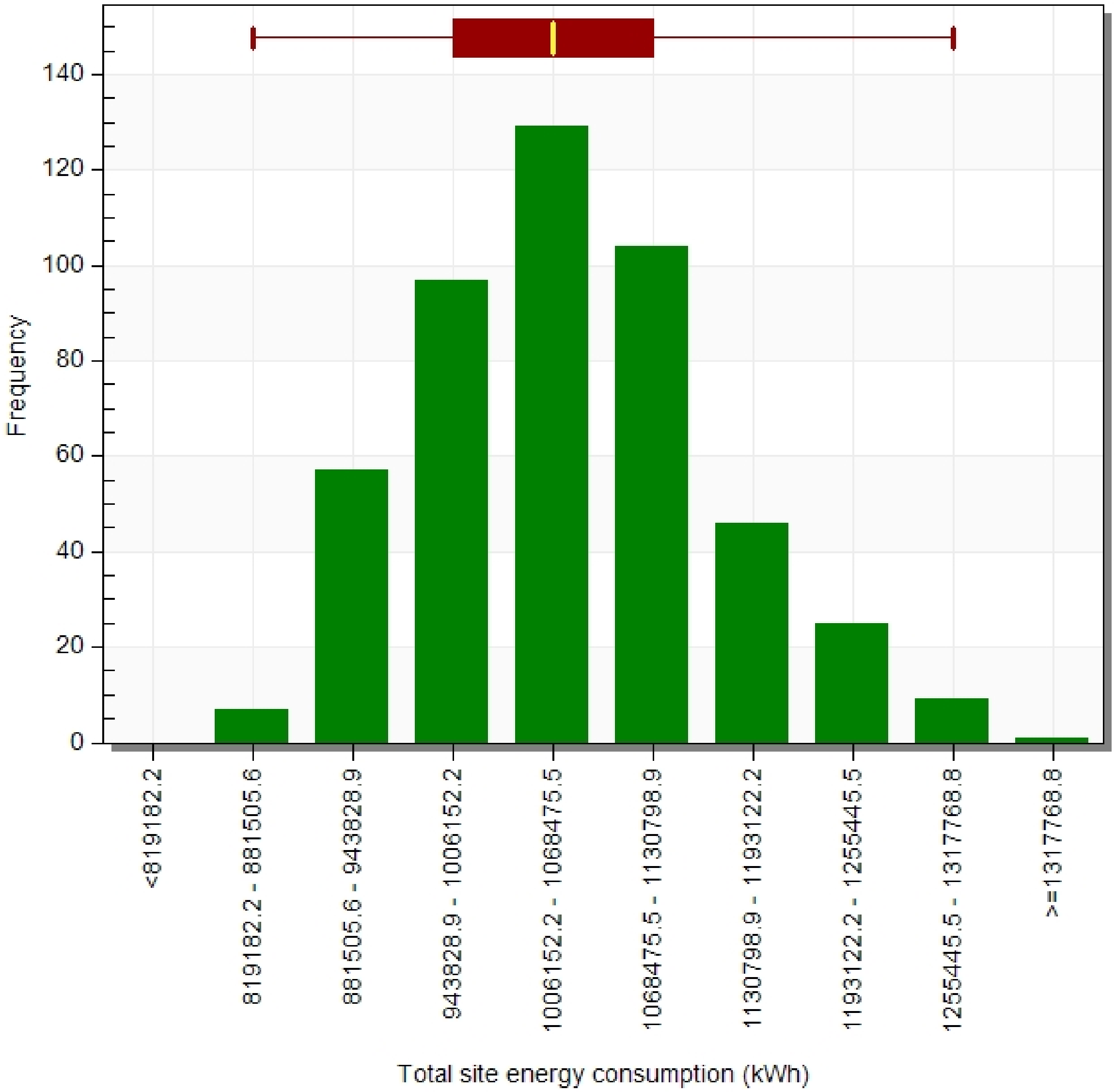


Figure 2 Total site energy consumption output uncertainty histogram.

The total site energy consumption sensitivity analysis graph is shown in Figure 3. Miscellaneous power density (plug loads and electrical equipment) has the strongest influence on site energy use. As it increases, energy consumption rises proportionally. Total site energy consumption is also strongly influenced by external wall construction, infiltration rate (m3/h-m2 at 50 Pa) and flat roof construction. Total site energy consumption is moderately influenced by occupant behaviour related inputs, such as Heating set-point temperature and Cooling set-point temperature. Glazing type does not have a notable influence on Total site energy consumption, therefore, this input can be ignored in further analysis of Total site energy consumption for this model.

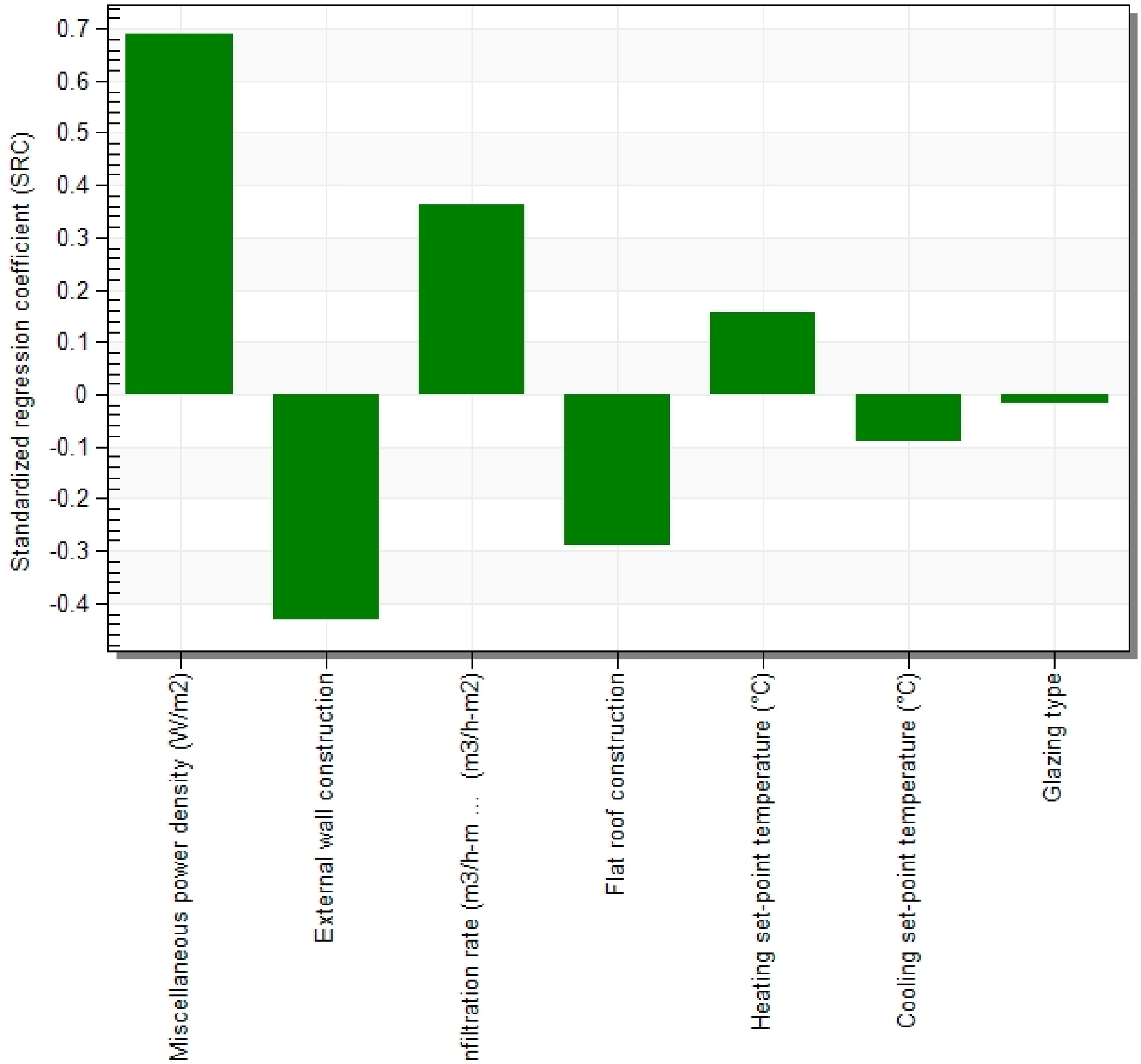


Figure 3 Total site energy sensitivity analysis graph

Recommendation

Based on the results of the UA/SA, we are recommending that the proposed building envelope be upgraded with the following:

- Wall insulation. Add 4" of XPS interior of envelope
- Roof insulation. Add 4" of spray foam polyurethane interior of envelope.
- Air sealing to target infiltration of 0.15CFM75 (50% of VT CBES code maximum)

Potential challenges:

- Wall insulation:
  - If installed on the exterior, potential difficulties could arise in the front where there is decorative brickwork that adds irregularity to the surface, or where canopies and shed structures would interrupt continuous installation.
  - If installed on the exterior, the existing parapet caps would need to be replaced to cover the new insulation

- If installed on interior, steps must be taken to ensure that CMU and mortar can handle freeze/thaw cycles
- Roof insulation
  - There is a requirement to maintain a minimum parapet height. Adding insulation may necessitate adding height to the existing parapet to maintain that height requirement.

Architectural and HVAC comparison

Building off the results and recommendations of the sensitivity analysis, (3) proposed building envelope alternatives and (3) proposed HVAC systems alternatives were modeled and compared. Further, a proposed on-site photovoltaic system was modeled and net metered with the utility. Additional details about the photovoltaic system are described in section, Photovoltaic design.

Each envelope and HVAC alternatives were simulated with and without cooling of the main production area and with and without solar generation. The summary of all 36 simulations is shown in Table 1. The results are sorted in order of lowest annual energy cost. The comparison highlights the following points:

- Adding on-site solar dramatically reduces the annual energy cost of all iterations
- The geothermal HVAC system consumes the least energy and has the lowest energy costs
- The fossil fuel variable air volume with reheat (VAV RH) HVAC system has the second lowest energy costs.
- Adding cooling has a variable effect on the annual energy cost based on the HVAC system, envelope package, and whether solar is on or off.
  - The largest cost increase (27%) due to adding cooling was for the VAV RH system, envelope 3, solar on.
  - The smallest cost increase (2%) due to adding cooling was for the ASHP system, envelope 1 and 2, solar off.
- The EUI trend mostly follows the energy cost except for the VAV RH system. Here, the energy consumption of fossil fuels is high, but the cost of propane is low.

The results show that the best performing combination of alternatives is iteration 11, which is the geothermal HVAC system, with building envelope alternative 3 (most insulation), cooling off in the main production area, and the onsite solar system enabled. Adding cooling to the main production area increases the annual energy cost by approximately $5,000, with little to no additional capital cost.

Table 1 Building envelope and HVAC system comparison summary, sorted by lowest ANNUAL ENERGY COST.

Iteration	HVAC Alternative	Envelope Alternative	Cooling	Solar	Net EUI (kBtu/ft²·yr)	Energy Cost ($/yr)
11	GSHP	3	Off	On	-8.9	$22,816.99
7	GSHP	2	Off	On	-8.2	$26,917.35
9	GSHP	3	On	On	-8.3	$27,998.95
5	GSHP	2	On	On	-7.6	$31,863.66
3	GSHP	1	Off	On	-6.8	$35,302.67
1	GSHP	1	On	On	-6.3	$39,641.19
35	VAV RH	3	Off	On	-0.6	$41,018.67
31	VAV RH	2	Off	On	1.43	$47,913.31
33	VAV RH	3	On	On	1.64	$52,146.49
29	VAV RH	2	On	On	3.64	$59,039.95
23	ASHP	3	Off	On	-6.5	$60,918.00
27	VAV RH	1	Off	On	5.84	$62,637.23
21	ASHP	3	On	On	-5.8	$64,412.75
19	ASHP	2	Off	On	-5.4	$69,683.86
17	ASHP	2	On	On	-4.7	$73,350.93
25	VAV RH	1	On	On	8.09	$74,186.71
15	ASHP	1	Off	On	-3.1	$86,974.85
13	ASHP	1	On	On	-2.4	$90,823.00
12	GSHP	3	Off	Off	19.95	$124,260.93
8	GSHP	2	Off	Off	20.59	$128,434.50
10	GSHP	3	On	Off	20.54	$131,479.85
6	GSHP	2	On	Off	21.15	$135,756.95
4	GSHP	1	Off	Off	21.91	$136,989.30
36	VAV RH	3	Off	Off	28.26	$142,198.75
2	GSHP	1	On	Off	22.39	$143,863.77
32	VAV RH	2	Off	Off	30.19	$149,094.73
34	VAV RH	3	On	Off	30.49	$158,073.05
24	ASHP	3	Off	Off	22.36	$161,954.27
28	VAV RH	1	Off	Off	34.51	$163,943.82
30	VAV RH	2	On	Off	32.4	$165,081.58
22	ASHP	3	On	Off	23.05	$165,491.04
20	ASHP	2	Off	Off	23.37	$171,072.89
18	ASHP	2	On	Off	24.08	$174,781.96
26	VAV RH	1	On	Off	36.76	$180,405.36
16	ASHP	1	Off	Off	25.58	$188,379.46
14	ASHP	1	On	Off	26.31	$192,254.03

Recommendation

For economic feasibility, it is recommended that a life cycle cost analysis (LCCA) be performed utilizing the annual energy costs calculated in this report. The life cycle cost analysis will calculate a present worth for each alternative. The alternative with the lowest present worth is the best economic choice. Outstanding required data includes:

- Estimated annual maintenance costs
- Estimated equipment life spans for determining future cost of replacement
- Initial cost of construction for each alternative

We can be contracted to perform the LCCA if desired.

Our recommendation based on this report is to proceed with the geothermal HVAC system with cooling, building envelope alternative 2, and onsite photovoltaic system. This is iteration 5 shown on Table 1. We make this recommendation for the following reasons:

- This iteration is net energy producing (net EUI = -7.6 kBtu/ft2)
- This iteration is the fourth lowest annual energy cost and includes cooling of the main production area.
- The annual energy cost savings for building envelope 3 compared to envelope 2 is only $4,000. This likely doesn't justify the additional cost of insulation material.
- The net metering of the onsite solar system reduces the annual energy cost from $128,000 (iteration 8) to $32,000 (iteration 5), for savings of $96,000.
- Project CAPEX incentives for geothermal and solar.

Summary of Recommendations

This study was completed in two phases: **Phase 1 (Uncertainty and Sensitivity Analysis)** and **Phase 2 (Architectural and HVAC Comparison)**. Each phase produced distinct but complementary recommendations.

Phase 1 – UA/SA-Based Envelope Enhancements

To improve efficiency and reduce performance uncertainty, we recommend:

- **Wall Insulation**: Add 4" of XPS insulation to the building envelope (interior application preferred, with precautions for freeze/thaw durability).
- **Roof Insulation**: Add 4" of spray polyurethane foam, with parapet height adjustments as required.
- **Air Sealing**: Target infiltration of 0.15 CFM75 (50% of VT CBES maximum).

Note: Implementation must address constructability challenges such as decorative brickwork, parapet caps, and canopy interruptions.

Phase 2 – Comparison-Based System and Design Choices

Based on detailed comparisons of envelope, HVAC, and solar alternatives, we recommend:

- **Geothermal HVAC system with cooling** to provide reliable performance and comfort.
- **Building Envelope Alternative 2**, which balances energy performance and cost-effectiveness.
- **Onsite Photovoltaic (PV) System**, leveraging net metering and available capital incentives.
- **Life Cycle Cost Analysis** to confirm financial viability, incorporating maintenance, equipment lifespans, and upfront costs.

This integrated package—**Iteration 5 (Table 1)**—is recommended as the most cost-effective and sustainable solution. It is **net energy producing** (net EUI = –7.6 kBtu/ft^2), reduces annual energy costs by roughly **$96,000** compared to non-solar options, and includes cooling of the main production area.

While Iteration 11 achieved slightly lower energy consumption, its advantages do not justify the added cost of insulation beyond Envelope 2. Iteration 5 therefore represents the optimal balance of performance, economics, and feasibility.

Introduction and intent

LN Consulting has been retained by John Guequierre of I-OSC to provide energy modeling services for the proposed Fair Haven manufacturing facility, located in Fair Haven VT. The energy modeling scope includes:

1. Building envelope analysis via Uncertainty and Sensitivity analysis (UA/SA)
2. Calculations of heating, cooling, and ventilation loads for the building.
3. HVAC system comparison of proposed alternatives:
    i. Existing system
    ii. Closed Loop Geothermal System
        a. Central ground source DHW plant
    iii. Air-to-Air Heat Pump systems
        a. Electric resistance DHW
    iv. ASHRAE 90.1 baseline system – VAV RH, fossil fuel heating
        a. Fossil fuel DHW
4. Incentive modeling

This report evaluates strategies to optimize building performance, reduce energy costs, and maximize economic incentives. This report was conducted in two phases. The first phase carried out an **uncertainty and sensitivity analysis**, which quantified the range of possible future outcomes and identified the building envelope components and occupant behaviors with the greatest influence on performance. The second phase provided a **detailed comparison of alternatives**, including building envelope and HVAC system options, the integration of onsite solar generation, and the implications of cooling the main production area.

Hyperlinks throughout this report will take the reader to Microsoft one drive directories or direct file downloads for supporting documentation. Here is the link to the main directory containing all supporting documentation: Fair Haven manufacturing facility energy modeling documentation.

Project overview

The city of Fair Haven, Vermont is conducting a feasibility study to renovate an existing mobile home factory (vintage 1970s) into a modern modular home production facility. The plan is to prepare the building for a future tenant.

The building consists of a large main assembly floor supported by warehouse and storage space, utility rooms, maintenance and repair shop, office space and a cafeteria.

Table 2 Fair Haven manufacturing facility area summary.

	Area [ft2]
Total Building Area	94, 061
Net Conditioned Building Area	94, 061
Unconditioned Building Area	0

Simulation tool

The simulation program used for this project was Design Builder version 7.3.1, which is a graphical user interface (GUI) for the calculation engine EnergyPlus (v9.4). EnergyPlus™ is a whole building energy simulation program that engineers, architects, and researchers use to model both energy consumption—for heating, cooling, ventilation, lighting and plug and process loads—and water use in buildings. Some of the notable features and capabilities of EnergyPlus include:

- Integrated, simultaneous solution of thermal zone conditions and HVAC system response that does not assume that the HVAC system can meet zone loads and can simulate un-conditioned and under-conditioned spaces.
- Heat balance-based solution of radiant and convective effects that produce surface temperatures thermal comfort and condensation calculations.
- Sub-hourly, user-definable time steps for interaction between thermal zones and the environment; with automatically varied time steps for interactions between thermal zones and HVAC systems. These allow EnergyPlus to model systems with fast dynamics while also trading off simulation speed for precision.
- Combined heat and mass transfer model that accounts for air movement between zones.
- Advanced fenestration models including controllable window blinds, electrochromic glazings, and layer-by-layer heat balances that calculate solar energy absorbed by windowpanes.
- Illuminance and glare calculations for reporting visual comfort and driving lighting controls.
- Component-based HVAC that supports both standard and novel system configurations.
- A large number of built-in HVAC and lighting control strategies and an extensible runtime scripting system for user-defined control.
- Functional Mockup Interface import and export for co-simulation with other engines.
- Standard summary and detailed output reports as well as user definable reports with selectable time-resolution from annual to sub-hourly, all with energy source multipliers.

Phase 1: Uncertainty and sensitivity analysis (UA/SA)

The uncertainty and sensitivity analyses were conducted to understand both the magnitude of variability in building performance outcomes and the key factors driving this variability. Using 500 simulation runs, the study examined seven input variables — heating set-point temperature, external wall construction, flat roof construction, infiltration rate, glazing type, miscellaneous power density, and cooling set-point temperature — against five performance indicators: heating load, heating electricity consumption, total site energy consumption, cooling load, and cooling electricity consumption. Each input was assigned an appropriate probability distribution to capture realistic variability in building design and operational parameters.

The input variables were intended to capture occupant behavior (heating and cooling setpoint, and miscellaneous power density) and construction quality (infiltration, wall construction, roof construction, glazing).

Table 3 Summary of Uncertainty Analysis Results

Output	Mean (kWh)	Std Dev (kWh)	Min (kWh)	Max (kWh)
Heating load	361,988	141,460	120,534	815,955
Heating (Electric)	177,588	59,795	69,668	364,518
Total site energy	1,046,976	91,646	819,182	1,317,769
Cooling load	143,456	35,089	65,787	230,135
Cooling (Electric)	47,819	11,696	21,929	76,712

The sensitivity analysis, performed using multiple linear regression, identified which variables most strongly influenced each output. Heating load and heating electricity were primarily affected by external wall construction (inverse relationship), infiltration rate, flat roof construction, and heating set-point temperature, with miscellaneous power density playing a moderate role. Glazing type and cooling set-point temperature had negligible influence on heating-related outputs.

For total site energy consumption, the dominant factor was miscellaneous power density, directly increasing energy use, followed by external wall construction, infiltration rate, and flat roof construction. Heating and cooling set-points exerted moderate influence, while glazing type was largely insignificant. Cooling performance, both in terms of load and electricity use, was strongly driven by cooling set-point temperature (inverse relationship), along with miscellaneous power density and flat roof construction.

Table 4 Key Influencing Factors by Output

Output	Top Influences
Heating load / Heating (Electric)	External wall construction, Infiltration rate, Flat roof construction, Heating set-point temperature
Total site energy	Miscellaneous power density, External wall construction, Infiltration rate, Flat roof construction
Cooling load / Cooling (Electric)	Cooling set-point temperature, Miscellaneous power density, Flat roof construction

While the regression models for total site energy and cooling performance exhibited high explanatory power (adjusted R^2 values above 0.91), the models for heating load and heating electricity had more moderate explanatory power (around 0.81), suggesting that additional influential variables may exist. In several cases, high p-values indicated low statistical confidence in certain variables, particularly those with minimal influence, pointing to potential benefits from either increasing the number of simulations or removing insignificant inputs in a staged manner. High p-values for glazing type and cooling set-point temperature in the heating load regression are explained by the building's small window-to-wall ratio, which limits the thermal influence of glazing, and by the fact that cooling set-point temperature does not directly influence heating demand. Overall, the findings indicate that optimizing set-points, improving envelope insulation and air tightness, and managing internal loads should be priority strategies for improving energy performance.

Input variables, outputs, and analysis information

All input variables, outputs, and analysis information were the same for both the uncertainty and sensitivity analyses.

1. Input Variables

7 input variables were selected. Below are the details of each input.

1.1 Input variable: Heating set-point temperature

Input Type:	Heating set-point temperature
Input Units:	°C
Probability Distribution:	14-Normal
Distribution Characteristics:	Mean: 20.00; Std Dev: 1.00; Truncated
Level:	Building

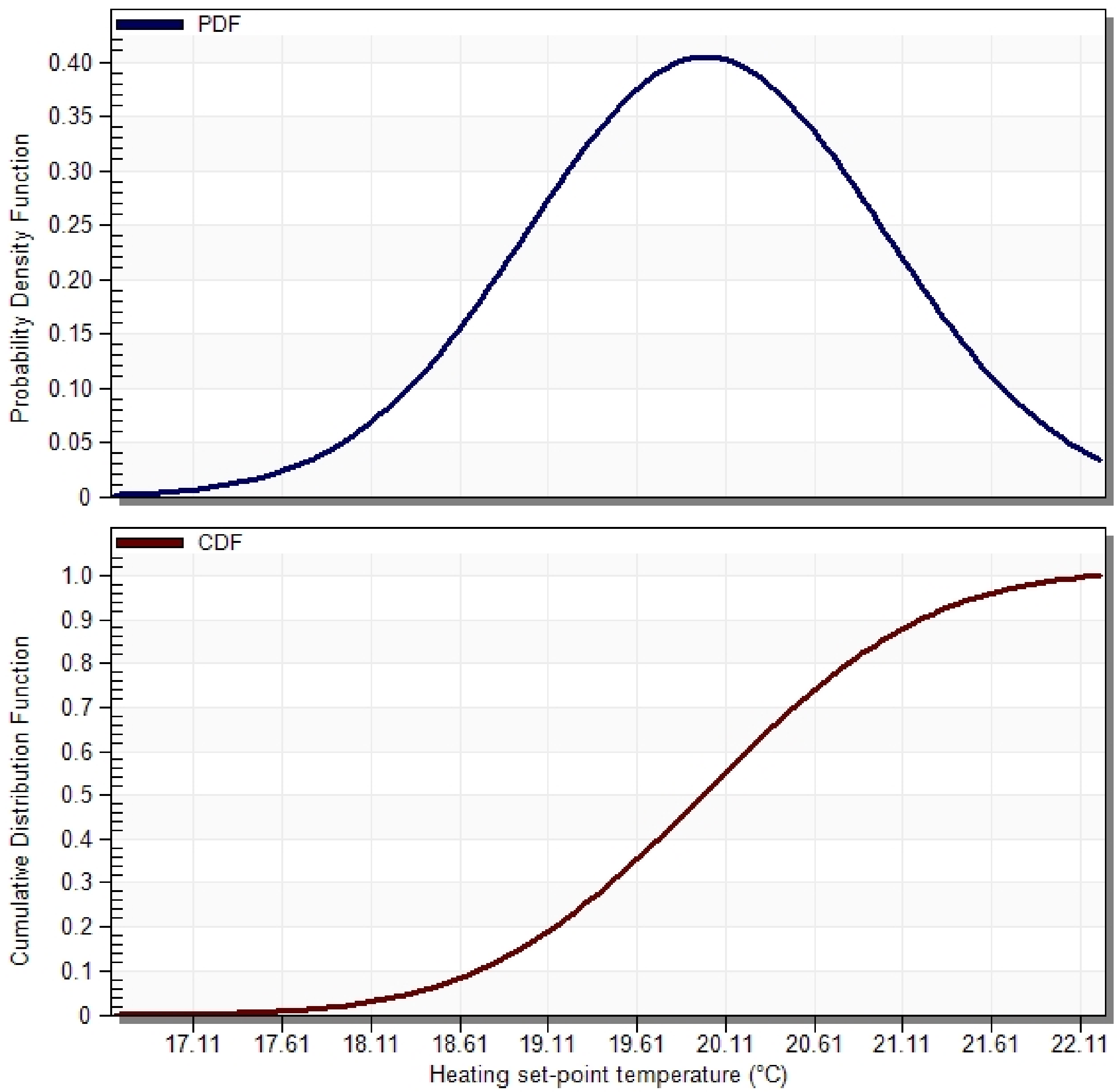


Figure 4 Heating Set-point Temperature Probability Density and Cumulative Distribution Functions.

1.2 Input variable: External wall construction

Input Type:	External wall construction
Input Units:	No Units
Probability Distribution:	20-Uniform(Discrete)
Distribution Characteristics:	Prob: 0.250; Options: 4
Level:	Selected Targets

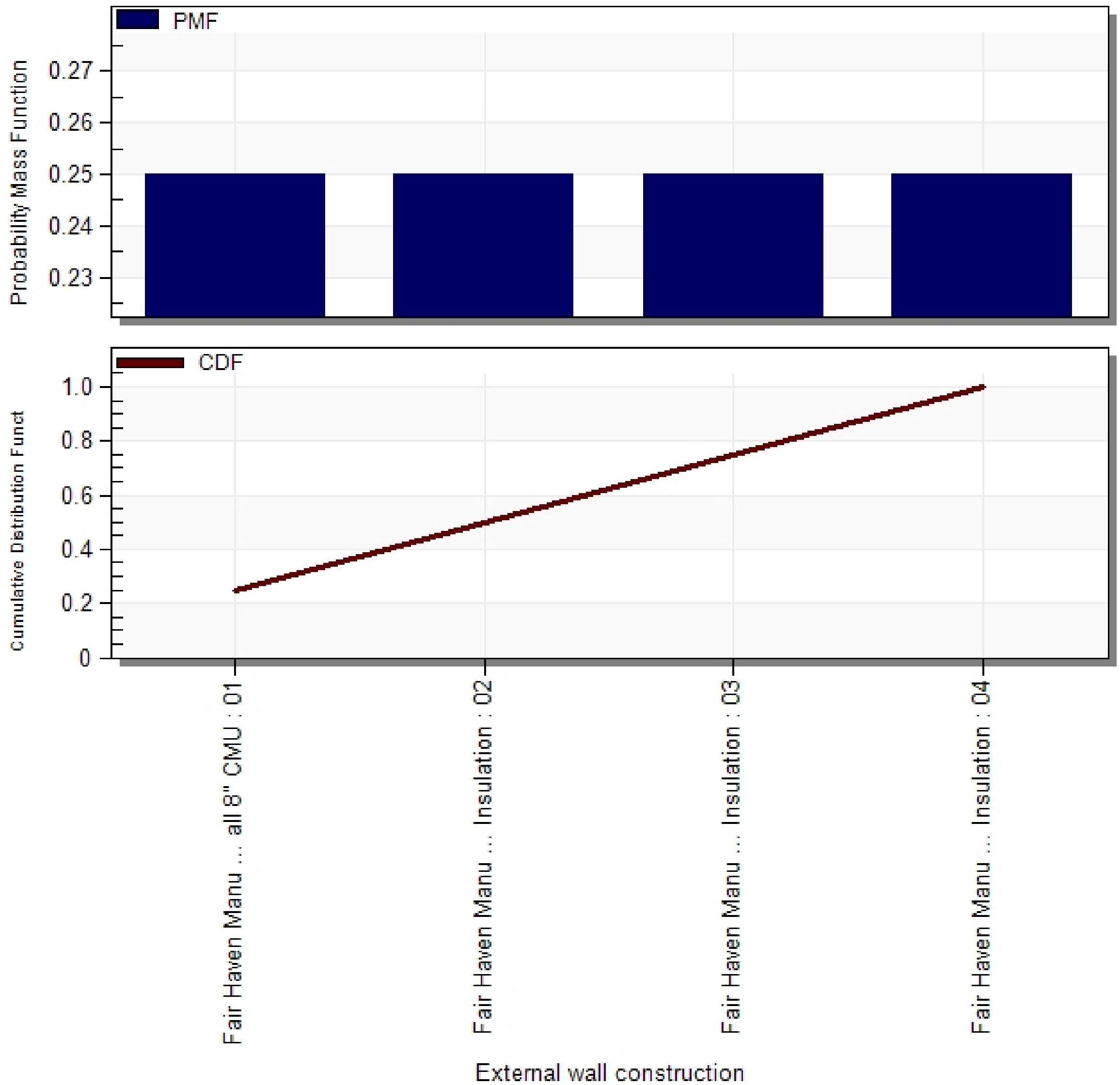


Figure 5 External Wall Construction Probability Mass and Cumulative Distribution Functions. The x-axis labels are not fully legible, thus: 01 = 8" CMU wall, no insulation, 02 = 8" CMU wall with 2" XPS, 03 = CMU wall with 4" XPS, and 04 = CMU wall with 8" XPS.

1.3 Input variable: Flat roof construction

Input Type:	Flat roof construction
Input Units:	No Units
Probability Distribution:	20-Uniform(Discrete)
Distribution Characteristics:	Prob: 0.250; Options: 4
Level:	Selected Targets

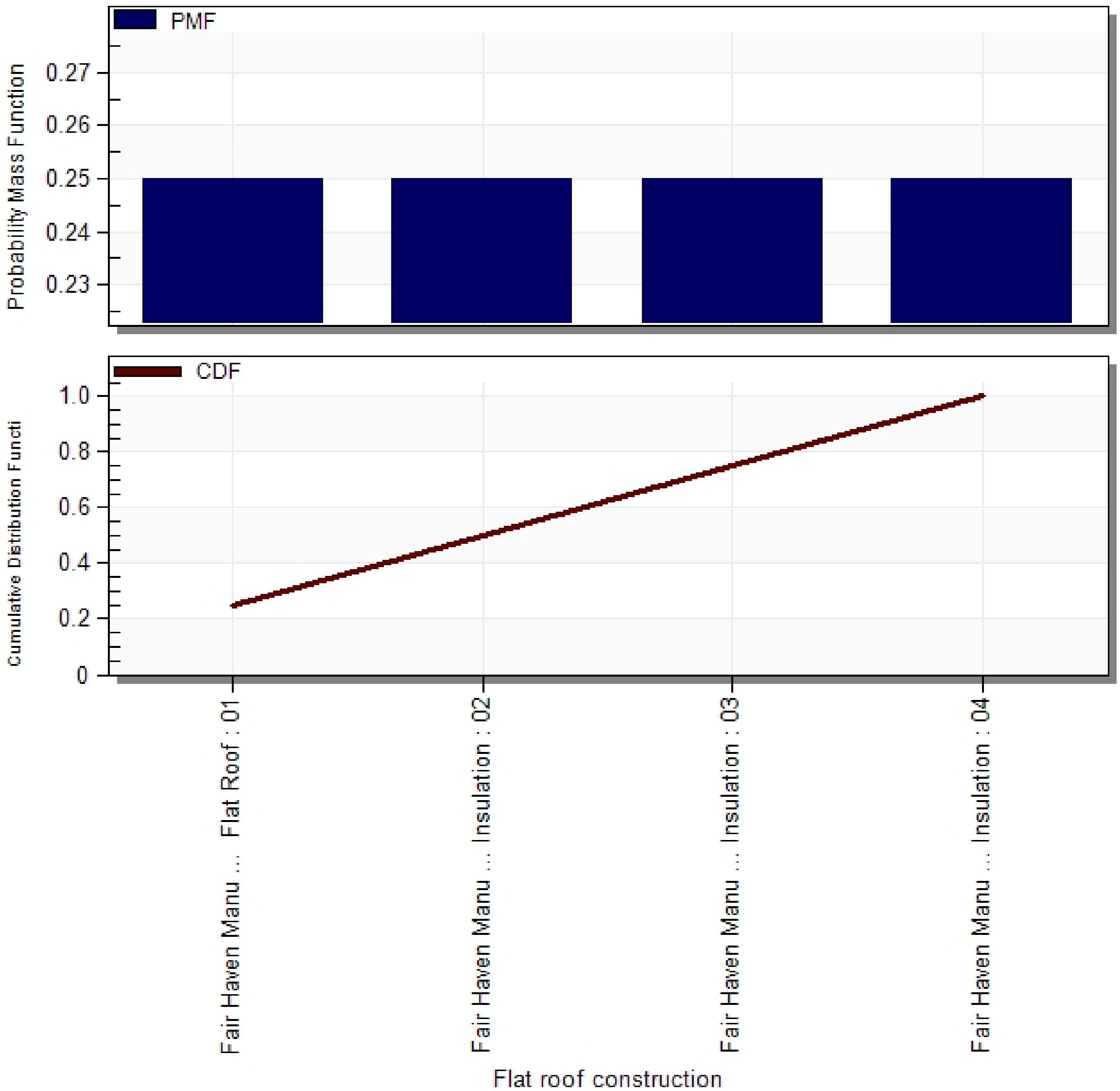


Figure 6 Flat Roof Construction Probability Mass and Cumulative Distribution Functions. The x-axis labels are not fully legible, thus: 01 = uninsulated flat roof. 02 = flat roof with 2" polyurethane. 03 = flat roof with 4" polyurethane.04 = flat roof with 6" polyurethane.

1.4 Input variable: Infiltration rate (m3/h-m2 at 50 Pa)

Input Type:	Infiltration rate (m3/h-m2 at 50 Pa)
Input Units:	m3/h-m2
Probability Distribution:	18-Triangular
Distribution Characteristics:	Peak Val.: 10; Min.Val.: 4; Max.Val.: 25
Level:	Building

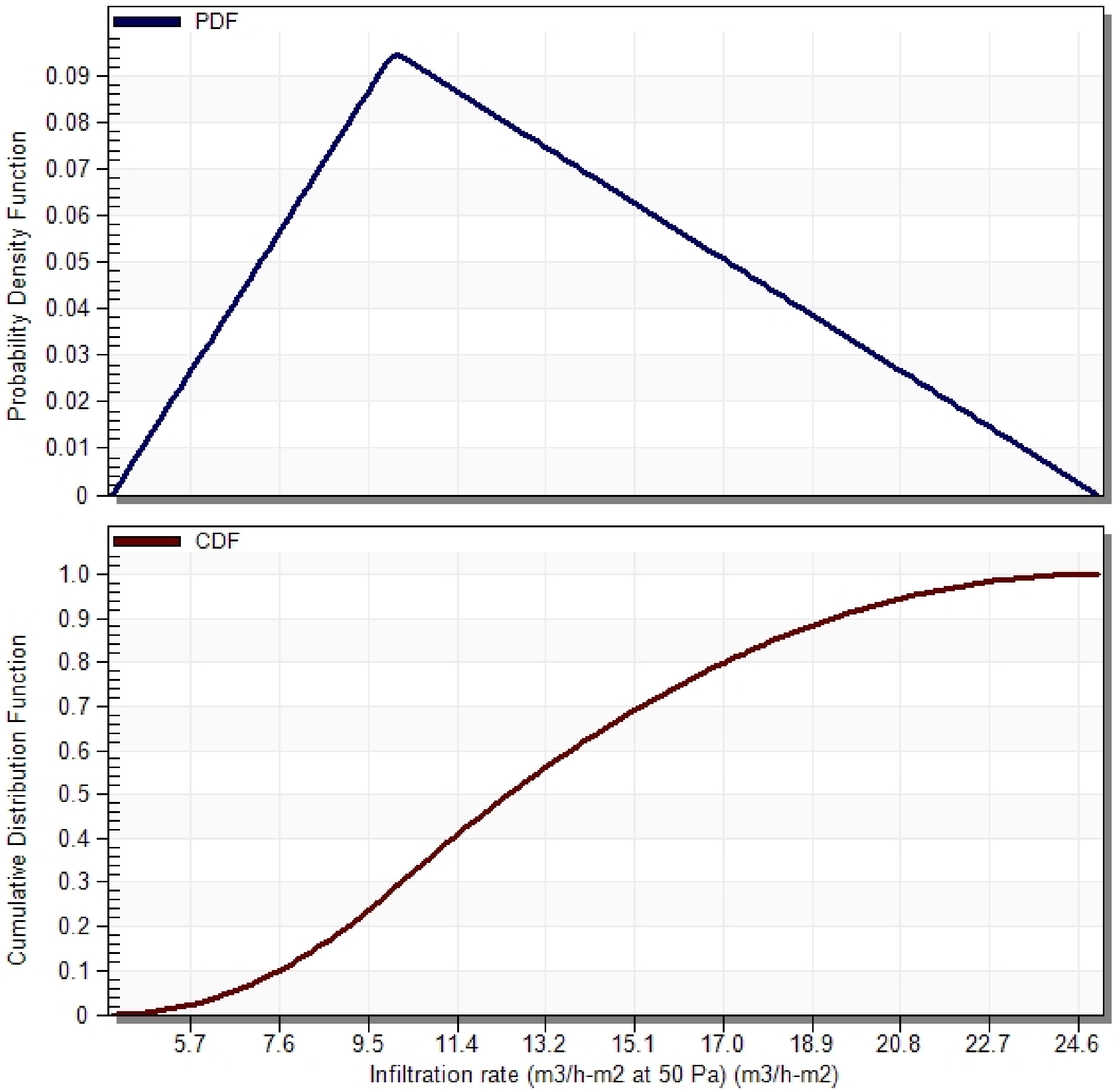


Figure 7 Infiltration Rate Probability Density and Cumulative Distribution Functions.

1.5 Input variable: Glazing type

Input Type:	Glazing type
Input Units:	No Units
Probability Distribution:	3-Binomial
Distribution Characteristics:	Prob. Val.: 0.4; Trials.: 5; Options: 6
Level:	Building

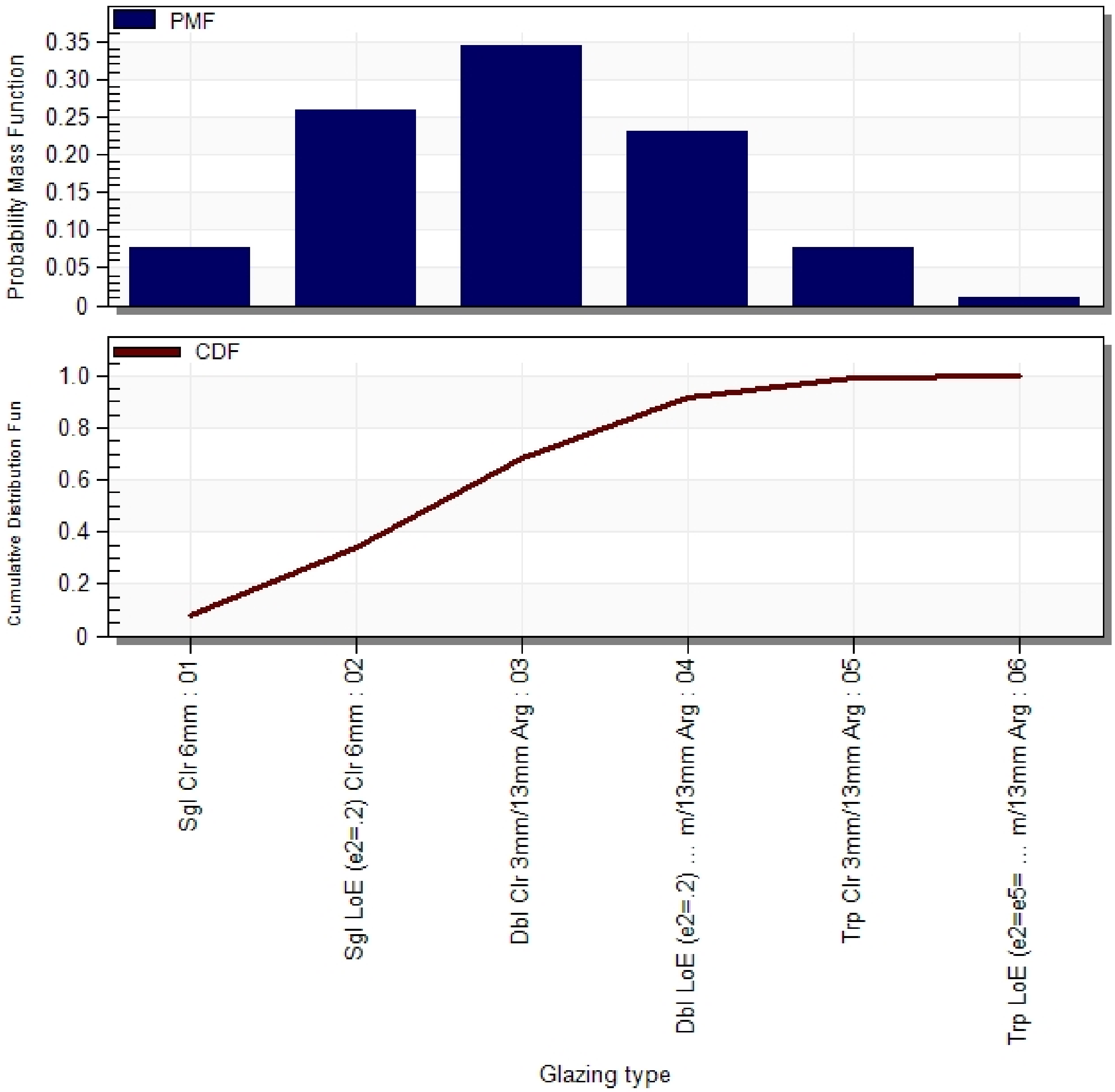


Figure 8 Flat Roof Construction Probability Mass and Cumulative Distribution Functions.

1.6 Input variable: Miscellaneous power density

Input Type:	Miscellaneous power density
Input Units:	W/m2
Probability Distribution:	18-Triangular
Distribution Characteristics:	Peak Val.: 5.00; Min.Val.: 1.00; Max.Val.: 10.76
Level:	Building

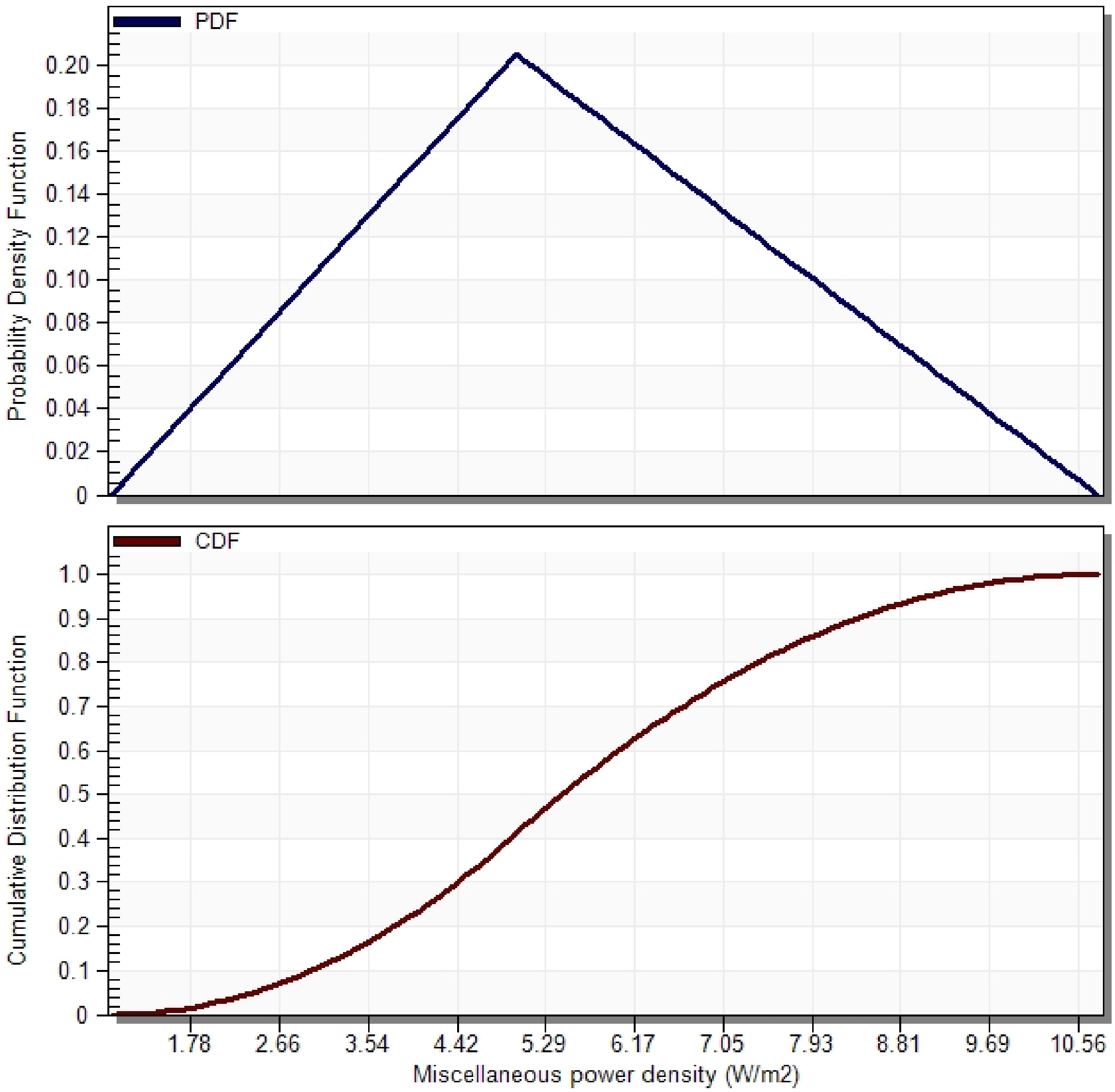


Figure 9 Miscellaneous Power Density Probability Density and Cumulative Distribution Functions.

1.7 Input variable: Cooling set-point temperature

Input Type:	Cooling set-point temperature
Input Units:	°C
Probability Distribution:	14-Normal
Distribution Characteristics:	Mean: 25.00; Std Dev: 1.00; Truncated
Level:	8 Targets Selected

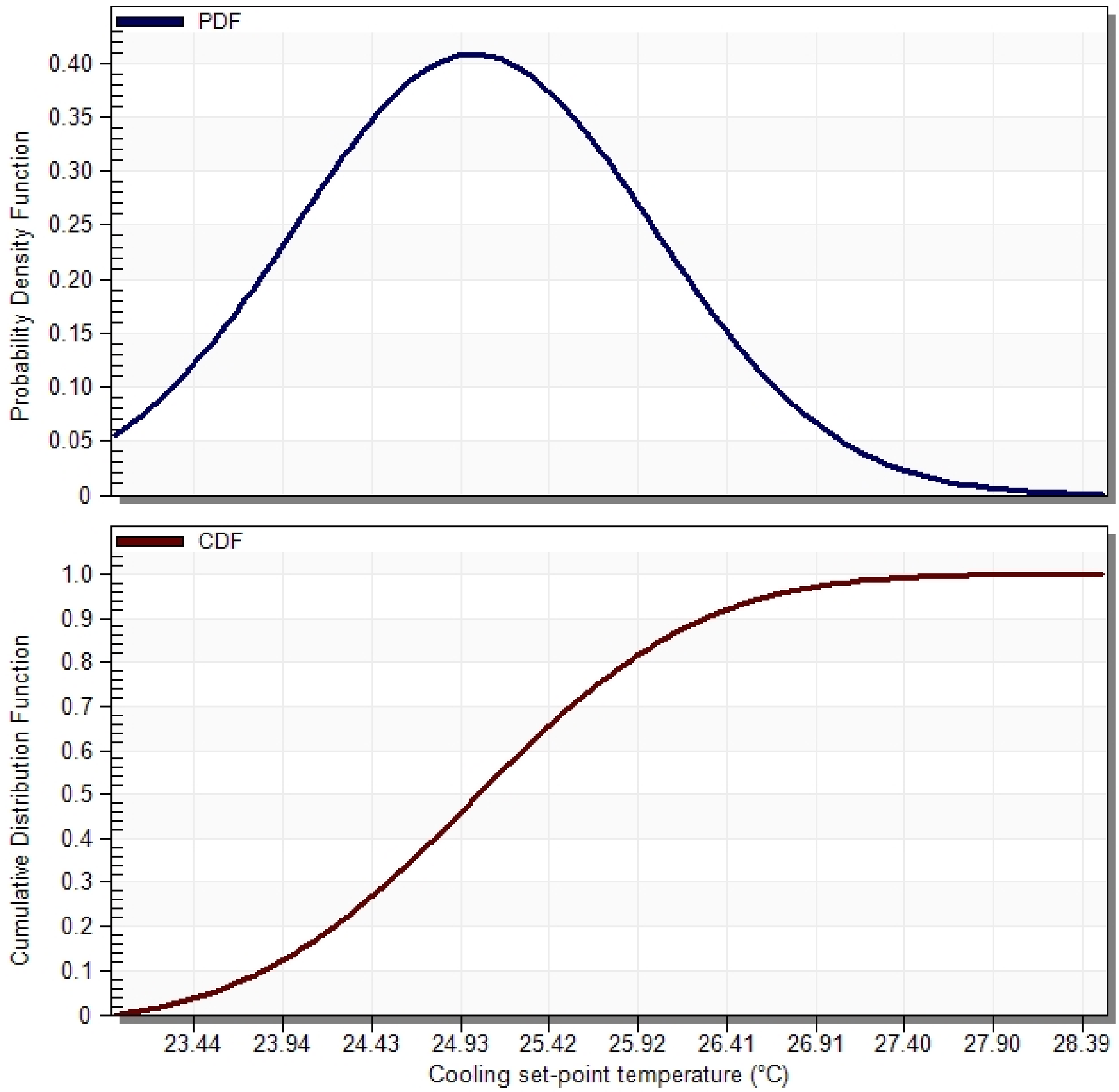


Figure 10 Cooling Set-Point Temperature Probability Density and Cumulative Distribution Functions.

2. Outputs

5 output KPIs were selected. Below are the details of the outputs.

2.1 Output: heating load (Heating load)

Output Type:	Heating load
Output Units:	kWh

2.2 Output: heating electricity (Heating (Electric))

Output Type:	Heating (Electric)
Output Units:	kWh

2.3 Output: total site energy (Total site energy consumption)

Output Type:	Total site energy consumption
Output Units:	kWh

2.4 Output: cooling load (Cooling load)

Output Type:	Cooling load
Output Units:	kWh

2.5 Output: cooling electricity (Cooling (Electric))

Output Type:	Cooling (Electric)
Output Units:	kWh

3. Analysis Information

This section summarises the overall analysis statistics and the range and distribution profiles of the actual values used for all the input variables in the simulation runs. The values are in accordance with the range and distribution profile selected in the analysis settings.

500 simulation runs were requested. Total simulation runs retrieved were 475. Below is the summary of the simulation and statistics for uncertainty in input samples and outputs.

3.1 Sampling and Simulation Summary

This section of the report lists the settings used for the uncertainty propagation and subsequent simulations runs undertaken. The failed iterations, if any, have been excluded from the results presented here and have not been used in the analysis.

Sampling Method:	RANDOM
Samples Requested:	500
Samples Created:	500
Failed Iterations:	25
Successful Iterations:	475

3.2 Input Sample Details

This section of the report lists the statistics for the samples generated, and used in the analysis, for all the inputs. The spread of sampled space is captured in the corresponding graphs.

3.2.1 Input variable: Heating set-point temperature

3.2.1.1 Summary Statistics: Heating set-point temperature

Mean	SD	Min	Q1	Median	Q3	Max
20	0.9	17	19	20	21	22

3.2.1.2 Input Distribution Histogram: Heating set-point temperature

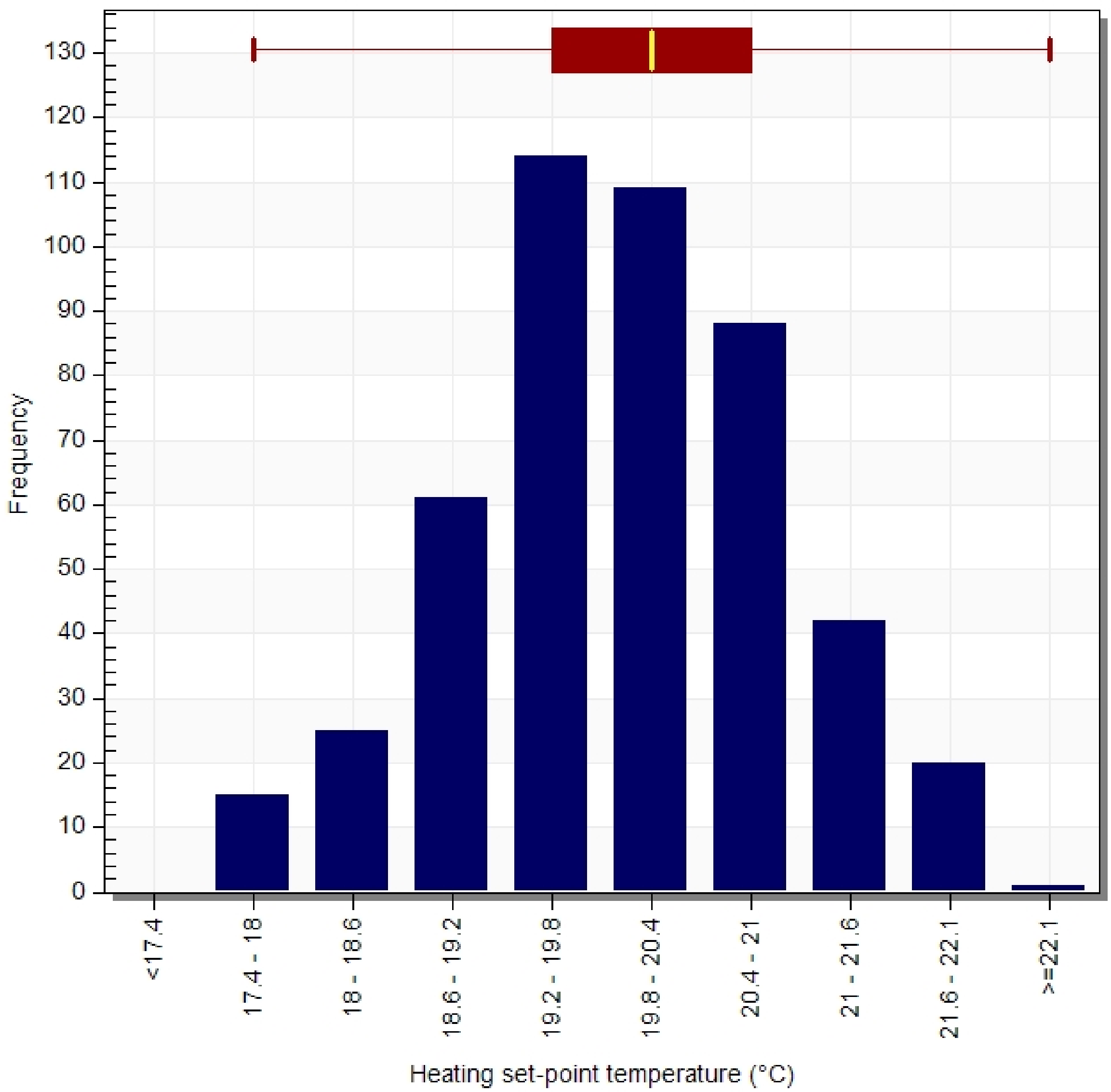


Figure 11 Heating Set-Point Temperature Input Distribution Histogram.

3.2.2 Input variable: External wall construction

3.2.2.1 Input Options' Frequency: External wall construction

Option Name	Frequency
Fair Haven Manu ... all 8" CMU : 01	110
Fair Haven Manu ... Insulation : 02	123
Fair Haven Manu ... Insulation : 03	128
Fair Haven Manu ... Insulation : 04	114

3.2.2.2 Frequency Distribution Graph: External wall construction

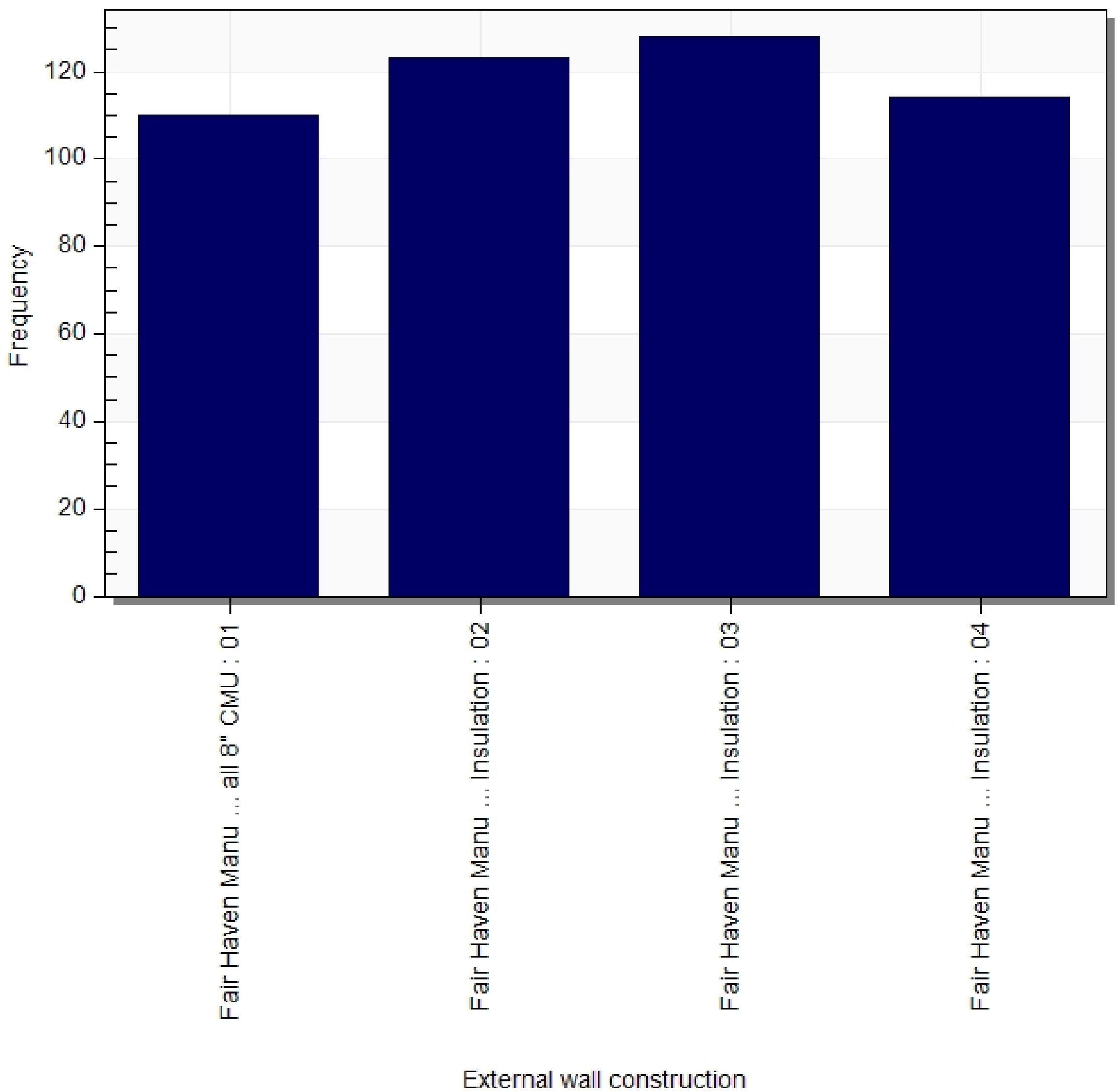


Figure 12 External Wall Construction Frequency Distribution Graph.

3.2.3 Input variable: Flat roof construction

3.2.3.1 Input Options' Frequency: Flat roof construction

Option Name	Frequency
Fair Haven Manu ... Flat Roof : 01	118
Fair Haven Manu ... Insulation : 02	133
Fair Haven Manu ... Insulation : 03	117
Fair Haven Manu ... Insulation : 04	107

3.2.3.2 Frequency Distribution Graph: Flat roof construction

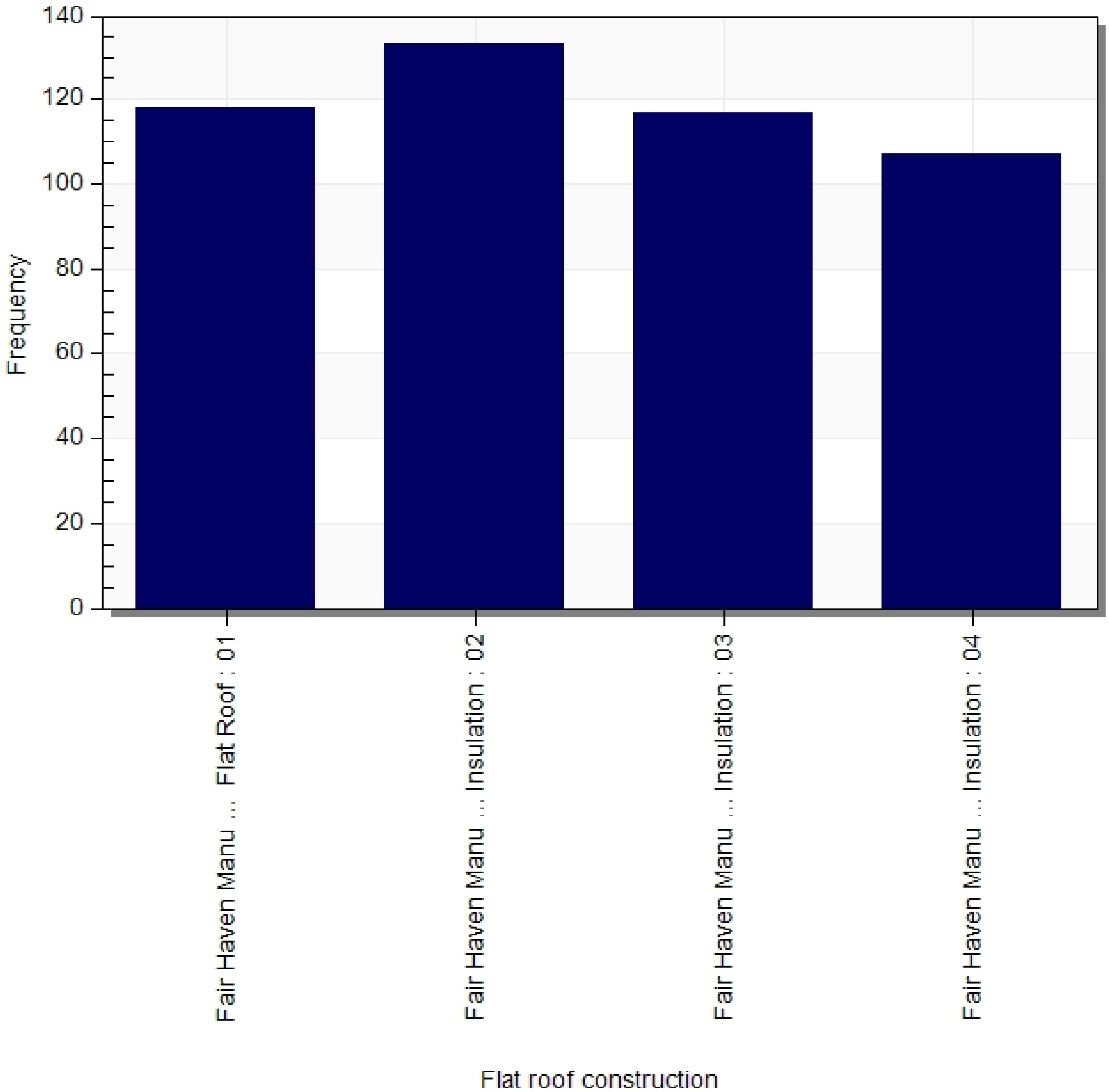


Figure 13 Flat Roof Construction Frequency Distribution Graph.

3.2.4 Input variable: Infiltration rate (m3/h-m2 at 50 Pa)

3.2.4.1 Summary Statistics: Infiltration rate (m3/h-m2 at 50 Pa)

Mean	SD	Min	Q1	Median	Q3	Max
13	4.5	4.4	9.5	12	16	24

3.2.4.2 Input Distribution Histogram: Infiltration rate (m3/h-m2 at 50 Pa)

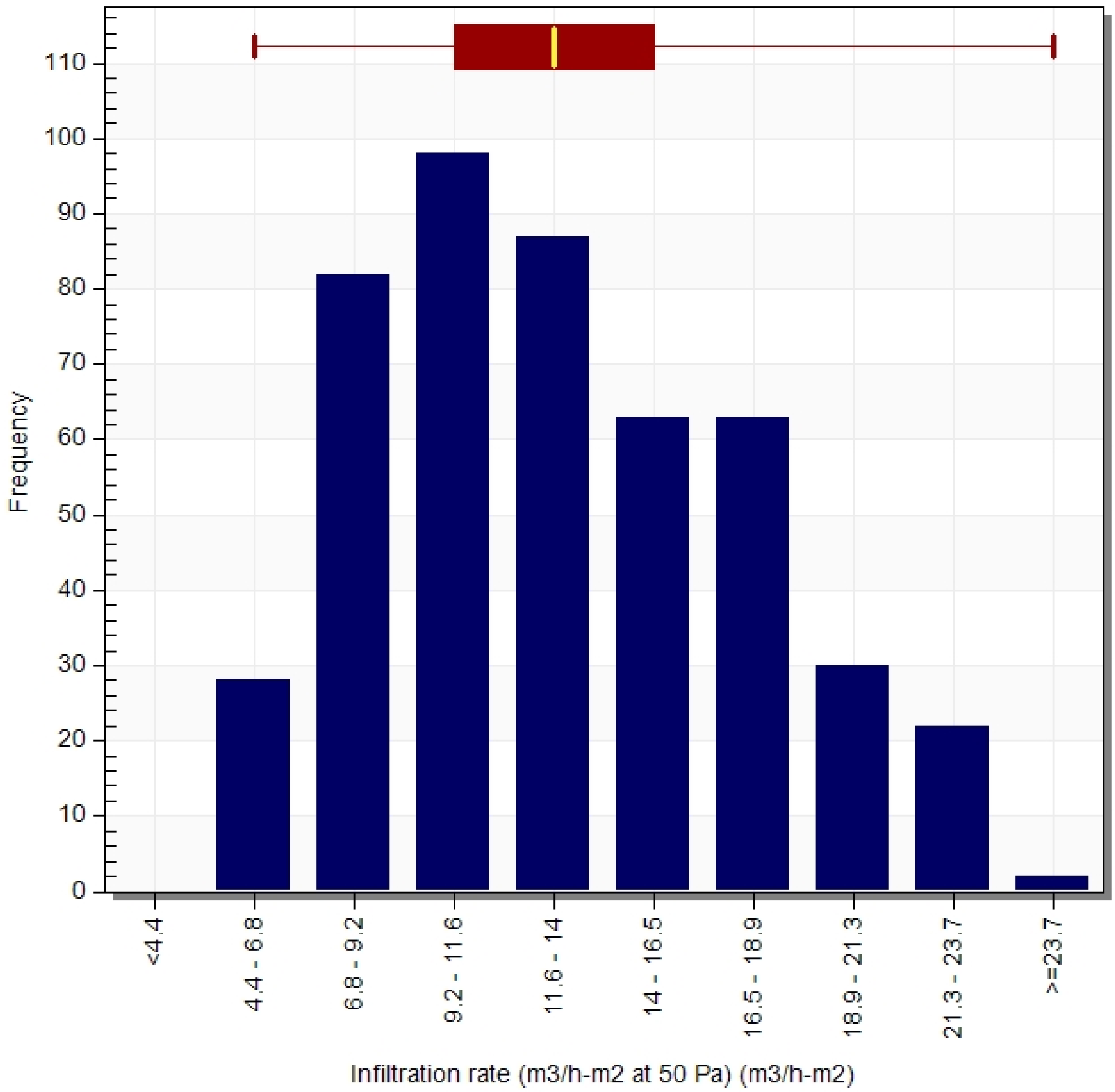


Figure 14 Infiltration Rate Input Distribution Histogram.

3.2.5 Input variable: Glazing type

3.2.5.1 Input Options' Frequency: Glazing type

Option Name	Frequency
Sgl Clr 6mm : 01	41
Sgl LoE (e2=.2) Clr 6mm : 02	140
Dbl Clr 3mm/13mm Arg : 03	164
Dbl LoE (e2=.2) ... m/13mm Arg : 04	92
Trp Clr 3mm/13mm Arg : 05	35
Trp LoE (e2=e5= ... m/13mm Arg : 06	3

3.2.5.2 Frequency Distribution Graph: Glazing type

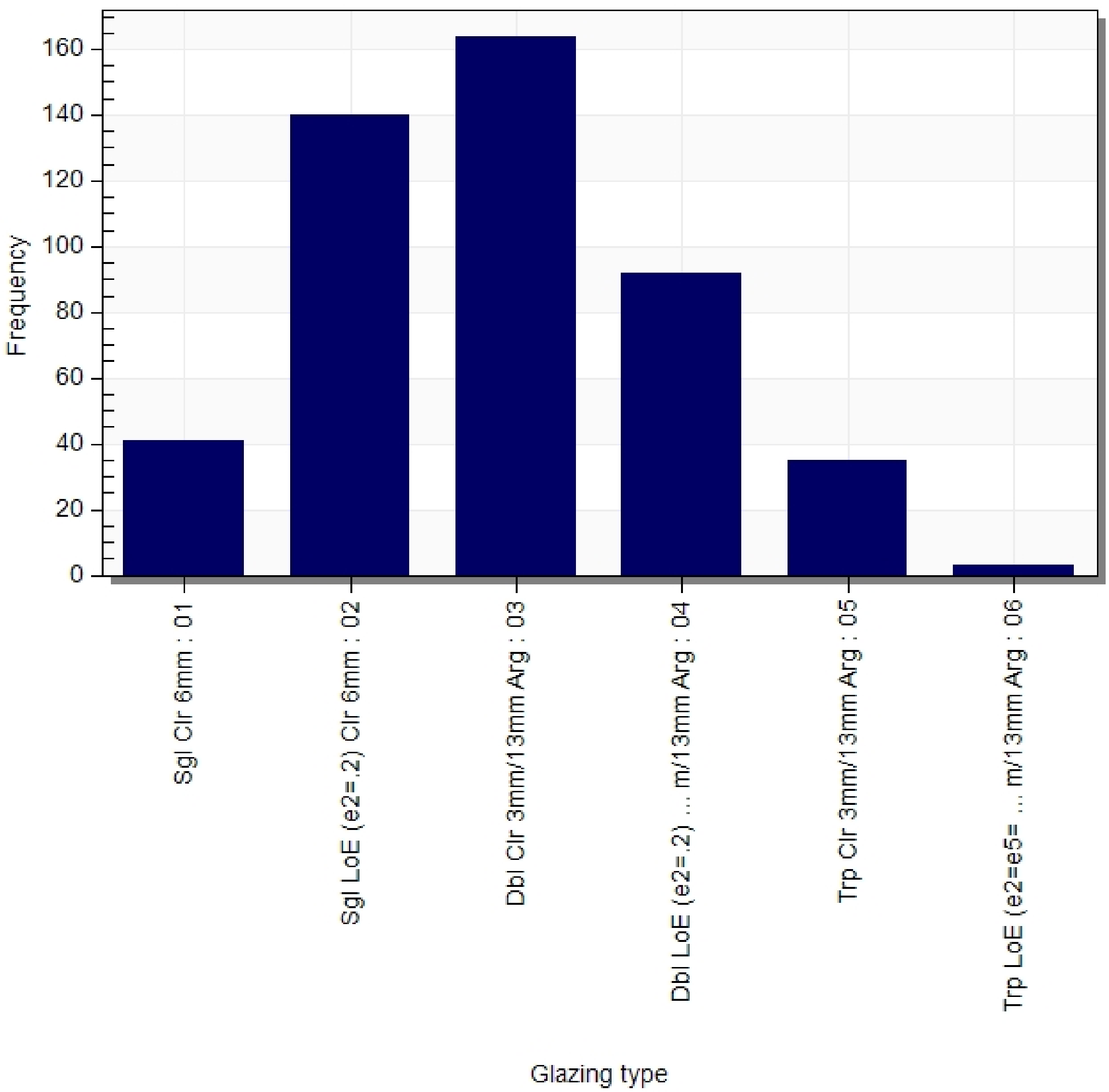


Figure 15 Glazing Type Frequency Distribution Graph.

3.2.6 Input variable: Miscellaneous power density

3.2.6.1 Summary Statistics: Miscellaneous power density

Mean	SD	Min	Q1	Median	Q3	Max
5.6	2	1.5	4	5.4	7	10

3.2.6.2 Input Distribution Histogram: Miscellaneous power density

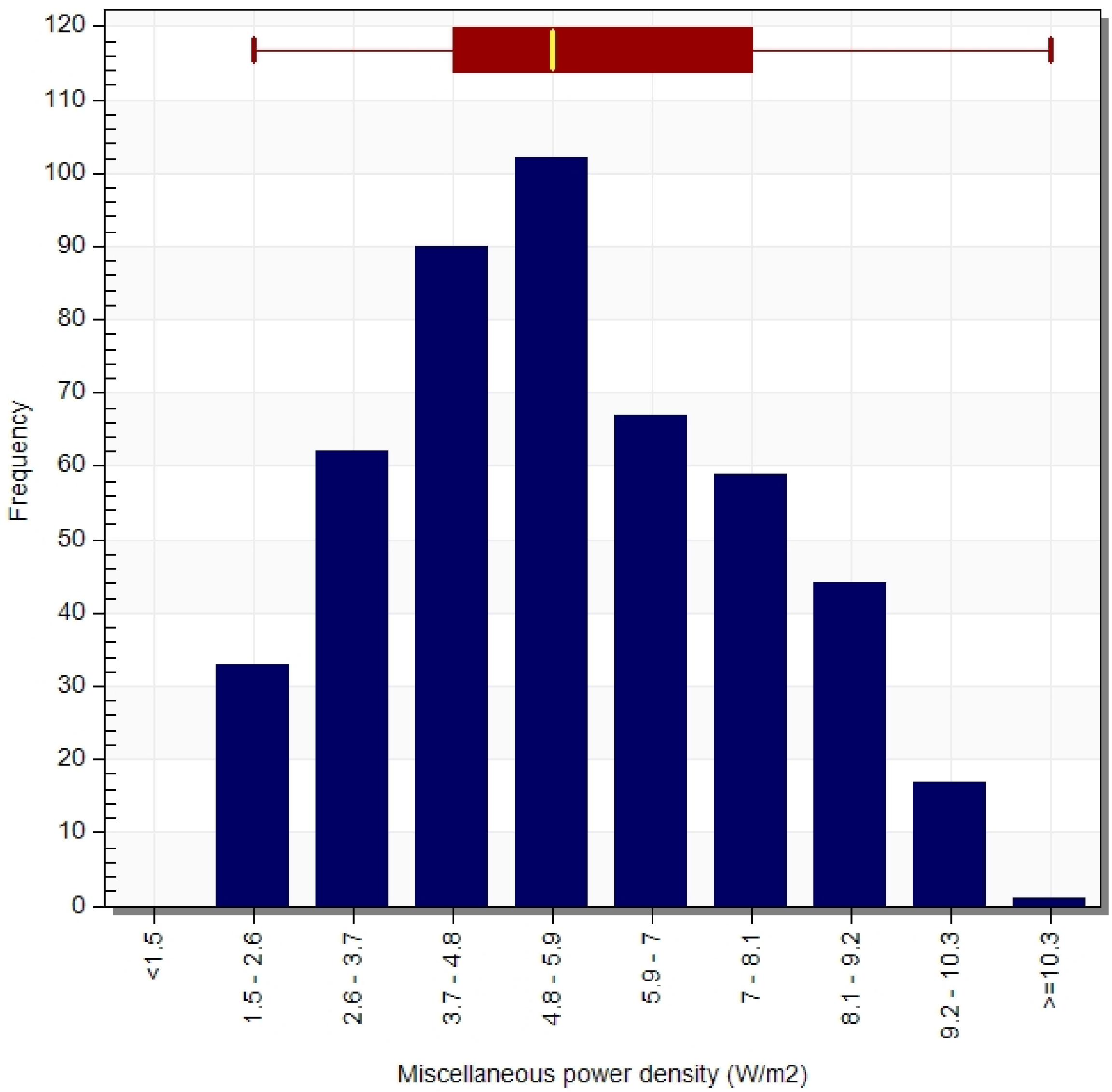


Figure 16 Miscellaneous Power Density Input Distribution Histogram.

3.2.7 Input variable: Cooling set-point temperature

3.2.7.1 Summary Statistics: Cooling set-point temperature

Mean	SD	Min	Q1	Median	Q3	Max
25	0.8	23	24	25	26	27

3.2.7.2 Input Distribution Histogram: Cooling set-point temperature

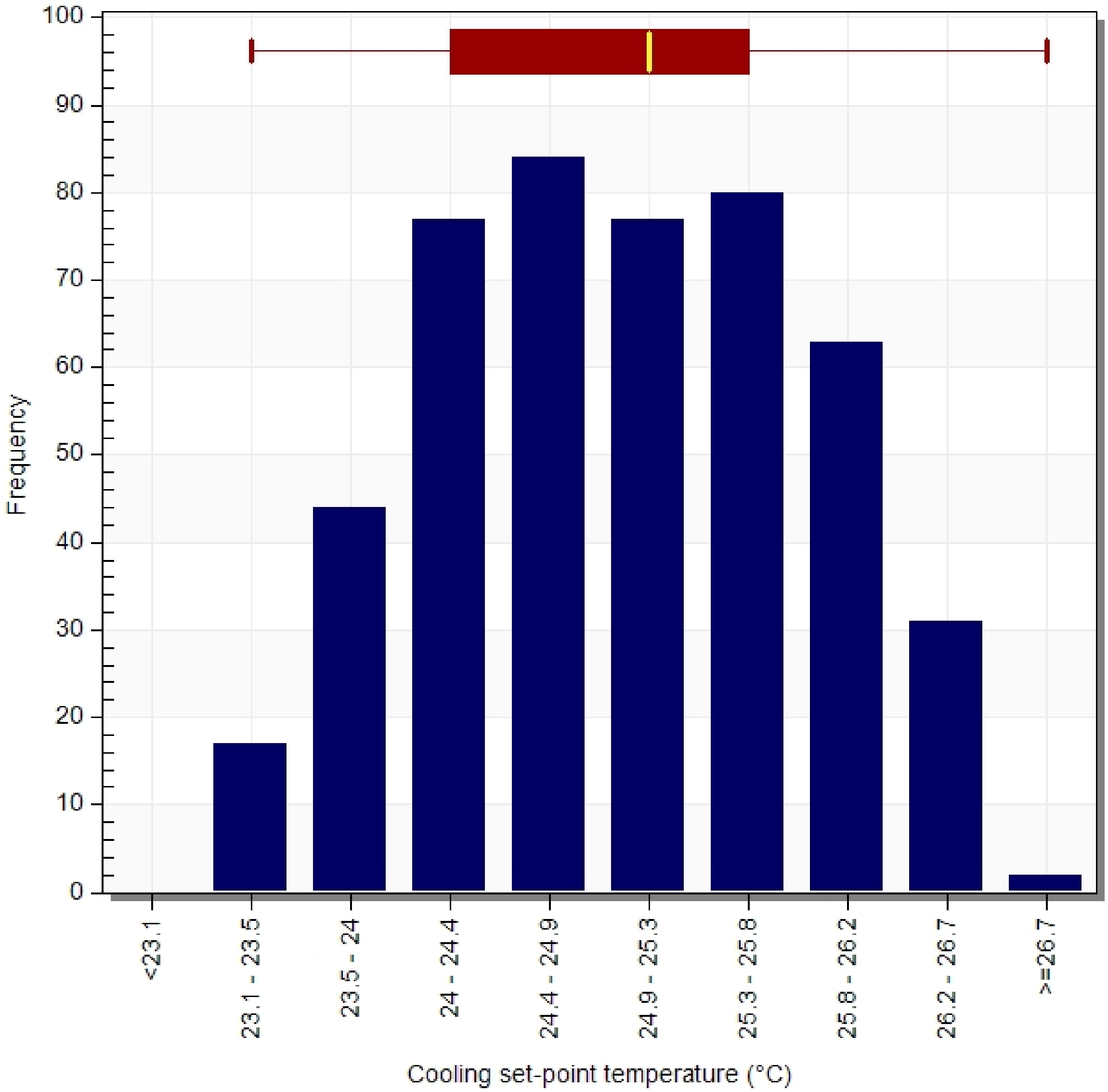


Figure 17 Cooling Set-Point Temperature Input Distribution Histogram.

Uncertainty analysis results

This section of the report presents the uncertainty analysis results for all the outputs requested. Summary statistics and corresponding graphs captures the spread of the outputs due to the variation in the inputs.

4.1 Output: heating load (Heating load)

4.1.1 Summary Statistics:

Mean	SD	Min	Q1	Median	Q3	Max
361987.9	141459.7	120533.7	252437.3	336026.2	446318.2	815954.6

4.1.2 Output Uncertainty Histogram:

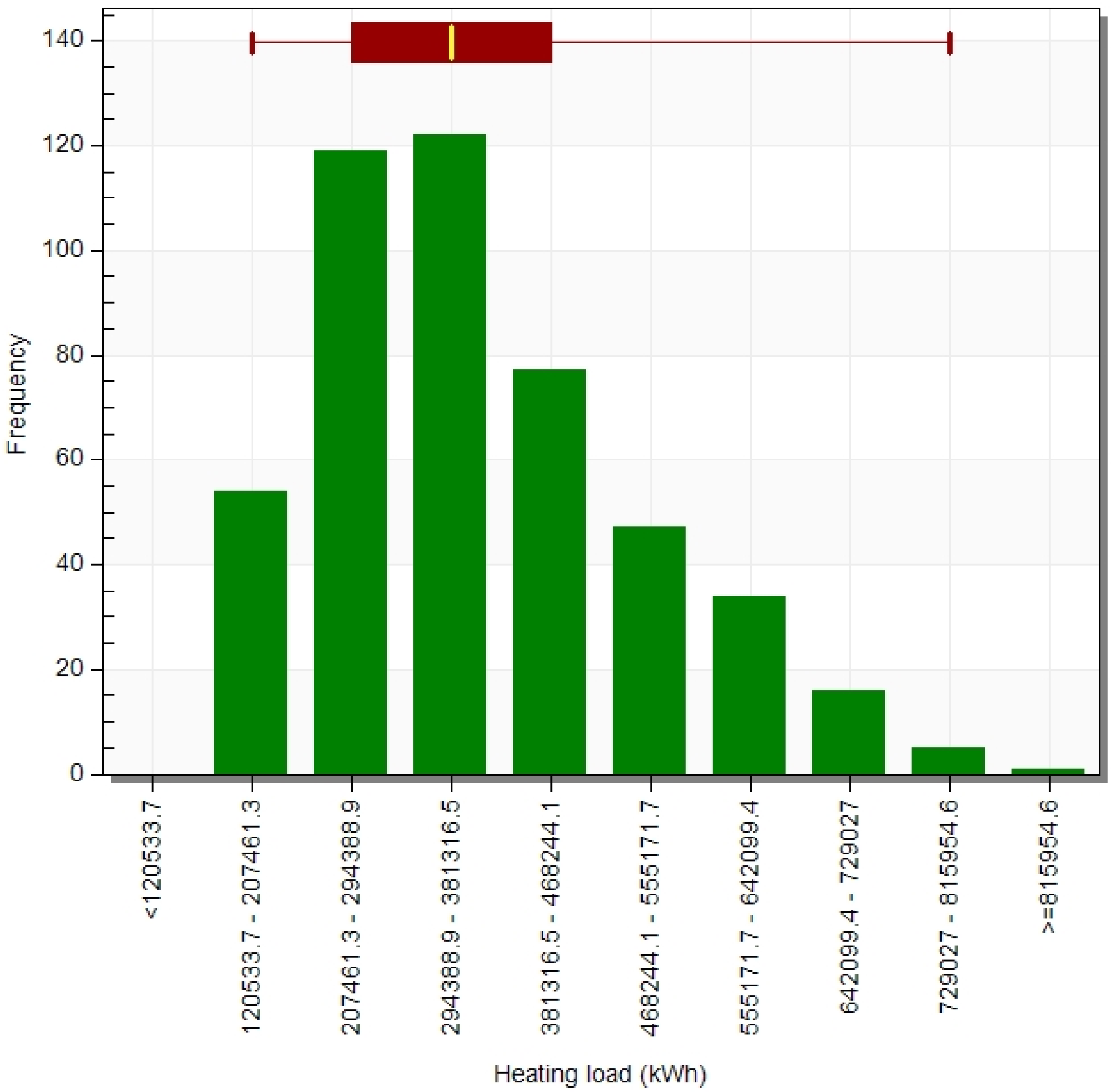


Figure 18 Heating Load Output Uncertainty Histogram.

4.2 Output: heating electricity (Heating (Electric))

4.2.1 Summary Statistics:

Mean	SD	Min	Q1	Median	Q3	Max
177587.6	59795.1	69667.8	131937.7	167855.5	213864.4	364518.4

4.2.2 Output Uncertainty Histogram:

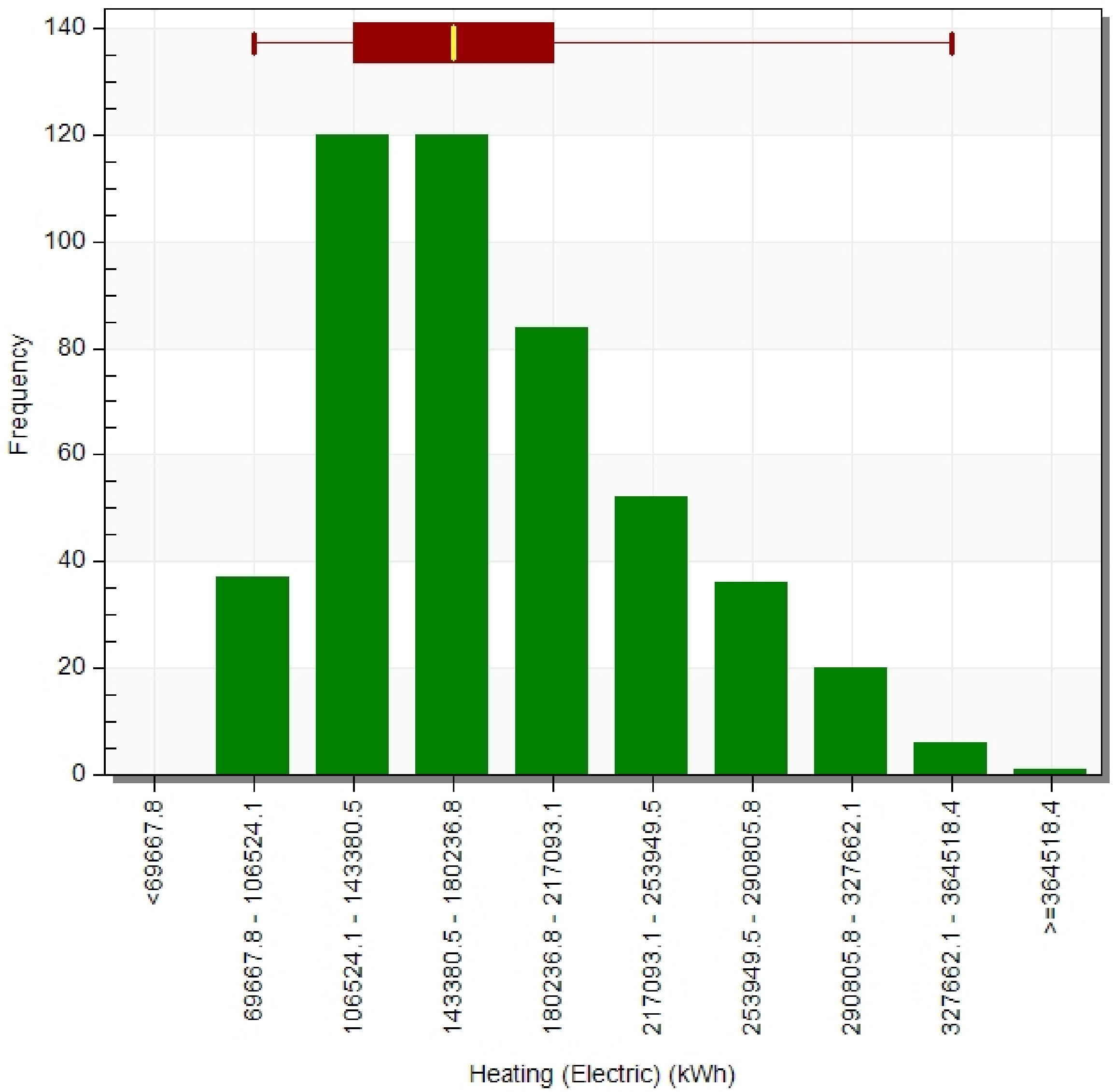


Figure 19 Heating Electricity Output Uncertainty Histogram.

4.3 Output: total site energy (Total site energy consumption)

4.3.1 Summary Statistics:

Mean	SD	Min	Q1	Median	Q3	Max
1046975.9	91646.1	819182.2	976586.2	1046892.1	1104392.1	1317768.8

4.3.2 Output Uncertainty Histogram:

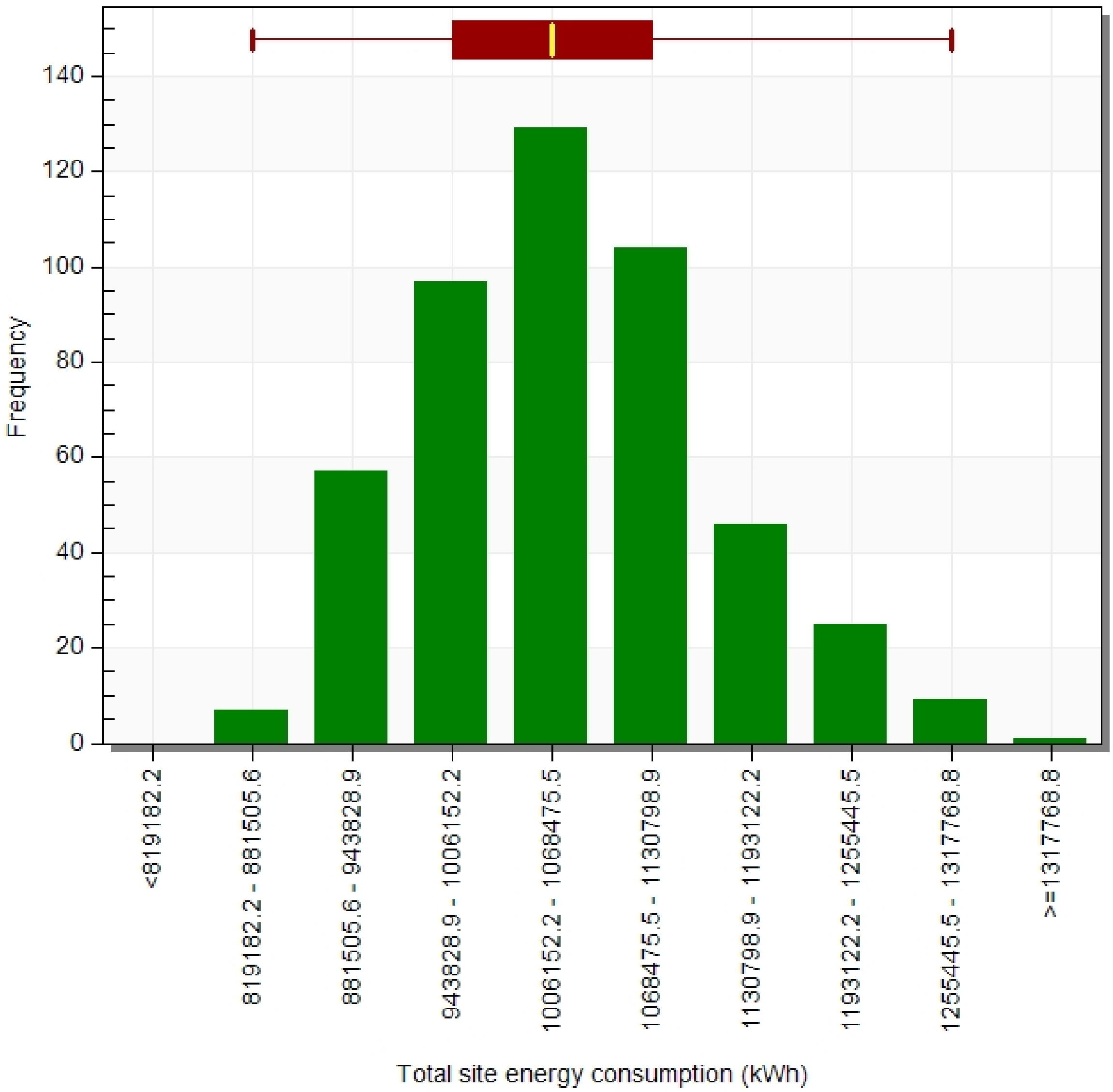


Figure 20 Total Site Energy Consumption Output Uncertainty Histogram.

4.4 Output: cooling load (Cooling load)

4.4.1 Summary Statistics:

Mean	SD	Min	Q1	Median	Q3	Max
143456.3	35089.2	65787	119918.4	141698.1	167982.4	230135.3

4.4.2 Output Uncertainty Histogram:

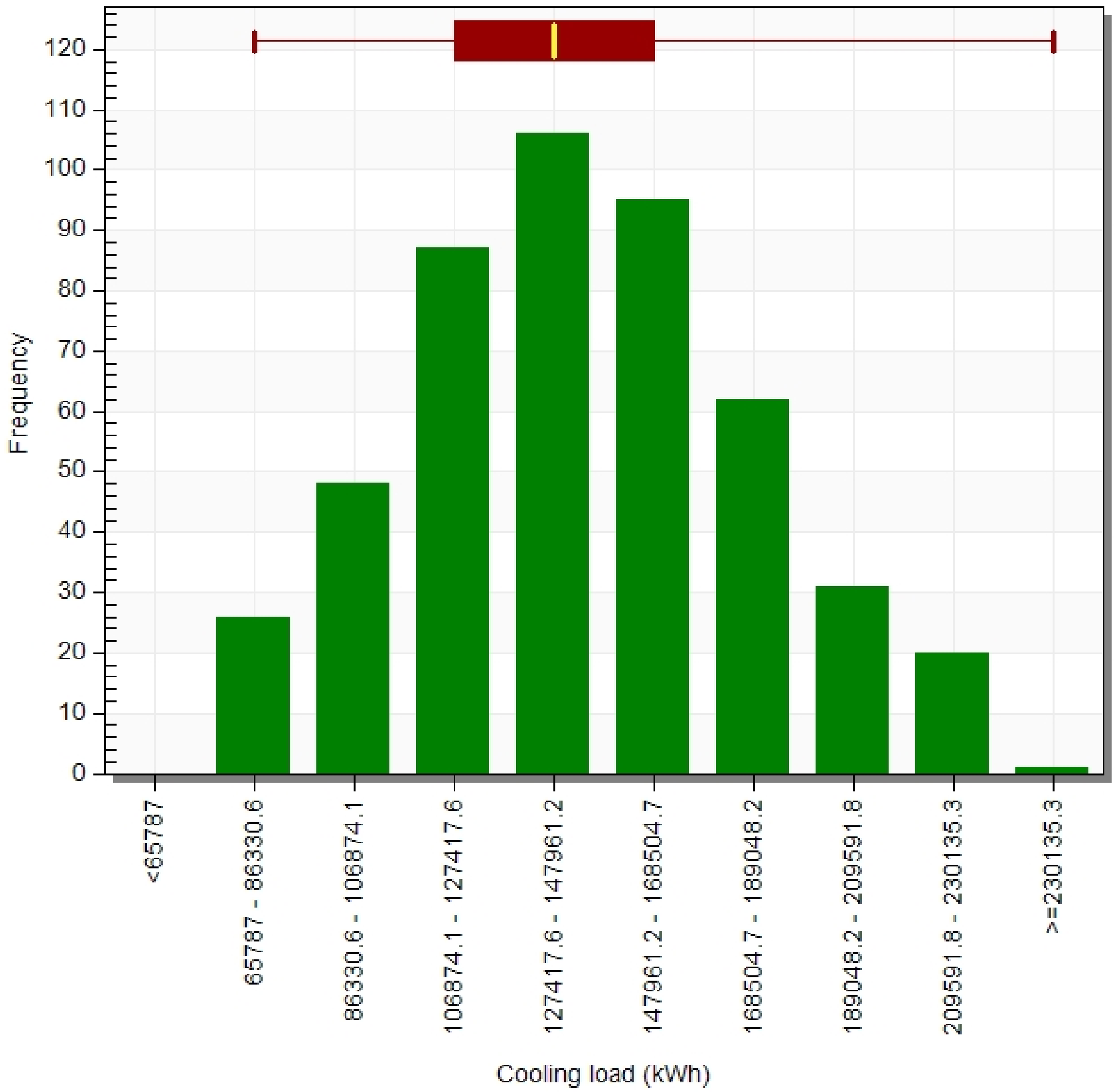


Figure 21 Cooling Load Uncertainty Histogram.

4.5 Output: cooling electricity (Cooling (Electric))

4.5.1 Summary Statistics:

Mean	SD	Min	Q1	Median	Q3	Max
47818.8	11696.4	21929	39972.8	47232.7	55994.1	76711.8

4.5.2 Output Uncertainty Histogram:

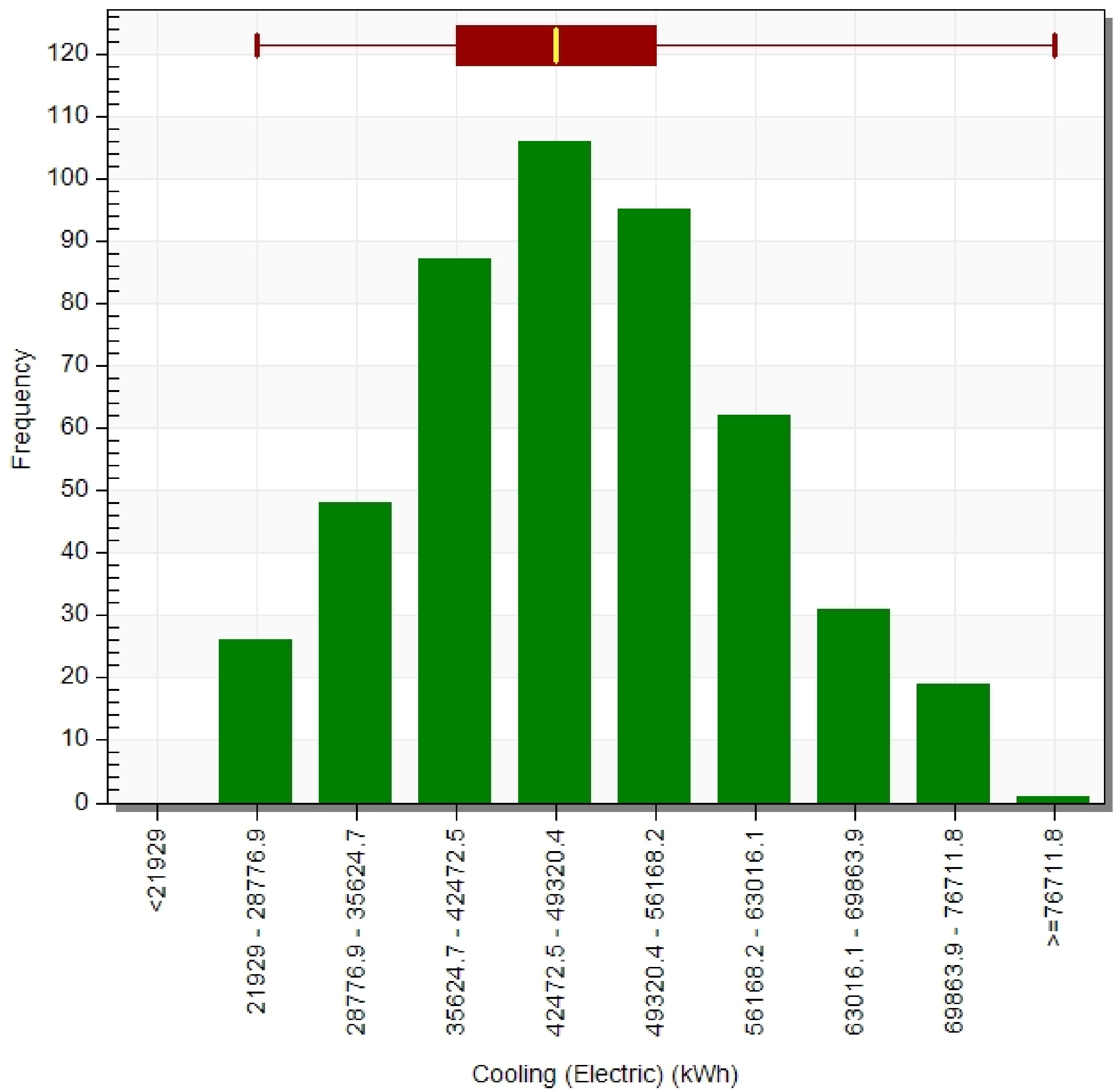


Figure 22 Cooling Electricity Output Uncertainty Histogram.

Sensitivity analysis results

Random sampling method is used for setting up the analysis. Regression method is used for this sensitivity analysis.

Regression analysis (multiple linear regression) is a statistical method that estimates the relationships among input variables. Regression analysis helps to understand how the typical value of the output changes when any one of the input variables is varied (assuming that the input variables are independent of each other). The Standardised Regression Coefficient (SRC) output the sensitivity of each input variable, thereby, identifying the most and least important variables. While other regression outputs like 'adjusted R-squared' value and 'p-value' help in determining the level of confidence and reliability of the results.

Summary of the influential factors for each output

Heating load is most strongly influenced by External wall construction, however there is an inverse relationship. Increasing External wall construction leads to a decrease in Heating load. Heating load is also strongly influenced by Infiltration rate (m3/h-m2 at 50 Pa), Flat roof construction and Heating set-point temperature. Heating load is also moderately influenced by Miscellaneous power density. Glazing type and Cooling set-point temperature do not have a notable influence on Heating load, therefore, these inputs can be ignored in further analysis of Heating load for this model.

Note: Adjusted R Squared Value of the analysis is not very high, suggesting that the current input variables partially explain the overall uncertainty in the output. The overall results of this analysis can be relied upon, but with care. Additionally, P-value of some (or all) of the inputs is high, suggesting that there is low level of confidence in their result values. Interpretations made specifically for Glazing type and Cooling set-point temperature inputs should be read with caution.

Heating (Electric) is most strongly influenced by External wall construction, however there is an inverse relationship. Increasing External wall construction leads to a decrease in Heating (Electric). Heating (Electric) is also strongly influenced by Infiltration rate (m3/h-m2 at 50 Pa), Flat roof construction and Heating set-point temperature. Heating (Electric) is also moderately influenced by Miscellaneous power density. Glazing type and Cooling set-point temperature do not have a notable influence on Heating (Electric), therefore, these inputs can be ignored in further analysis of Heating (Electric) for this model.

Note: Adjusted R Squared Value of the analysis is not very high, suggesting that the current input variables partially explain the overall uncertainty in the output. The overall results of this analysis can be relied upon, but with care. Additionally, P-value of some (or all) of the inputs is high, suggesting that there is low level of confidence in their result values. Interpretations made specifically for Glazing type and Cooling set-point temperature inputs should be read with caution.

Total site energy consumption is most strongly influenced by Miscellaneous power density. The input and output are directly related. Increasing Miscellaneous power density leads to increase in Total site energy consumption. Total site energy consumption is also strongly influenced by External wall construction, Infiltration rate (m3/h-m2 at 50 Pa) and Flat roof construction. Total site energy consumption is also moderately influenced by Heating set-point temperature and Cooling set-point temperature. Glazing type does not have a notable influence on Total site energy consumption, therefore, this input can be ignored in further analysis of Total site energy consumption for this model.

Note: P-value of some (or all) of the inputs is high, suggesting that there is low level of confidence in their result values. Interpretations made specifically for Glazing type input should be read with caution.

Cooling load is most strongly influenced by Cooling set-point temperature, however there is an inverse relationship. Increasing Cooling set-point temperature leads to a decrease in Cooling load. Cooling load is also strongly influenced by Miscellaneous power density and Flat roof construction. Heating set-point temperature, Infiltration rate (m3/h-m2 at 50 Pa), Glazing type and External wall construction do not have a notable influence on Cooling load, therefore, these inputs can be ignored in further analysis of Cooling load for this model.

Note: P-value of some (or all) of the inputs is high, suggesting that there is low level of confidence in their result values. Interpretations made specifically for Heating set-point temperature, Infiltration rate (m3/h-m2 at 50 Pa), Glazing type and External wall construction inputs should be read with caution.

Cooling (Electric) is most strongly influenced by Cooling set-point temperature, however there is an inverse relationship. Increasing Cooling set-point temperature leads to a decrease in Cooling (Electric). Cooling (Electric) is also strongly influenced by Miscellaneous power density and Flat roof construction. Heating set-point temperature, Infiltration rate (m3/h-m2 at 50 Pa), Glazing type and External wall construction do not have a notable influence on Cooling (Electric), therefore, these inputs can be ignored in further analysis of Cooling (Electric) for this model.

Note: P-value of some (or all) of the inputs is high, suggesting that there is low level of confidence in their result values. Interpretations made specifically for Heating set-point temperature, Infiltration rate (m3/h-m2 at 50 Pa), Glazing type and External wall construction inputs should be read with caution.

4.1 Output: heating load (Heating load)

4.1.1 Sensitivity Analysis Graph

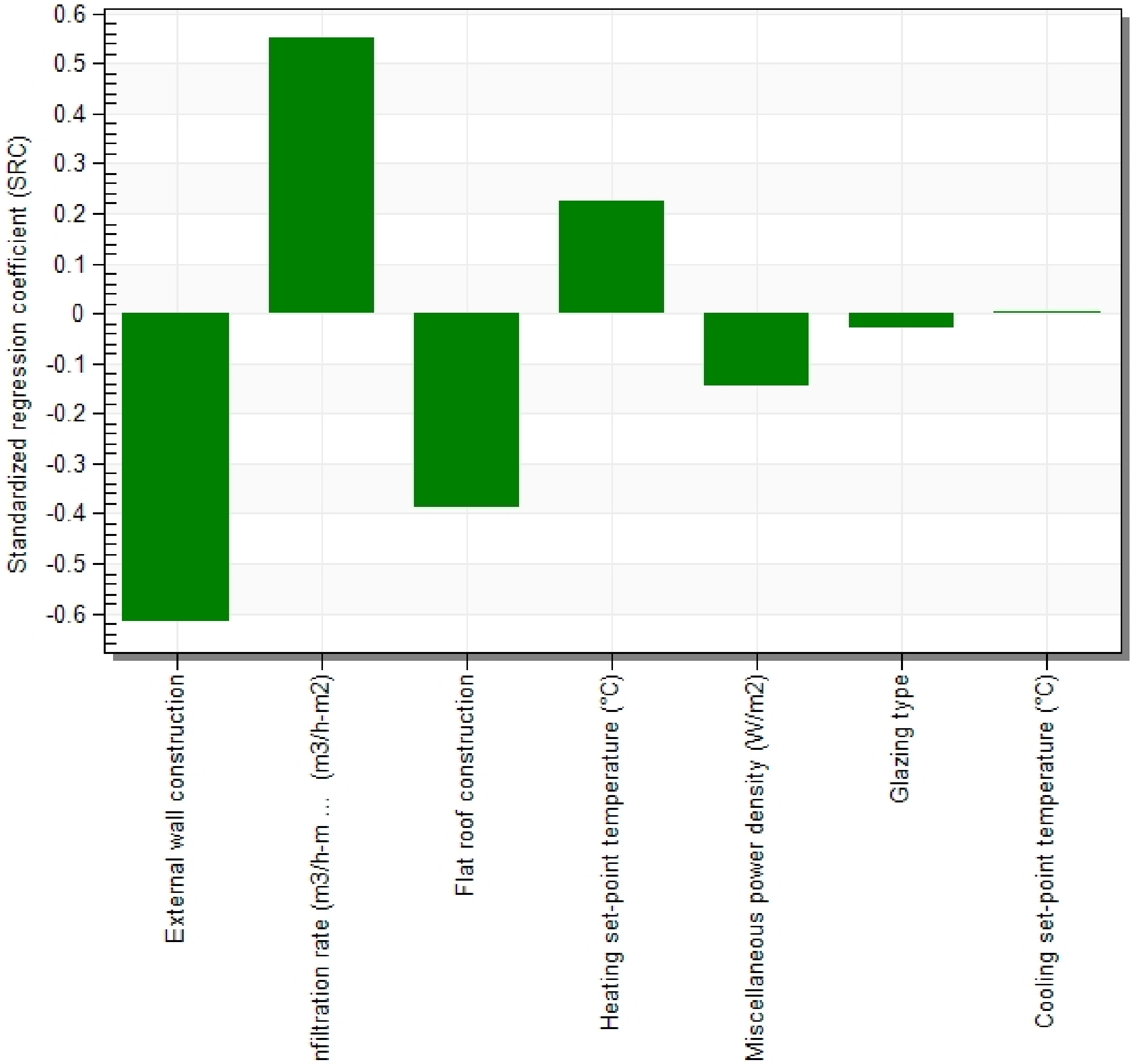


Figure 23 Heating Load Output Sensitivity Analysis.

4.1.2 Result Interpretation

Adjusted R-squared value

It represents goodness of fit of the complete model. It indicates how much variation of the output is explained by the input variables.

For the output: 'heating load (Heating load)', the 'adjusted R-squared' value of '0.8056' is not very high, suggesting that the current input variables partially explain the uncertainty in the output. Some more input variables need to be identified to improve the results. Alternatively, some of the current input variables are insignificant and can be removed. The current results can still be used to screen out less sensitive input variables.

p-value

This value tells if the input variable has a statistically significant effect on the output.

Some input variables have a p-value more than 0.05, suggesting that there is low level of confidence in their respective regression result values. They are the following:

1. Glazing type (0.1814)
2. Cooling set-point temperature (0.8349)

Improvement Suggestion: The p-value can be lowered by increasing the number of simulations. Alternatively, the input variable with the insignificant 'p-value' can be removed and the analysis can be re-run. However, only one input variable should be removed at a time because a input variable that is insignificant in the presence of the others may become significant when some of another input variable is removed. (Note: The applicability of 'p-value' threshold of 0.05 is up to the modeller's judgement as marginal increase over 0.05 in 'p-value' can also be acceptable)

Standardised regression coefficient (SRC)

This value tells the relative sensitivity of the input variables to the output. Its absolute value ranks the input variables in order of sensitivity the importance and the sign identifies, if relationship to the output is direct or inverse. The list below ranks the variables in decreasing level of importance. (High Importance: **Green**, Medium Importance: **Yellow**, Low Importance: **Red**).

1. **External wall construction**
2. **Infiltration rate (m3/h-m2 at 50 Pa)**
3. **Flat roof construction**
4. **Heating set-point temperature**
5. **Miscellaneous power density**
6. **Glazing type**
7. **Cooling set-point temperature**

4.1.3 Summary of Fit

Adjusted R Squared Value	**0.8056**

4.1.4 Regression Coefficients

Variable	Reg. Coef.	Std. Reg. Coef.	Std. Error	P Value
Intercept	-165908.8571	0.0000	106419.5444	**0.1197**
External wall construction (No Units)	-79845.4650	-0.6171	2634.5926	**0.0000**
Infiltration rate (m3/h-m2 at 50 Pa) (m3/h-m2)	17334.8161	0.5530	637.3084	**0.0000**
Flat roof construction (No Units)	-50165.2499	-0.3880	2626.5137	**0.0000**

Heating set-point temperature (°C)	33700.6411	0.2251	3045.0685	**0.0000**
Miscellaneous power density (W/m2)	-10108.3280	-0.1455	1414.2810	**0.0000**
Glazing type (No Units)	-3553.9160	-0.0272	2654.9606	**0.1814**
Cooling set-point temperature (°C)	715.5669	0.0042	3430.6619	**0.8349**

Note:Regression results show the relative importance of the different variables. However, these can't determine whether the variables are important in a practical sense. To determine practical importance case specific understanding is necessary, along with ensuring that other statistical indices ('p-value' and 'adjusted R-squared' value) are acceptable"

4.2 Output: heating electricity (Heating (Electric))

4.2.1 Sensitivity Analysis Graph

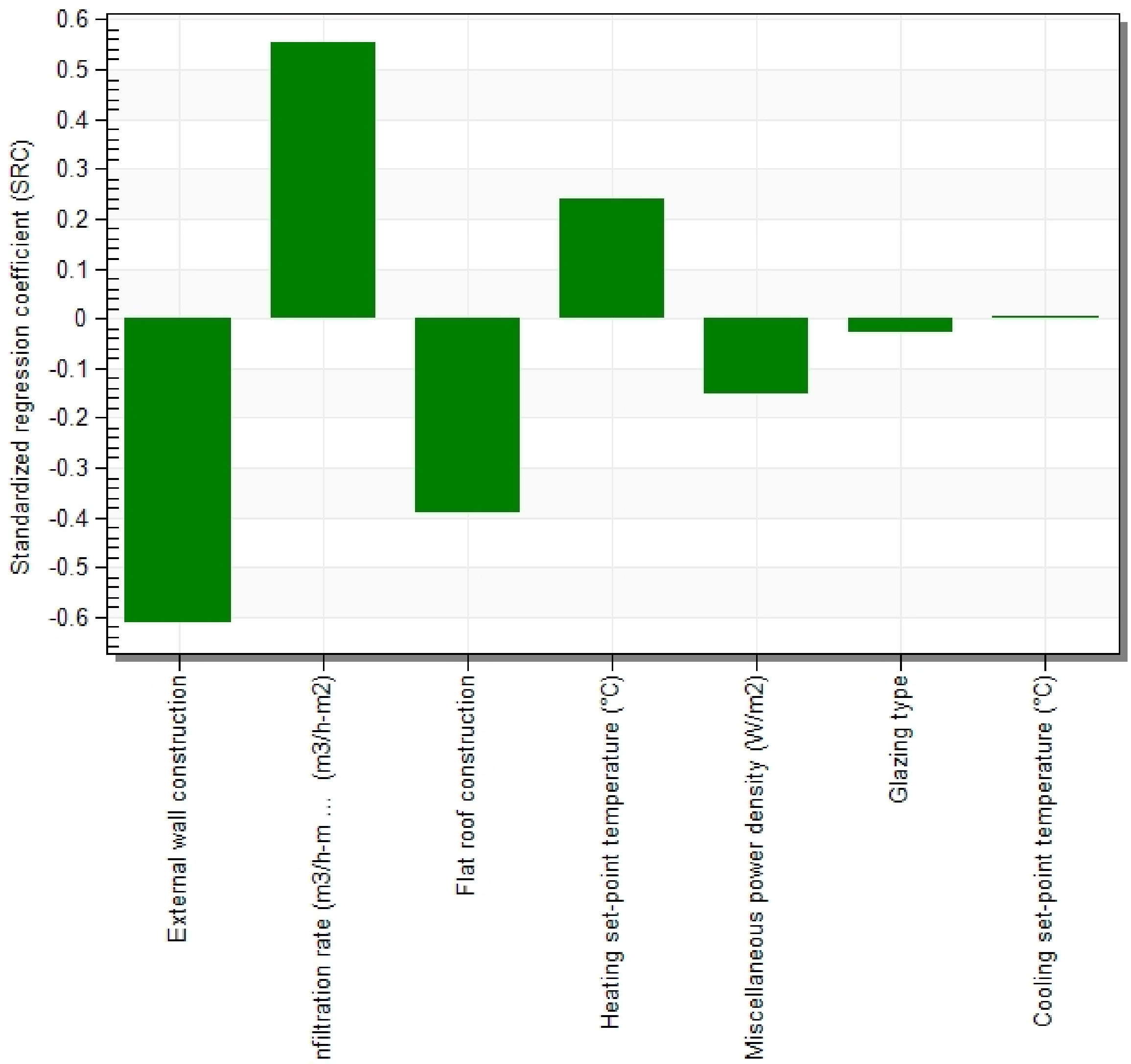


Figure 24 Heating Electricity Output Sensitivity Analysis.

4.2.2 Result Interpretation

Adjusted R-squared value

It represents goodness of fit of the complete model. It indicates how much variation of the output is explained by the input variables.

For the output: 'heating electricity (Heating (Electric))', the 'adjusted R-squared' value of '0.8131' is not very high, suggesting that the current input variables partially explain the uncertainty in the output. Some more input variables need to be identified to improve the results. Alternatively, some of the current input variables are insignificant and can be removed. The current results can still be used to screen out less sensitive input variables.

p-value

This value tells if the input variable has a statistically significant effect on the output.

Some input variables have a p-value more than 0.05, suggesting that there is low level of confidence in their respective regression result values. They are the following:

1. Glazing type (0.1690)
2. Cooling set-point temperature (0.8197)

Improvement Suggestion: The p-value can be lowered by increasing the number of simulations. Alternatively, the input variable with the insignificant 'p-value' can be removed and the analysis can be re-run. However only one input variable should be removed at a time because a input variable that is insignificant in the presence of the others may become significant when some of another input variable is removed. (Note: The applicability of 'p-value' threshold of 0.05 is up to the modeller's judgement as marginal increase over 0.05 in 'p-value' can also be acceptable)

Standardised regression coefficient (SRC)

This value tells the relative sensitivity of the input variables to the output. Its absolute value ranks the input variables in order of sensitivity the importance and the sign identifies, if relationship to the output is direct or inverse. The list below ranks the variables in decreasing level of importance. (High Importance: **Green**, Medium Importance: **Yellow**, Low Importance: **Red**).

1. **External wall construction**
2. **Infiltration rate (m3/h-m2 at 50 Pa)**
3. **Flat roof construction**
4. **Heating set-point temperature**
5. **Miscellaneous power density**
6. **Glazing type**
7. **Cooling set-point temperature**

4.2.3 Summary of Fit

Adjusted R Squared Value	**0.8131**

4.2.4 Regression Coefficients

Variable	Reg. Coef.	Std. Reg. Coef.	Std. Error	P Value
Intercept	-65648.4166	0.0000	44104.9687	**0.1373**
External wall construction (No Units)	-33500.5896	-0.6125	1091.8918	**0.0000**
Infiltration rate (m3/h-m2 at 50 Pa) (m3/h-m2)	7363.5132	0.5557	264.1288	**0.0000**
Flat roof construction (No Units)	-21400.7389	-0.3916	1088.5435	**0.0000**
Heating set-point temperature (°C)	15238.2502	0.2408	1262.0111	**0.0000**

Miscellaneous power density (W/m2)	-4423.0254	-0.1506	586.1406	**0.0000**
Glazing type (No Units)	-1515.7530	-0.0275	1100.3332	**0.1690**
Cooling set-point temperature (°C)	324.2805	0.0045	1421.8181	**0.8197**

Note:Regression results show the relative importance of the different variables. However, these can't determine whether the variables are important in a practical sense. To determine practical importance case specific understanding is necessary, along with ensuring that other statistical indices ('p-value' and 'adjusted R-squared' value) are acceptable"

4.3 Output: total site energy (Total site energy consumption)

4.3.1 Sensitivity Analysis Graph

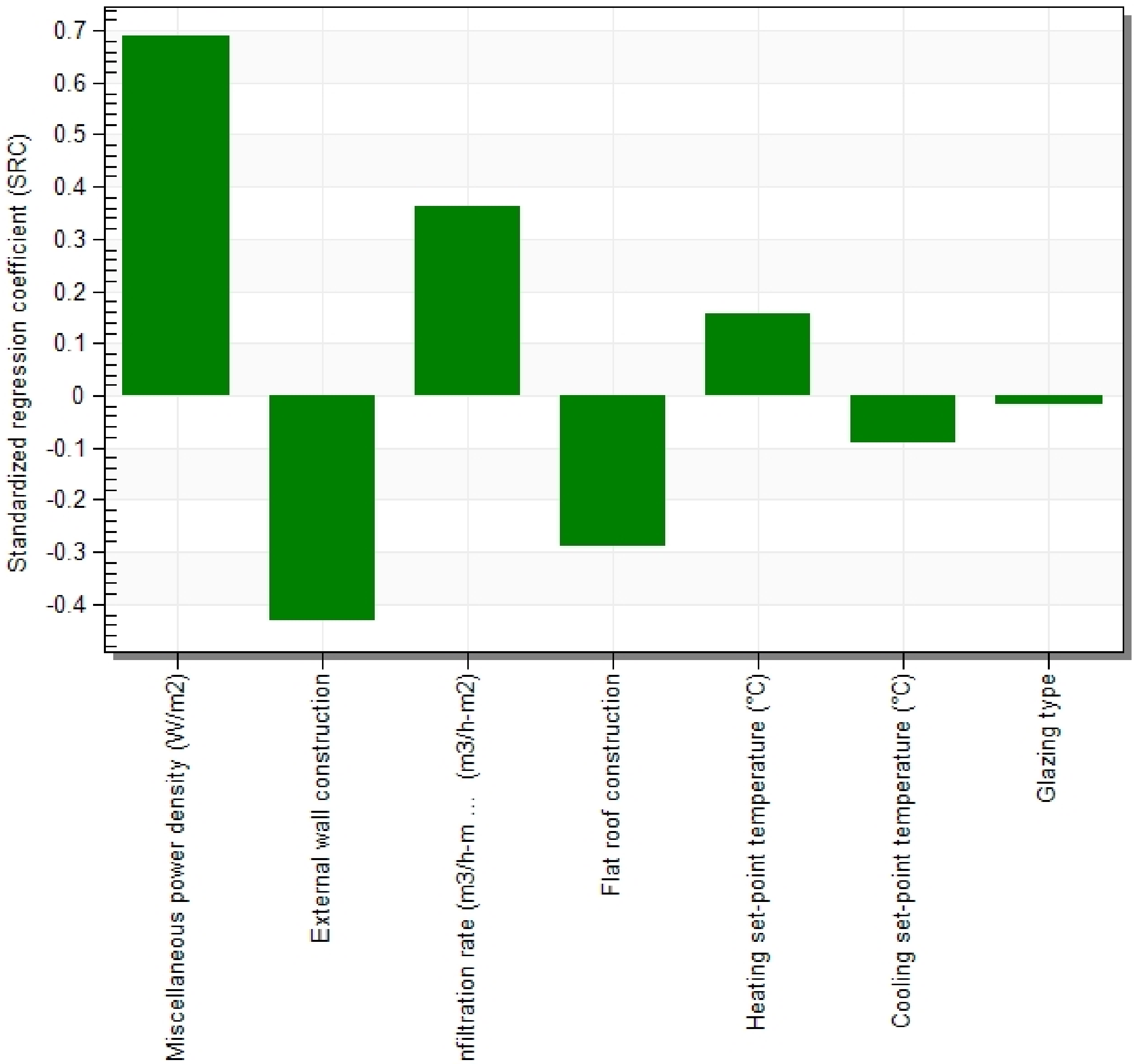


Figure 25 Total Site Energy Output Sensitivity Analysis.

4.3.2 Result Interpretation

Adjusted R-squared value

It represents goodness of fit of the complete model. It indicates how much variation of the output is explained by the input variables.

For the output: 'total site energy (Total site energy consumption)', the 'adjusted R-squared' value of '0.9173' is high, suggesting that most of the key sensitive input variables have been identified. Only a few input variables might be left that can improve the results. The current results can be usefully considered to identify most and least sensitive input variables.

p-value

This value tells if the input variable has a statistically significant effect on the output.

Some input variables have a p-value more than 0.05, suggesting that there is low level of confidence in their respective regression result values. They are the following:

1. Glazing type (0.2254)

Improvement Suggestion: The p-value can be lowered by increasing the number of simulations. Alternatively, the input variable with the insignificant 'p-value' can be removed and the analysis can be re-run. However only one input variable should be removed at a time because a input variable that is insignificant in the presence of the others may become significant when some of another input variable is removed. (Note: The applicability of 'p-value' threshold of 0.05 is up to the modeller's judgement as marginal increase over 0.05 in 'p-value' can also be acceptable)

Standardised regression coefficient (SRC)

This value tells the relative sensitivity of the input variables to the output. Its absolute value ranks the input variables in order of sensitivity the importance and the sign identifies, if relationship to the output is direct or inverse. The list below ranks the variables in decreasing level of importance. (High Importance: **Green**, Medium Importance: **Yellow**, Low Importance: **Red**).

1. **Miscellaneous power density**
2. **External wall construction**
3. **Infiltration rate (m3/h-m2 at 50 Pa)**
4. **Flat roof construction**
5. **Heating set-point temperature**
6. **Cooling set-point temperature**
7. **Glazing type**

4.3.3 Summary of Fit

Adjusted R Squared Value	**0.9173**

4.3.4 Regression Coefficients

Variable	Reg. Coef.	Std. Reg. Coef.	Std. Error	P Value
Intercept	873098.2310	0.0000	44978.6577	**0.0000**
Miscellaneous power density (W/m2)	31109.4948	0.6911	597.7517	**0.0000**
External wall construction (No Units)	-36326.3735	-0.4334	1113.5214	**0.0000**
Infiltration rate (m3/h-m2 at 50 Pa) (m3/h-m2)	7343.9399	0.3616	269.3610	**0.0000**
Flat roof construction (No Units)	-24329.7873	-0.2905	1110.1068	**0.0000**
Heating set-point temperature (°C)	15367.7042	0.1584	1287.0107	**0.0000**

Cooling set-point temperature (°C)	-9889.1728	-0.0903	1449.9834	**0.0000**
Glazing type (No Units)	-1362.0312	-0.0161	1122.1300	**0.2254**

Note:Regression results show the relative importance of the different variables. However, these can't determine whether the variables are important in a practical sense. To determine practical importance case specific understanding is necessary, along with ensuring that other statistical indices ('p-value' and 'adjusted R-squared' value) are acceptable"

4.4 Output: cooling load (Cooling load)

4.4.1 Sensitivity Analysis Graph

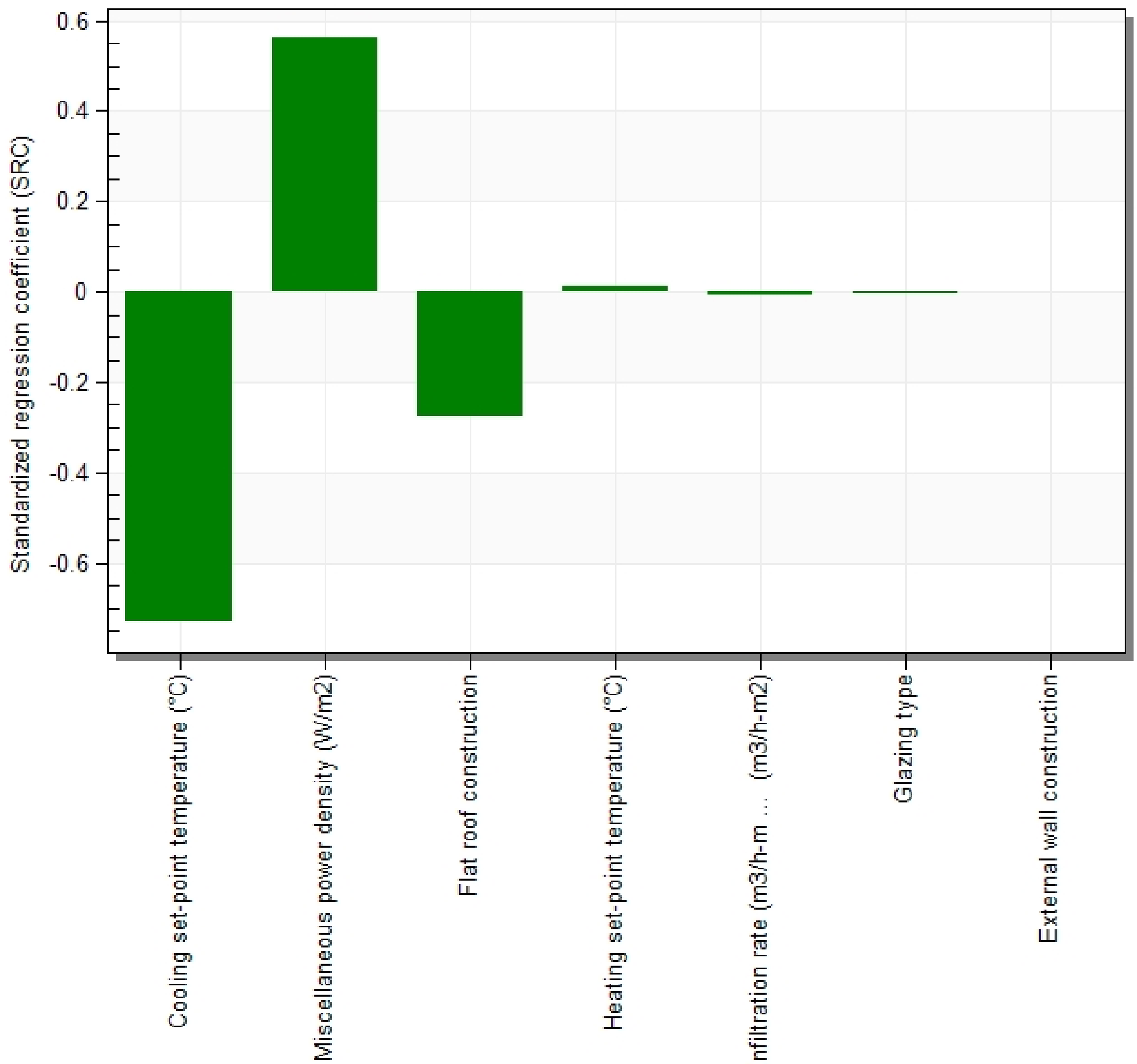


Figure 26 Cooling Load Output Sensitivity Analysis.

4.4.2 Result Interpretation

Adjusted R-squared value

It represents goodness of fit of the complete model. It indicates how much variation of the output is explained by the input variables.

For the output: 'cooling load (Cooling load)', the 'adjusted R-squared' value of '0.9751' is high, suggesting that most of the key sensitive input variables have been identified. Only a few input variables might be left that can improve the results. The current results can be usefully considered to identify most and least sensitive input variables.

p-value

This value tells if the input variable has a statistically significant effect on the output.

Some input variables have a p-value more than 0.05, suggesting that there is low level of confidence in their respective regression result values. They are the following:

1. Heating set-point temperature (0.1440)
2. Infiltration rate (m3/h-m2 at 50 Pa) (0.2897)
3. Glazing type (0.7523)
4. External wall construction (0.9395)

Improvement Suggestion: The p-value can be lowered by increasing the number of simulations. Alternatively, the input variable with the insignificant 'p-value' can be removed and the analysis can be re-run. However only one input variable should be removed at a time because a input variable that is insignificant in the presence of the others may become significant when some of another input variable is removed. (Note: The applicability of 'p-value' threshold of 0.05 is up to the modeller's judgement as marginal increase over 0.05 in 'p-value' can also be acceptable)

Standardised regression coefficient (SRC)

This value tells the relative sensitivity of the input variables to the output. Its absolute value ranks the input variables in order of sensitivity the importance and the sign identifies, if relationship to the output is direct or inverse. The list below ranks the variables in decreasing level of importance. (High Importance: **Green**, Medium Importance: **Yellow**, Low Importance: **Red**).

1. **Cooling set-point temperature**
2. **Miscellaneous power density**
3. **Flat roof construction**
4. **Heating set-point temperature**
5. **Infiltration rate (m3/h-m2 at 50 Pa)**
6. **Glazing type**
7. **External wall construction**

4.4.3 Summary of Fit

Adjusted R Squared Value	**0.9751**

4.4.4 Regression Coefficients

Variable	Reg. Coef.	Std. Reg. Coef.	Std. Error	P Value
Intercept	869265.3301	0.0000	9441.1073	**0.0000**
Cooling set-point temperature (°C)	-30647.7675	-0.7313	304.3543	**0.0000**
Miscellaneous power density (W/m2)	9719.3288	0.5639	125.4692	**0.0000**
Flat roof construction (No Units)	-8807.2263	-0.2746	233.0136	**0.0000**
Heating set-point temperature (°C)	395.3597	0.0106	270.1460	**0.1440**

Infiltration rate (m3/h-m2 at 50 Pa) (m3/h-m2)	-59.9268	-0.0077	56.5394	**0.2897**
Glazing type (No Units)	-74.3727	-0.0023	235.5373	**0.7523**
External wall construction (No Units)	17.7514	0.0006	233.7303	**0.9395**

Note:Regression results show the relative importance of the different variables. However, these can't determine whether the variables are important in a practical sense. To determine practical importance case specific understanding is necessary, along with ensuring that other statistical indices ('p-value' and 'adjusted R-squared' value) are acceptable"

4.5 Output: cooling electricity (Cooling (Electric))

4.5.1 Sensitivity Analysis Graph

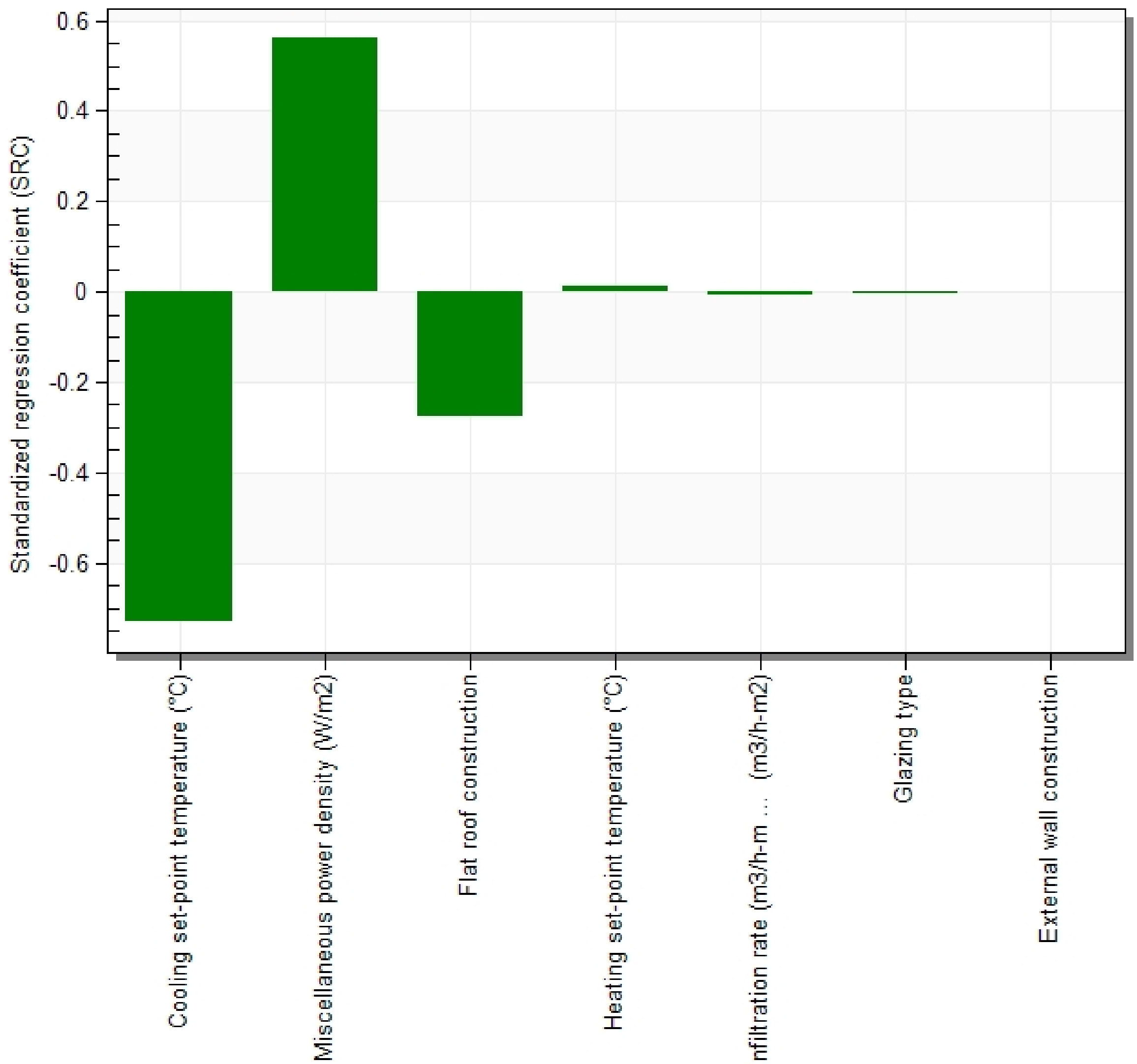


Figure 27 Cooling Electricity Output Sensitivity Analysis.

4.5.2 Result Interpretation

Adjusted R-squared value

It represents goodness of fit of the complete model. It indicates how much variation of the output is explained by the input variables.

For the output: 'cooling electricity (Cooling (Electric))', the 'adjusted R-squared' value of '0.9751' is high, suggesting that most of the key sensitive input variables have been identified. Only a few input variables might be left that can improve the results. The current results can be usefully considered to identify most and least sensitive input variables.

p-value

This value tells if the input variable has a statistically significant effect on the output.

Some input variables have a p-value more than 0.05, suggesting that there is low level of confidence in their respective regression result values. They are the following:

1. Heating set-point temperature (0.1440)
2. Infiltration rate (m3/h-m2 at 50 Pa) (0.2897)
3. Glazing type (0.7523)
4. External wall construction (0.9395)

Improvement Suggestion: The p-value can be lowered by increasing the number of simulations. Alternatively, the input variable with the insignificant 'p-value' can be removed and the analysis can be re-run. However only one input variable should be removed at a time because a input variable that is insignificant in the presence of the others may become significant when some of another input variable is removed. (Note: The applicability of 'p-value' threshold of 0.05 is up to the modeller's judgement as marginal increase over 0.05 in 'p-value' can also be acceptable)

Standardised regression coefficient (SRC)

This value tells the relative sensitivity of the input variables to the output. Its absolute value ranks the input variables in order of sensitivity the importance and the sign identifies, if relationship to the output is direct or inverse. The list below ranks the variables in decreasing level of importance. (High Importance: **Green**, Medium Importance: **Yellow**, Low Importance: **Red**).

1. **Cooling set-point temperature**
2. **Miscellaneous power density**
3. **Flat roof construction**
4. **Heating set-point temperature**
5. **Infiltration rate (m3/h-m2 at 50 Pa)**
6. **Glazing type**
7. **External wall construction**

4.5.3 Summary of Fit

Adjusted R Squared Value	**0.9751**

4.5.4 Regression Coefficients

Variable	**Reg. Coef.**	**Std. Reg. Coef.**	**Std. Error**	**P Value**
Intercept	289755.1100	0.0000	3147.0359	**0.0000**
Cooling set-point temperature (°C)	-10215.9224	-0.7313	101.4514	**0.0000**
Miscellaneous power density (W/m2)	3239.7763	0.5639	41.8231	**0.0000**
Flat roof construction (No Units)	-2935.7419	-0.2746	77.6712	**0.0000**
Heating set-point temperature (°C)	131.7864	0.0106	90.0487	**0.1440**

Infiltration rate (m3/h-m2 at 50 Pa) (m3/h-m2)	-19.9756	-0.0077	18.8465	**0.2897**
Glazing type (No Units)	-24.7910	-0.0023	78.5124	**0.7523**
External wall construction (No Units)	5.9170	0.0006	77.9101	**0.9395**

Note:Regression results show the relative importance of the different variables. However, these can't determine whether the variables are important in a practical sense. To determine practical importance case specific understanding is necessary, along with ensuring that other statistical indices ('p-value' and 'adjusted R-squared' value) are acceptable"

End of Phase 1.

Page left intentionally blank.

Phase 2: Detailed comparison of alternatives

This phase of the report is a detailed comparison of alternatives, including building envelope and HVAC system options, the integration of onsite solar generation, and the implications of cooling the main production area.

Existing conditions model

A model of the existing conditions was developed for reference. The existing conditions model estimates an **EUI of 64.73 kBtu/ft2 and annual energy cost of $255,470.54**. The energy end uses are summarized in Table 5, and the annual energy cost breakdown is shown in Table 6.

Table 5 existing envelope and HVAC system energy end uses.

	Electricity [kBtu]	Propane [kBtu]
Heating	97.58	4197838.07
Cooling	18122.31	0.00
Interior Lighting	1010922.32	0.00
Exterior Lighting	59545.21	0.00
Interior Equipment	537546.10	0.00
Exterior Equipment	0.00	0.00
Fans	54506.94	0.00
Pumps	584.89	0.00
Heat Rejection	0.00	0.00
Humidification	0.00	0.00
Heat Recovery	0.00	0.00
Water Systems	0.00	154684.35
Refrigeration	0.00	0.00
Generators	0.00	0.00
Total End Uses	1681325.33	4352522.42

Table 6 existing conditions annual energy cost.

	Electricity	Propane	Total
Cost [$]	109531.93	145938.61	255470.54
Cost per Total Building Area [$/ft2]	1.18	1.57	2.74
Cost per Net Conditioned Building Area [$/ft2]	1.18	1.57	2.74

Existing HVAC system description

The main production area is heated with propane-fired unit heaters and relies on exhaust fans as the only means of ventilation. There is no cooling in the main production area.

The office areas are served by a rooftop unit (RTU) and an air handling unit (AHU). The AHU provides direct expansion (DX) cooling as well as hot water (HW) heating to maintain comfort in these spaces.

Natural ventilation is assumed to occur by occupant control of the overhead doors. It is assumed that when outdoor air temperatures are cooler than indoor air temperatures, occupants open the perimeter overhead doors for natural cooling.

Domestic hot water is provided by a 75-gallon, propane fired water heater.

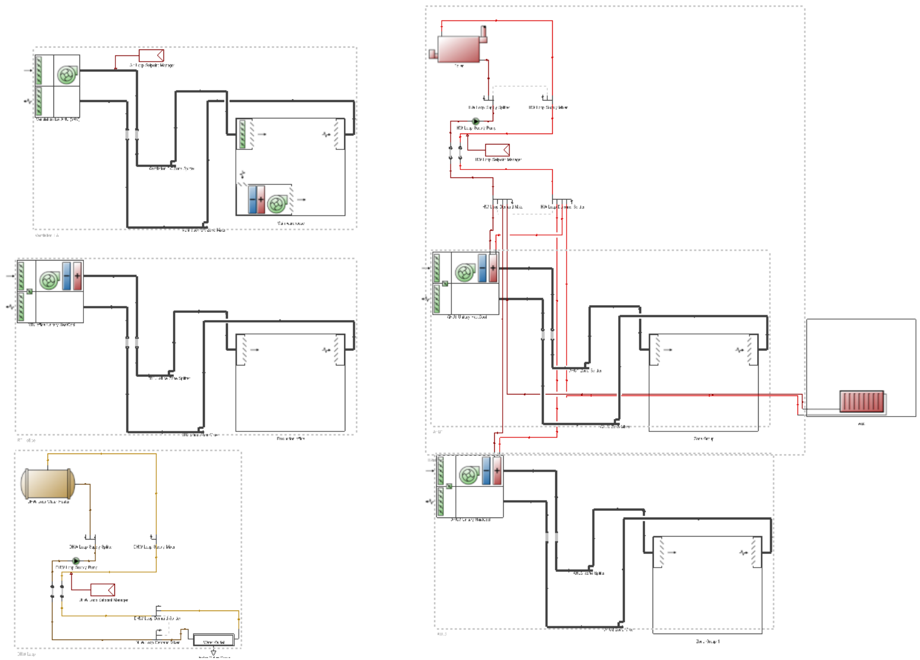


Figure 28 modeled existing HVAC schematic.

Photovoltaic design

The modeled photovoltaic system consists of three arrays named, west, east, and south. The west and east arrays are identical and are located on the main flat roof. The south array is above the cafeteria and office. Each array has rows spaced at 10' increments and an angle of inclination of 10 degrees to the south. The west and east arrays include 16 rows of 42 panels each (1,344 panels) and the south array includes 11 rows of 9 panels (99 panels).

The total number PV panels is 1,443 for a system capacity of 613 kW. This system leaves about 20,620 ft2 of available flat roof area for mechanical and other equipment.

It is estimated that the 613 kW PV system will generate about 780,237 kWh, accounting for power conversion losses.

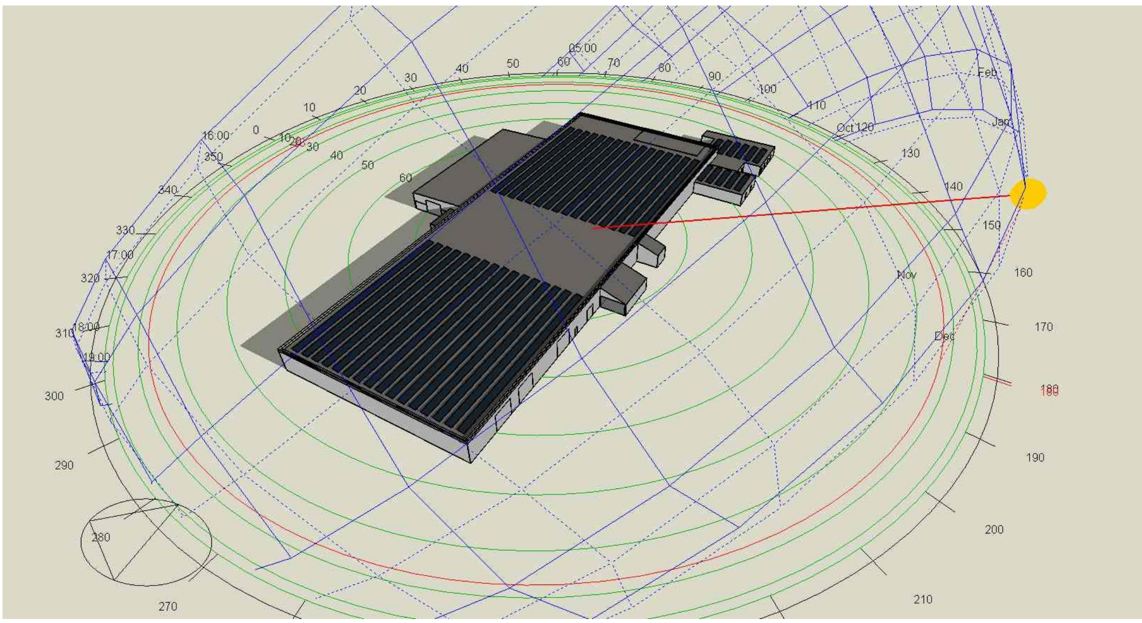


Figure 29 axonometric view of building and photovoltaic system. This rendering is at 12pm on December 21.

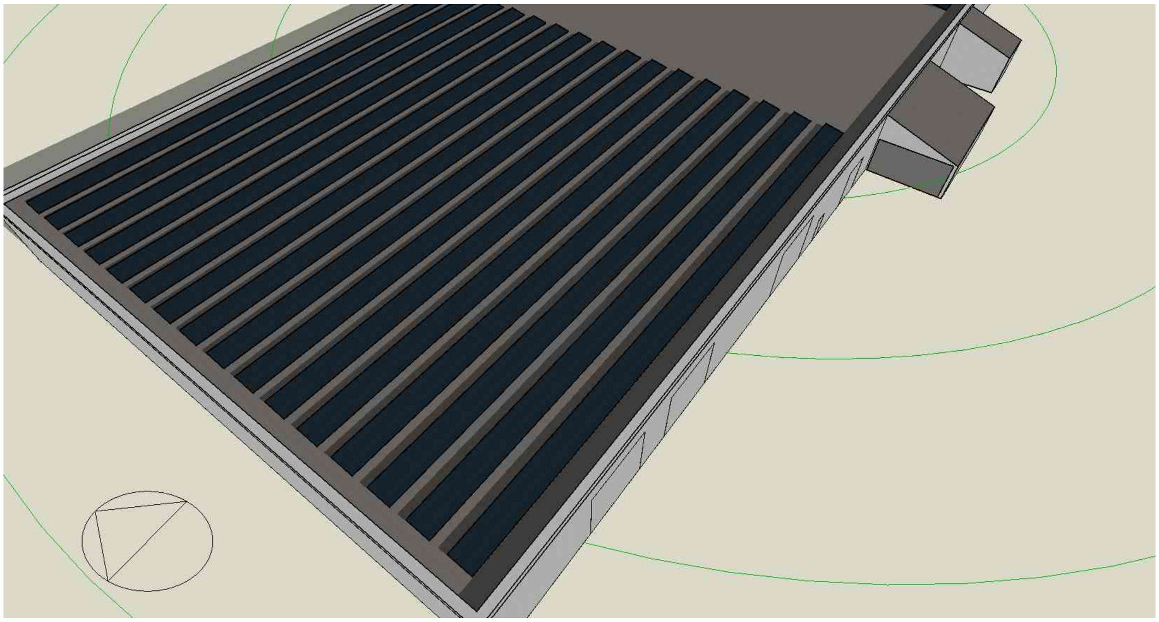


Figure 30 Zoomed view of west array for shading and spacing. This rendering is at 12pm on December 21.

Architectural and HVAC comparisons

This section of the report compares the following alternatives:

- (3) building envelope packages
- (3) HVAC systems
- With and without cooling of the main production area
- With and without onsite photovoltaic

In total, 36 simulations were compared for energy end uses and operational energy costs.

Proposed building envelope alternatives

Three building envelope alternatives were considered for this analysis. All alternatives match the existing conditions except as noted in Table 7. The existing envelope was not included in the comparison study because it is assumed that some CAPEX will be used for improving the existing building.

Table 7 summary of building envelope alternatives.

Alternative	Exterior wall	Roof	Infiltration
Existing	8" CMU no insulation	EPDM-2" Min.Wool-air gap-metal deck	Unknown. Assumed 1.2CFM75
1	+ 2" XPS insulation	+2" spray on polyurethane	0.15CFM75
2	+ 4" XPS insulation	+4" spray on polyurethane	0.15CFM75
3	+ 6" XPS insulation	+6" spray on polyurethane	0.15CFM75

Proposed HVAC system alternative descriptions

This section provides a brief description of each HVAC system included in our analysis. The HVAC systems modeled include the existing system and the following alternatives:

1. Closed-loop geothermal serving zone WAHPs with dedicated outdoor air system (DOAS) with energy recovery.
2. Air-to-air rooftop heat pump air handlers, with energy recovery.
3. ASHRAE 90.1 system 5: Packaged VAV with reheat

Alternatives 1 and 2 are fossil fuel free, while alternative 3 includes a fossil fuel boiler and DHW.

Table 8 summarizes some of the HVAC system inputs.

Table 8 Universal HVAC settings summary.

Input	Setting
Heating setpoint, setback temperature [F]	68, 60
Cooling setpoint, setback temperature [F]	75, 80
Natural ventilation	
Allowed Outdoor airflow [ACH]	3
Minimum outdoor air temp [F]	50F
Maximum outdoor air temp [F]	70F
Tin – Tout [F]	5
Minimum indoor temperature [F]	72

Alternative 1: Closed-loop geothermal system

This HVAC system includes ground source heat pumps for space heating and cooling. Dedicated outdoor air systems (DOAS) with energy recovery devices were included for ventilation air. The geothermal water is distributed via a primary/secondary pumping scheme. The primary loop is pumped through the bore holes (ground heat exchanger), and the secondary loop is pumped through the heat pumps. The primary loop modulates flow to maintain temperature in the secondary loop, while the secondary loop modulates to meet the demand of the heat pumps.

Natural ventilation was still assumed, but with cooler outdoor air cut off temperature.

Domestic hot water was assumed to be provided by ground source heat pump.

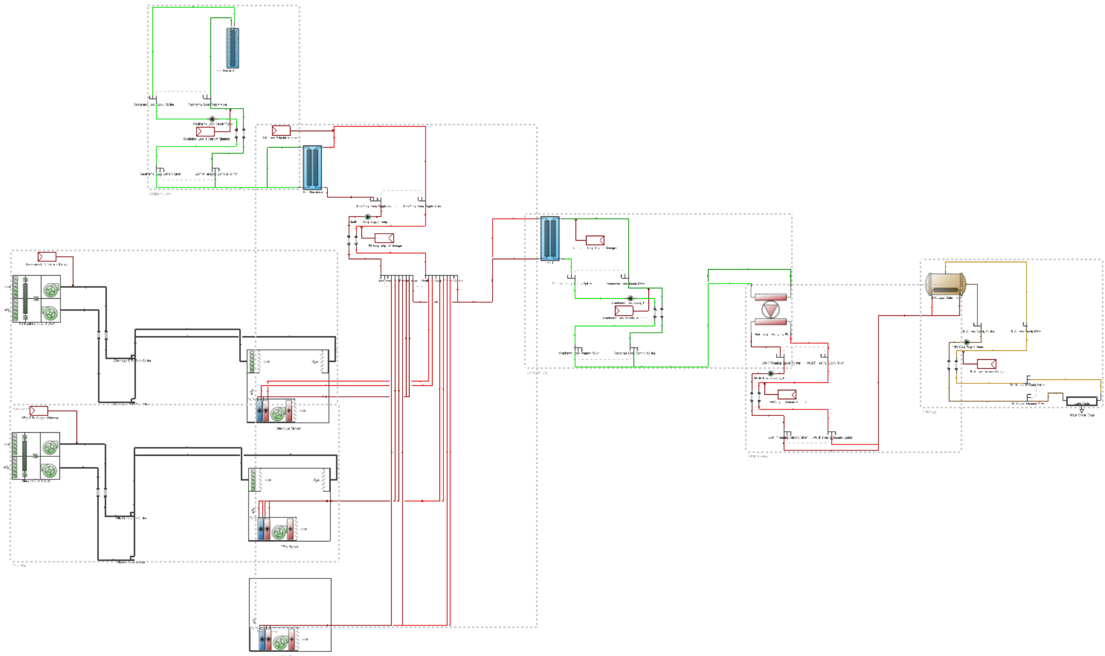


Figure 31 GSHP HVAC alternative schematic.

Geothermal design

Ground heat exchangers (GHX) were sized for all three envelope alternatives and the existing envelope. As shown in Table 9, the existing envelope would require 165 boreholes. This is clearly not feasible and was excluded from the comparison analysis.

Table 9 shows that the number of boreholes did not change when cooling was added to the ground loop. This is because each alternative GHX was constrained by the heating load. Ground heat exchangers must be sized with changing ground temperatures in mind. Unbalanced loads will either heat or cool the ground overtime. To account for this, sizing is checked after 30 years and after the first year. Envelope alternatives existing and 1, were constrained by the 30-year heating load. Alternatives 2 and three were constrained by the first-year heating load.

Interestingly, the peak cooling load for alternatives 2 and 3 was higher than the heating load. Despite the cooling imbalance, the heating load still drove the number of boreholes. This is because the temperature difference between the ground and design heat pump heating supply temperature is about 10F (50F-40F), while the cooling temperature difference is about 25F (75F-50F).

In summary, the number of boreholes decreased as more insulation was added to reduce the heating load.

Table 9 Geothermal design summary.

Envelope alternative	Boreholes (No Cooling)	Boreholes (With Cooling)
Existing	165	165
Alternative 1	36	36
Alternative 2	30	30
Alternative 3	24	24

Geothermal design documents can be found here. FHMF Geothermal Design.

Alternative 2: Air-to-Air heat pump

This alternative utilizes packaged rooftop units (RTUs) with air source heat pumps and electric resistance supplemental heating coil. An energy recovery device is included in the RTUs as well as economizer controls. The RTUs are distributed across the main production and warehouse zones. Additional RTUs serve the office areas and the cafeteria. Vestibules are electric resistance.

Domestic hot water provided by electric resistance water heater.

Figure 32 ASHP HVAC alternative schematic.

Alternative 3: ASHRAE 90.1 baseline system #5, packaged VAV with reheat

Alternative 3 is a baseline case for comparing the proposed HVAC systems (alternatives 1 and 2). This system is modeled as described and specified by ASHRAE 90.1. The system is a packaged rooftop VAV with reheat. The fan control is variable air volume with direct expansion cooling and hot-water fossil fuel boiler. DHW is by direct propane fired water heater.

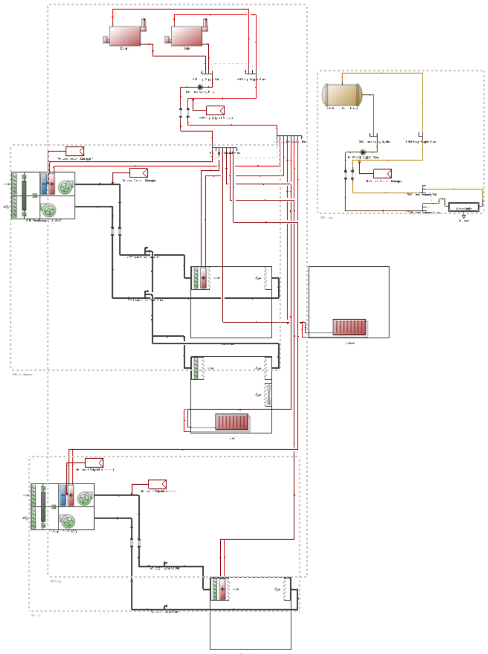


Figure 33 ASHRAE system 5 - Variable air volume with reheat HVAC alternative schematic.

Results

Each envelope and HVAC alternatives were simulated with and without cooling of the main production area and with and without solar generation. The comparison highlights the following points:

- Adding on-site solar dramatically reduces the annual energy cost of all iterations
- The geothermal HVAC system consumes the least energy and has the lowest energy costs
- The fossil fuel variable air volume with reheat (VAV RH) HVAC system has the second lowest energy costs.
- Adding cooling has a variable effect on the annual energy cost based on the HVAC system, envelope package, and whether solar is on or off.
    - The largest cost increase (27%) due to adding cooling was for the VAV RH system, envelope 3, solar on.
    - The smallest cost increase (2%) due to adding cooling was for the ASHP system, envelope 1 and 2, solar off.
- The EUI trend mostly follows the energy cost except for the VAV RH system. Here, the energy consumption of fossil fuels is high, but the cost of propane is low.

The results show that the best performing combination of alternatives is iteration 11, which is the geothermal HVAC system, with building envelope alternative 3 (most insulation), cooling off in the main production area, and the onsite solar system enabled. Adding cooling to the main production area increases the annual energy cost by approximately $5,000, with little to no additional capital cost.

36 simulations were compared for Net EUI (energy use intensity, kBtu/ft2*yr) and annual energy cost. These results are summarized in Table 10 and then sorted for lowest annual energy cost in Table 11.

Table 10 Building Envelope and HVAC system comparison summary.

Iteration	HVAC Alternative	Envelope Alternative	Cooling	Solar	Net EUI (kBtu/ft²·yr)	Energy Cost ($/yr)
1	GSHP	1	On	On	-6.3	$39,641.19
2	GSHP	1	On	Off	22.39	$143,863.77
3	GSHP	1	Off	On	-6.8	$35,302.67
4	GSHP	1	Off	Off	21.91	$136,989.30
5	GSHP	2	On	On	-7.6	$31,863.66
6	GSHP	2	On	Off	21.15	$135,756.95
7	GSHP	2	Off	On	-8.2	$26,917.35
8	GSHP	2	Off	Off	20.59	$128,434.50
9	GSHP	3	On	On	-8.3	$27,998.95
10	GSHP	3	On	Off	20.54	$131,479.85
11	GSHP	3	Off	On	-8.9	$22,816.99
12	GSHP	3	Off	Off	19.95	$124,260.93
13	ASHP	1	On	On	-2.4	$90,823.00
14	ASHP	1	On	Off	26.31	$192,254.03
15	ASHP	1	Off	On	-3.1	$86,974.85
16	ASHP	1	Off	Off	25.58	$188,379.46
17	ASHP	2	On	On	-4.7	$73,350.93
18	ASHP	2	On	Off	24.08	$174,781.96
19	ASHP	2	Off	On	-5.4	$69,683.86
20	ASHP	2	Off	Off	23.37	$171,072.89
21	ASHP	3	On	On	-5.8	$64,412.75
22	ASHP	3	On	Off	23.05	$165,491.04
23	ASHP	3	Off	On	-6.5	$60,918.00
24	ASHP	3	Off	Off	22.36	$161,954.27
25	VAV RH	1	On	On	8.09	$74,186.71
26	VAV RH	1	On	Off	36.76	$180,405.36
27	VAV RH	1	Off	On	5.84	$62,637.23
28	VAV RH	1	Off	Off	34.51	$163,943.82
29	VAV RH	2	On	On	3.64	$59,039.95
30	VAV RH	2	On	Off	32.4	$165,081.58
31	VAV RH	2	Off	On	1.43	$47,913.31
32	VAV RH	2	Off	Off	30.19	$149,094.73
33	VAV RH	3	On	On	1.64	$52,146.49
34	VAV RH	3	On	Off	30.49	$158,073.05
35	VAV RH	3	Off	On	-0.6	$41,018.67
36	VAV RH	3	Off	Off	28.26	$142,198.75

Table 11 Building envelope and HVAC system comparison summary, sorted by lowest annual energy cost.

Iteration	HVAC Alternative	Envelope Alternative	Cooling	Solar	Net EUI (kBtu/ft²·yr)	Energy Cost ($/yr)
11	GSHP	3	Off	On	-8.9	$22,816.99
7	GSHP	2	Off	On	-8.2	$26,917.35
9	GSHP	3	On	On	-8.3	$27,998.95
5	GSHP	2	On	On	-7.6	$31,863.66
3	GSHP	1	Off	On	-6.8	$35,302.67
1	GSHP	1	On	On	-6.3	$39,641.19
35	VAV RH	3	Off	On	-0.6	$41,018.67
31	VAV RH	2	Off	On	1.43	$47,913.31
33	VAV RH	3	On	On	1.64	$52,146.49
29	VAV RH	2	On	On	3.64	$59,039.95
23	ASHP	3	Off	On	-6.5	$60,918.00
27	VAV RH	1	Off	On	5.84	$62,637.23
21	ASHP	3	On	On	-5.8	$64,412.75
19	ASHP	2	Off	On	-5.4	$69,683.86
17	ASHP	2	On	On	-4.7	$73,350.93
25	VAV RH	1	On	On	8.09	$74,186.71
15	ASHP	1	Off	On	-3.1	$86,974.85
13	ASHP	1	On	On	-2.4	$90,823.00
12	GSHP	3	Off	Off	19.95	$124,260.93
8	GSHP	2	Off	Off	20.59	$128,434.50
10	GSHP	3	On	Off	20.54	$131,479.85
6	GSHP	2	On	Off	21.15	$135,756.95
4	GSHP	1	Off	Off	21.91	$136,989.30
36	VAV RH	3	Off	Off	28.26	$142,198.75
2	GSHP	1	On	Off	22.39	$143,863.77
32	VAV RH	2	Off	Off	30.19	$149,094.73
34	VAV RH	3	On	Off	30.49	$158,073.05
24	ASHP	3	Off	Off	22.36	$161,954.27
28	VAV RH	1	Off	Off	34.51	$163,943.82
30	VAV RH	2	On	Off	32.4	$165,081.58
22	ASHP	3	On	Off	23.05	$165,491.04
20	ASHP	2	Off	Off	23.37	$171,072.89
18	ASHP	2	On	Off	24.08	$174,781.96
26	VAV RH	1	On	Off	36.76	$180,405.36
16	ASHP	1	Off	Off	25.58	$188,379.46
14	ASHP	1	On	Off	26.31	$192,254.03

Each HVAC system alternative was compared for each building envelope alternative. Cooling of the main production area and the onsite solar was included for each of the comparison tables. The results shown in Table 12 through Table 14 breakdown each energy end use category.

Table 12 HVAC comparison with building envelope alternative 1.

FHMF: Energy End Use Comparison: HVAC Comparison: Env alt 1: Cooling On				
	GSHP	ASHP	VAV RH	
EUI [kBtu/ft2] per conditioned area	22.4	26.3	36.8	
	Electricity [kBtu]	Electricity [kBtu]	Electricity [kBtu]	Propane [kBtu]
Heating	324171	550191	0	1184578
Cooling	72637	76846	191380	0
Interior Lighting	1007654	1007654	1007654	0
Exterior Lighting	59545	59545	59545	0
Interior Equipment	536090	536090	536090	0
Exterior Equipment	0	0	0	0
Fans	47325	67002	214948	0
Pumps	33561	22	4281	0
Heat Rejection	0	0	0	0
Humidification	0	0	0	0
Heat Recovery	0	0	0	0
Water Systems	0	147445	0	217285
Refrigeration	0	0	0	0
Generators	0	0	0	0
	0	0	0	0
Total End Uses	2080982	2444795	2013898	1401863
HVAC total	477693	841506	1812472	
Annual Energy Cost Comparison				
Electrical rate net metering, Propane	$39,641.19	$90,823.00	$27,182.72	$47,003.99
Total annual energy cost	$39,641.19	$90,823.00	$74,186.71	

Table 13 HVAC comparison with building envelope alternative 2.

FHMF: Energy End Use Comparison: HVAC Comparison: Env alt 2: Cooling On				
	GSHP	ASHP	VAV RH	
EUI [kBtu/ft2] per conditioned area	21.2	24.1	32.4	
	Electricity [kBtu]	Electricity [kBtu]	Electricity [kBtu]	Propane [kBtu]
Heating	215677	355895	0	803292
Cooling	70338	74220	184489	0
Interior Lighting	1004829	1004829	1004829	0
Exterior Lighting	59545	59545	59545	0
Interior Equipment	534637	534637	534637	0
Exterior Equipment	0	0	0	0
Fans	46714	55193	196601	0
Pumps	27200	22	2827	0
Heat Rejection	0	0	0	0
Humidification	0	0	0	0
Heat Recovery	0	0	0	0
Water Systems	0	146096	0	215308
Refrigeration	0	0	0	0
Generators	0	0	0	0
	0	0	0	0
Total End Uses	1958940	2230438	1982929	1018600
HVAC total	359929	631426	1402518	
Annual Energy Cost Comparison				
Electrical rate net metering, Propane	$31,863.66	$73,350.93	$24,886.64	$34,153.31
Total annual energy cost	$31,863.66	$73,350.93	$59,039.95	

Table 14 HVAC comparison with building envelope alternative 3.

FHMF: Energy End Use Comparison: HVAC Comparison: Env alt 3: Cooling On				
	GSHP	ASHP	VAV RH	
EUI [kBtu/ft2] per conditioned area	20.5	23.1	30.5	
	Electricity [kBtu]	Electricity [kBtu]	Electricity [kBtu]	Propane [kBtu]
Heating	165673	266802	0	633462
Cooling	67102	73012	183008	0
Interior Lighting	1002012	1002012	1002012	0
Exterior Lighting	59545	59545	59545	0
Interior Equipment	533186	533186	533186	0
Exterior Equipment	0	0	0	0
Fans	46815	49612	189026	0
Pumps	23027	22	2203	0
Heat Rejection	0	0	0	0
Humidification	0	0	0	0
Heat Recovery	0	0	0	0
Water Systems	0	144756	0	213322
Refrigeration	0	0	0	0
Generators	0	0	0	0
	0	0	0	0
Total End Uses	1897360	2128947	1968979	846785
HVAC total	302617	534204	1221021	
Annual Energy Cost Comparison				
Electrical rate net metering, Propane	$27,998.95	$64,412.75	$23,754.07	$28,392.41
Total annual energy cost	$27,998.95	$64,412.75	$52,146.48	

Energy end use consumption discussion

This section will discuss how each of the end uses changes with each HVAC alternative.

Heating

Heating energy consumption is lowest for the GSHP, then ASHP, then VAV RH. This is expected as the geothermal system utilizes energy transfer of a refrigerant, and the sourcing temperature of the water is fixed at 40F. The ASHP system also uses a refrigerant, but the heat sourcing temperature is that of the outside air, which is much colder than the GSHP system. Finally, the VAV RH system uses noncondensing propane boilers with 80% efficiency. Other reasons for increased heating energy of the VAV RH system include reheating of air at VAV boxes, reduced energy recovery effectiveness, simultaneous heating and cooling

Cooling

Cooling energy consumption is lowest for the GSHP, then ASHP, then VAV RH. All three systems use a direct expansion cooling coil, but the GSHP is rejecting the heat to a cooler water stream, while the ASHP and the VAV RH are rejecting heat to the outdoor air. This difference reduces the cooling efficiency for the air source options. Further, the VAV RH system consumes more cooling energy relative to ASHP RTUs due to the following reasons:

- Cool, then reheat
- Larger fan heat building up in airstream
- Ventilation control and energy recovery effectiveness is not as good
- Part-load efficiency
- Minimum flow settings keep the cooling coil load up and trigger reheat

Interior and exterior lighting, interior and exterior equipment

These categories are fixed for all simulations. Interior lighting is the largest energy end use.

Fans

Fan energy increases from GSHP to ASHP and increases dramatically for the VAV RH system. Fan energy is higher for the VAV system due to larger duct runs and larger components in the AHU. Also, the fan can only turn down to 30% of design.

Pumps

Pump energy consumption is lowest for the ASHP, then the VAV RH, and largest for the GSHP alternative. This makes sense as the geothermal system must pump through the ground heat exchanger as well as the heat pump loop. The only pump in the ASHP system is for DHW. The VAV RH system uses boiler pumps for hot heating water.

Water Systems

The water systems category captures heating energy required for DHW. The GSHP DHW heating energy gets categorized in the heating category because a water-to-water heat pump was used to indirectly heat the DHW storage tank. This metric could be extracted upon request. The ASHP uses electric resistance, while the VAV RH uses direct fired propane.

Energy cost

For each building envelope, the annual energy cost is lowest for the GSHP, then VAV RH, then ASHP. The reason for the high cost of the ASHP is the demand charge during winter and the DHW electric resistance coil. The cost of electricity is much higher than the cost of propane per unit of heating energy.

Cooling of the main production area

Adding cooling has a variable effect on the annual energy cost depending on the HVAC system, envelope package and whether solar is on or off. The largest cost increase (27%) due to adding cooling was for the VAV RH system, envelope 3, solar on. The smallest cost increase (2%) due to adding cooling was for the ASHP system, envelope 1 and 2, solar off.

It is recommended that cooling be included in the proposed HVAC system as the incremental capital cost is minimal. Standard heat pumps are manufactured to provide both heating and cooling via the refrigerant reversing valve.

If cooling is not included, then temperatures rise above 80F in the main production area for most of the summer, as indicated in Figure 34. The figure shows the zone air temperature and relative humidity for the main side saddle assembly line area. All zones in the main production area are open to each other and allow for free airflow. Natural ventilation is being modeled for free cooling when conditions permit.

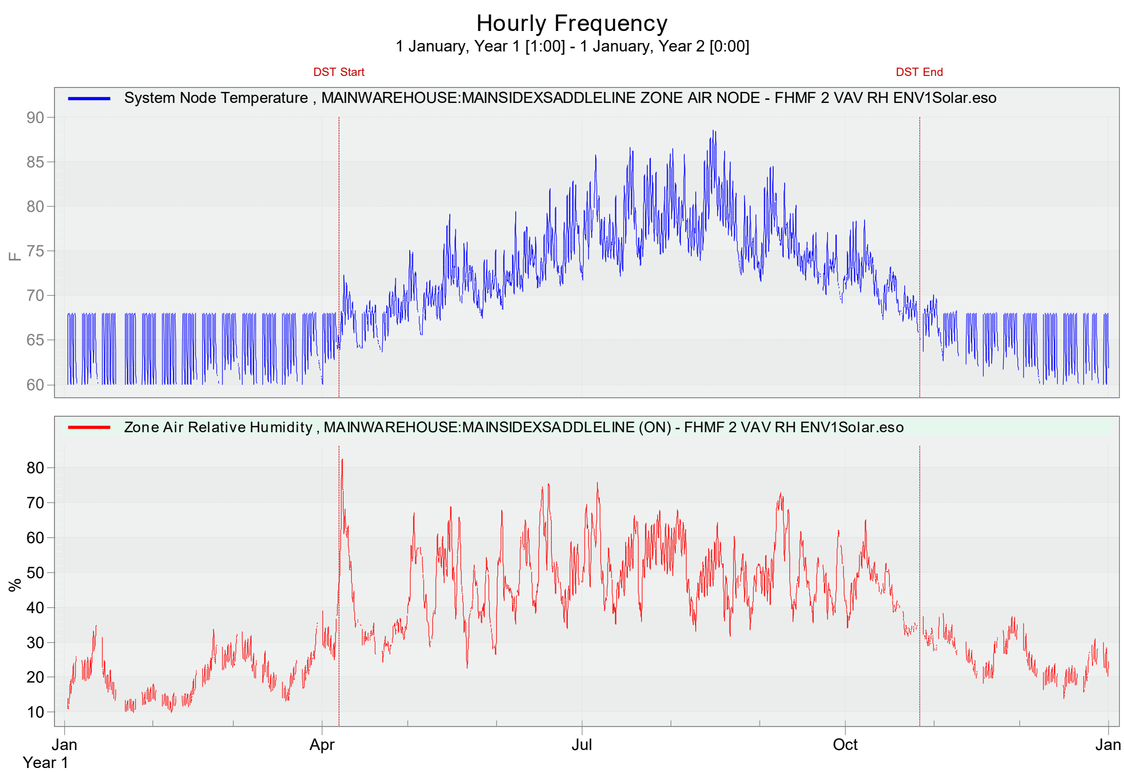


Figure 34 main side saddle line zone temperature and relative humidity.

Figure 35 shows the same zone with cooling. These results were from the proposed iteration 5, which includes the GSHP alternative, envelope alternative 2, cooling and solar on. The figure shows that the temperature is maintained at 75F during occupied hours and allowed to drift up to 80F overnight. Peak cooling load is around 5 tons, which fits nicely in available manufacturing zone water source heat pump size range.

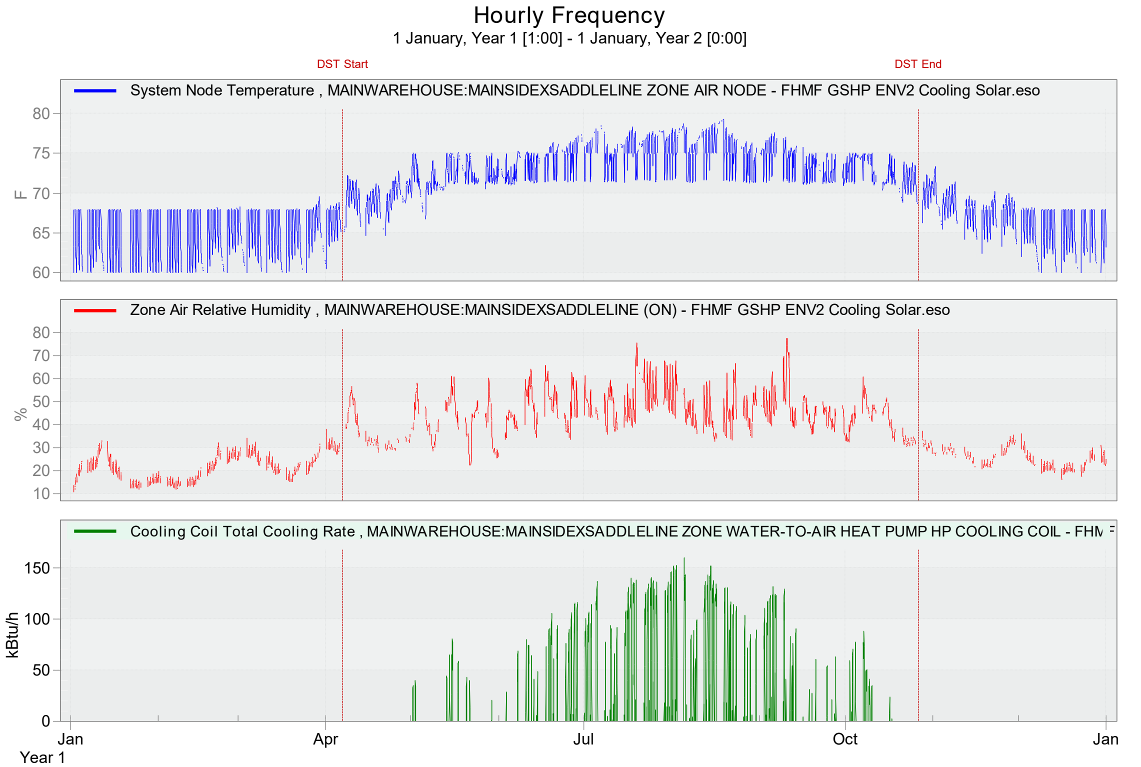


Figure 35 main side saddle line zone temperature, RH, and cooling coil rate.

EnergyPlus summary report

The following link provides access to the EnergyPlus summary annual and monthly reports. Not all reports were selected and more could be provided upon the reader's request.

Fair Haven manufacturing facility: EnergyPlus summary reports

Efficiency Vermont incentive modeling

The incentive modeling compares the proposed model (iteration 5, GSHP, envelope alternative 2, Cooling on, Solar on) to the existing building envelope with the ASHRAE baseline HVAC system (system 5 – VAV RH). The results shown in Table 15 indicate that the proposed building will **save 64% on energy use and 87% on annual energy cost.**

The EUI is total site energy intensity, not net site energy. Thus, solar production is not included in the energy comparison. The proposed energy cost does include net metering and solar production.

Table 15 Energy end use comparison of the proposed building to the baseline.

FHMF: Incentive comparison				
	Proposed	Baseline		% savings
EUI [kBtu/ft2] per conditioned area	21.2	58.7		64%
	Electricity [kBtu]	Electricity [kBtu]	Propane [kBtu]	
Heating	183254	0	3218145	94%
Cooling	70338	116455	0	40%
Interior Lighting	1004829	1005260	0	0%
Exterior Lighting	59545	59545	0	0%
Interior Equipment	534637	534637	0	0%
Exterior Equipment	0	0	0	0%
Fans	46714	273609	0	83%
Pumps	27200	14756	0	-84%
Heat Rejection	0	0	0	0%
Humidification	0	0	0	0%
Heat Recovery	0	0	0	0%
Water Systems	32423	0	215212	85%
Refrigeration	0	0	0	0%
Generators	0	0	0	0%
	0	0	0	0%
Total End Uses	1958940	2004262	3433357	64%
HVAC total	359929	3838177		91%
Annual Energy Cost Comparison				
Electrical rate net metering, Propane	$31,863.66	$128,451.84	$115,119.31	
Total annual energy cost	$31,863.66	$243,571.15		87%

Appendix 1: Site plan, building elevations, and floor plans

All drawings provided for the energy study are located here: [FHMF drawings](#).

Appendix 2: Renderings (Model data visualization)

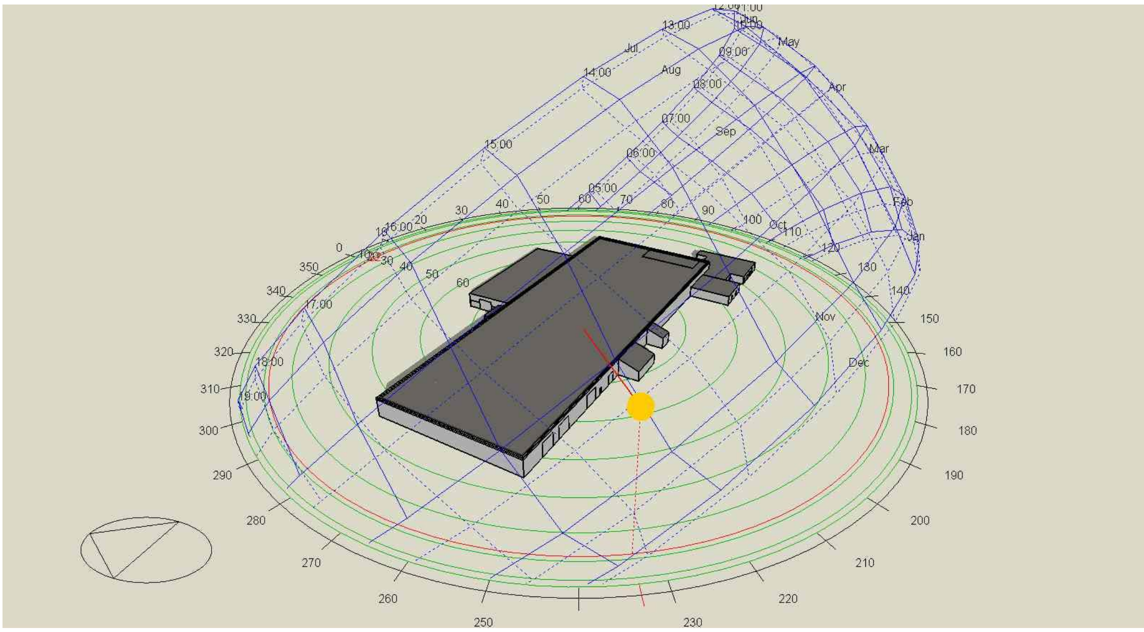


Figure 36 axonometric view with sunpath diagram.

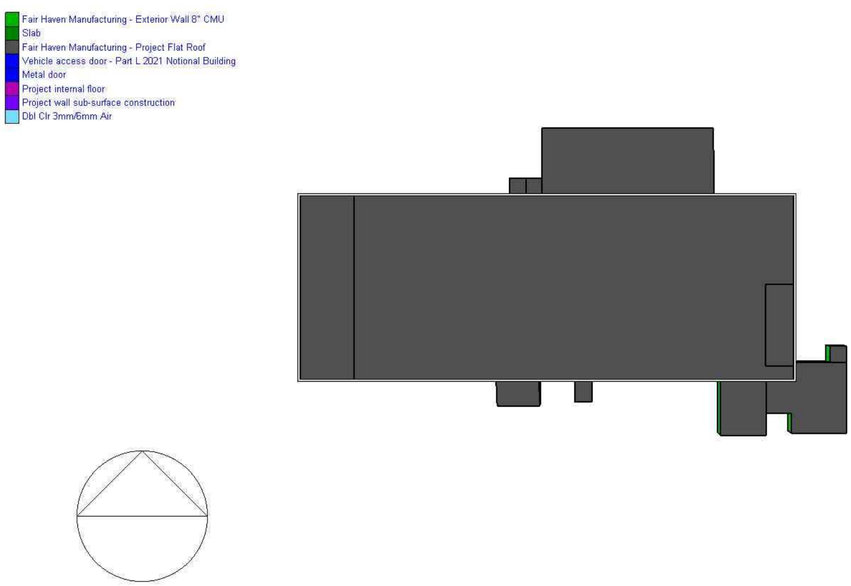


Figure 37 plan view.

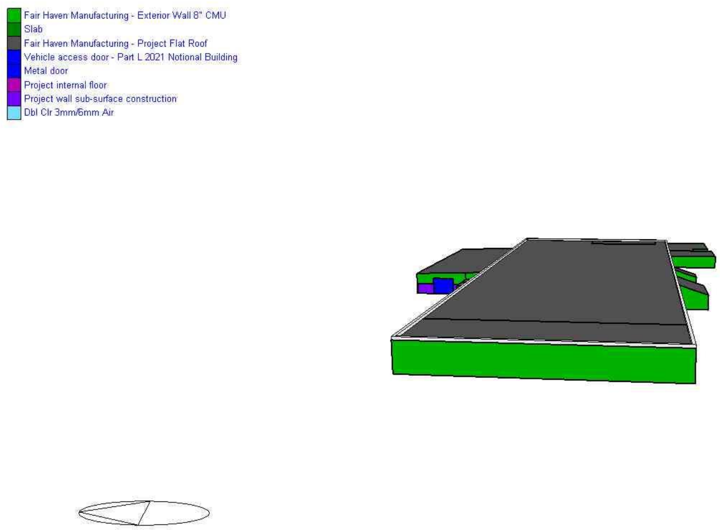


Figure 38 west facade.

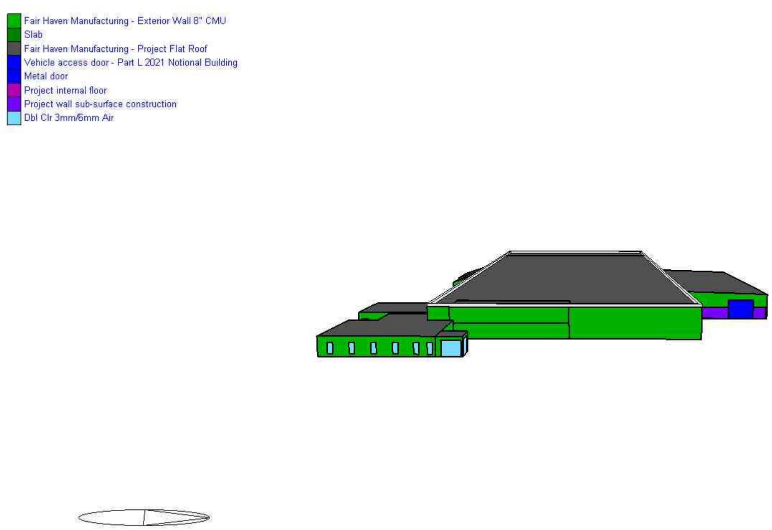


Figure 39 east facade.

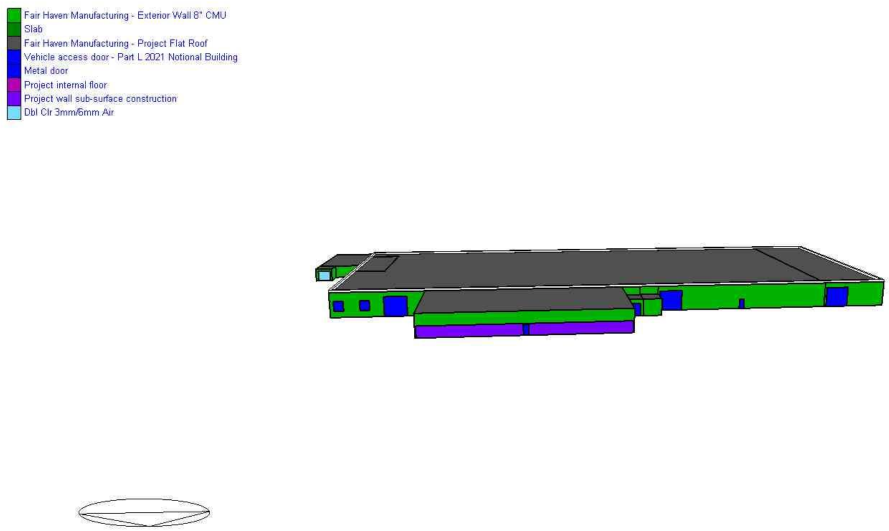


Figure 40 north facade.

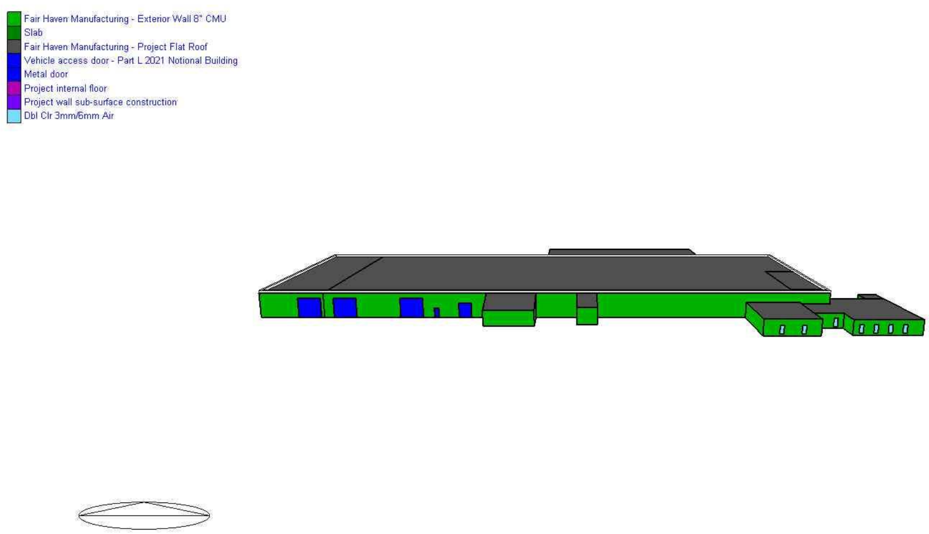
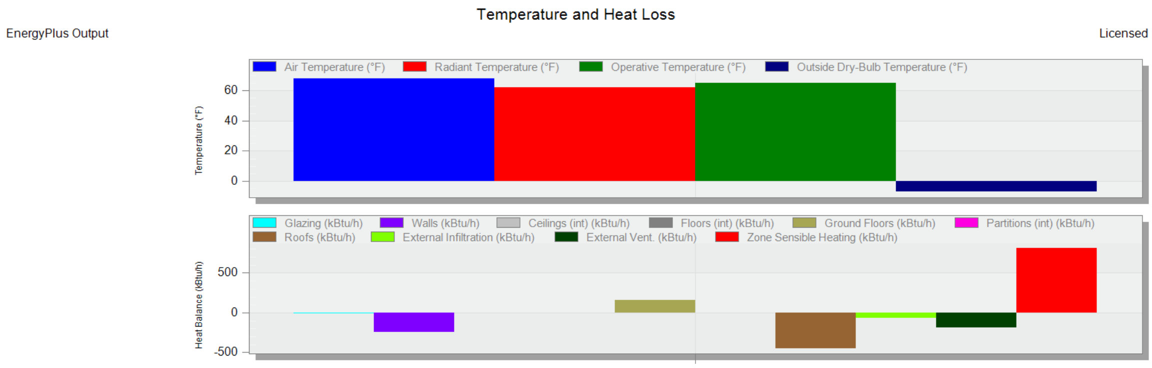


Figure 41 south facade.

Appendix 3: Heating and cooling design loads

The heating and cooling design loads shown in this section are representative of the proposed building envelope alternative 2. Heating and cooling design loads have been calculated and are ready for equipment sizing. Zone heating and cooling loads can be found here: [Fair Haven manufacturing facility: heating and cooling design loads](). Figures in this section show the building heating design and cooling design heat balance.



Air Temperature (°F)	67.98
Radiant Temperature (°F)	61.92
Operative Temperature (°F)	64.95
Outside Dry-Bulb Temperature (°F)	-6.88
Glazing (kBtu/h)	-12.55
Walls (kBtu/h)	-246.15
Ceilings (int) (kBtu/h)	-1.27
Floors (int) (kBtu/h)	1.27
Ground Floors (kBtu/h)	155.38
Partitions (int) (kBtu/h)	-0.49
Roofs (kBtu/h)	-446.85
External Infiltration (kBtu/h)	-68.56
External Vent. (kBtu/h)	-190.42
Zone Sensible Heating (kBtu/h)	809.64

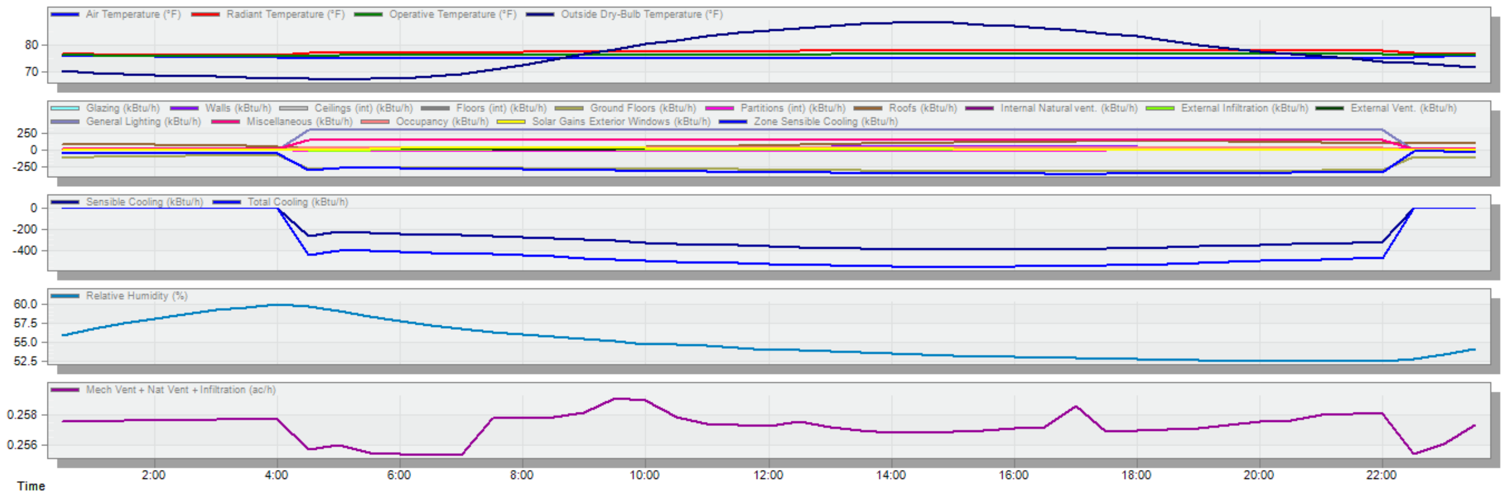
Figure 42 building heating design heat balance.

EnergyPlus Output

Temperature and Heat Gains - 25169 - Fair Haven Manufacturing Facility, Building 1

15 Jul, Sub-hourly

Licensed



Time	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00	20:00	22:00
Air Temperature (°F)	75.54	75.34	75.02	75.04	75.04	75.03	75.03	75.03	75.03	75.02	75.02
Radiant Temperature (°F)	76.22	75.95	77.10	77.24	77.43	77.62	77.84	77.98	78.05	77.94	77.81
Operative Temperature (°F)	75.88	75.65	76.06	76.14	76.23	76.33	76.43	76.50	76.54	76.48	76.41
Outside Dry-Bulb Temperature (°F)	68.63	67.35	67.35	72.49	80.20	85.56	88.34	87.05	83.20	77.63	73.77
Glazing (kBtu/h)	-2.18	-2.26	0.03	0.64	1.95	1.80	2.14	0.94	-0.12	-1.13	-1.58
Walls (kBtu/h)	12.37	6.69	9.59	15.78	30.77	39.44	47.13	45.13	43.60	29.06	23.62
Ceilings (int) (kBtu/h)	2.84	2.78	1.11	1.07	1.00	0.99	1.09	1.26	1.43	1.56	1.63
Floors (int) (kBtu/h)	-1.00	-0.50	-1.22	-1.18	-1.49	-1.90	-2.20	-2.33	-2.27	-2.02	-1.69
Ground Floors (kBtu/h)	-92.99	-71.64	-267.39	-269.22	-277.78	-288.46	-306.03	-314.73	-318.38	-307.21	-295.31
Partitions (int) (kBtu/h)	22.07	21.29	-10.33	-10.32	-9.46	-8.10	-8.47	-7.50	-6.11	-2.29	0.45
Roofs (kBtu/h)	76.18	58.81	29.59	27.93	44.75	71.90	99.95	121.75	130.41	122.22	103.43
Internal Natural vent. (kBtu/h)	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
External Infiltration (kBtu/h)	-5.46	-6.29	-6.10	-2.08	3.89	7.97	10.05	9.10	6.20	1.97	-1.00
External Vent. (kBtu/h)	0.00	0.00	29.52	9.84	16.17	32.78	41.42	37.41	25.20	8.10	4.74
General Lighting (kBtu/h)	0.32	0.32	297.92	297.59	296.83	297.51	299.50	302.48	304.46	307.17	307.17
Miscellaneous (kBtu/h)	25.97	25.97	144.82	144.82	144.82	144.82	144.82	144.82	144.82	144.82	144.82
Occupancy (kBtu/h)	0.00	0.00	43.12	43.12	43.12	43.12	43.12	43.12	43.05	43.05	43.06
Solar Gains Exterior Windows (kBtu/h)	0.00	0.00	28.31	36.21	27.39	16.04	13.26	7.92	3.79	0.00	0.00
Zone Sensible Cooling (kBtu/h)	-46.28	-53.24	-266.57	-282.58	-305.28	-325.03	-343.80	-351.62	-351.04	-337.38	-324.70
Sensible Cooling (kBtu/h)	0.00	0.00	-242.96	-275.18	-322.29	-359.00	-386.58	-390.34	-377.40	-346.14	-321.15
Total Cooling (kBtu/h)	0.00	0.00	-407.79	-443.42	-490.10	-522.49	-549.61	-549.42	-532.12	-495.35	-466.97
Relative Humidity (%)	58.13	60.00	57.75	56.00	54.77	53.97	53.53	53.03	52.73	52.53	52.50
Mech Vent + Nat Vent + Infiltration (ac/h)	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26

Figure 43 building cooling design heat balance.

Appendix 4: Model inputs, HVAC performance and quality control

This section will show graphs of key model inputs including occupancy, internal equipment such as lighting, plug load, kitchen catering and process equipment, central HVAC plant performance, and zone HVAC performance.

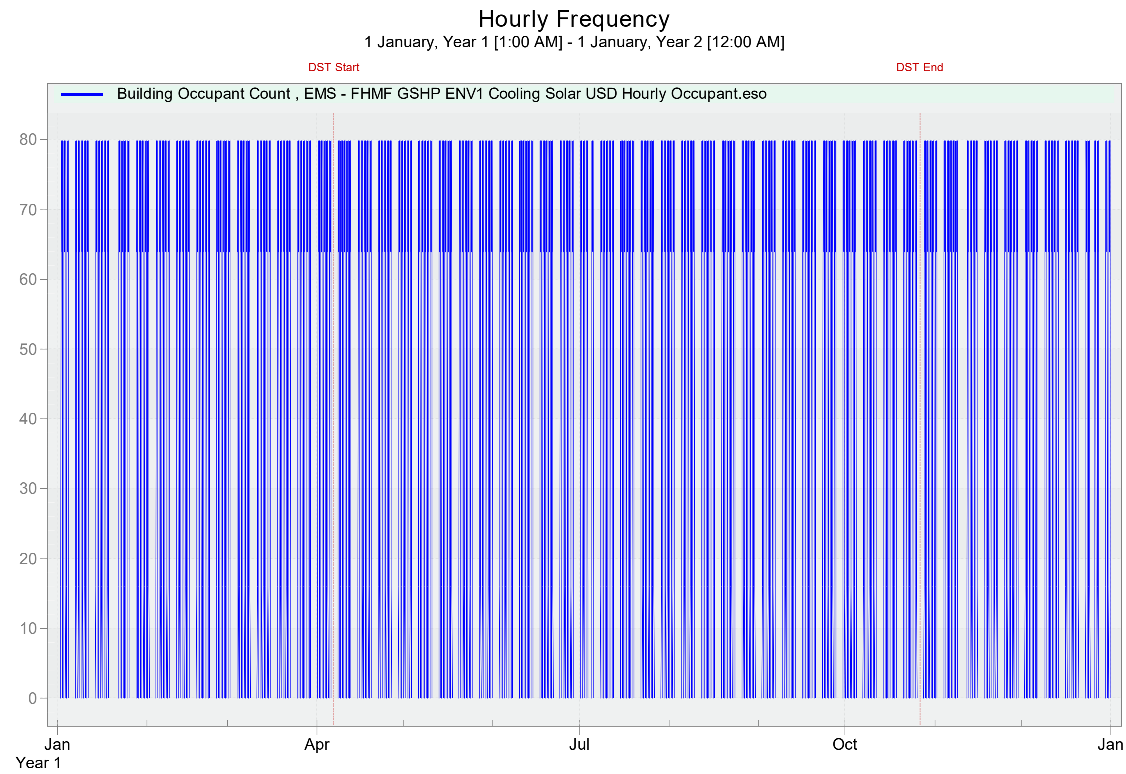


Figure 44 total building occupant count, annual.

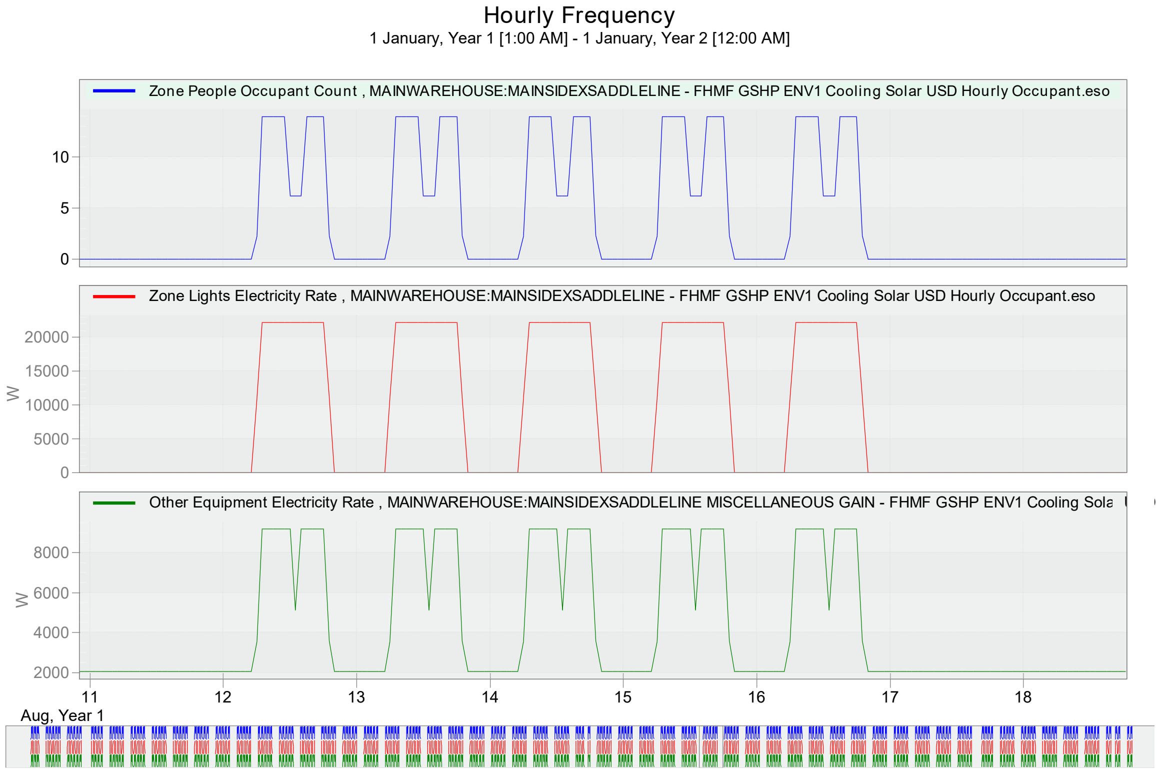


Figure 45 summer week view of the main side saddle line. Top graph is total occupants, middle graph is lighting electricity rate, bottom graph is the plug load (equipment) electricity rate.

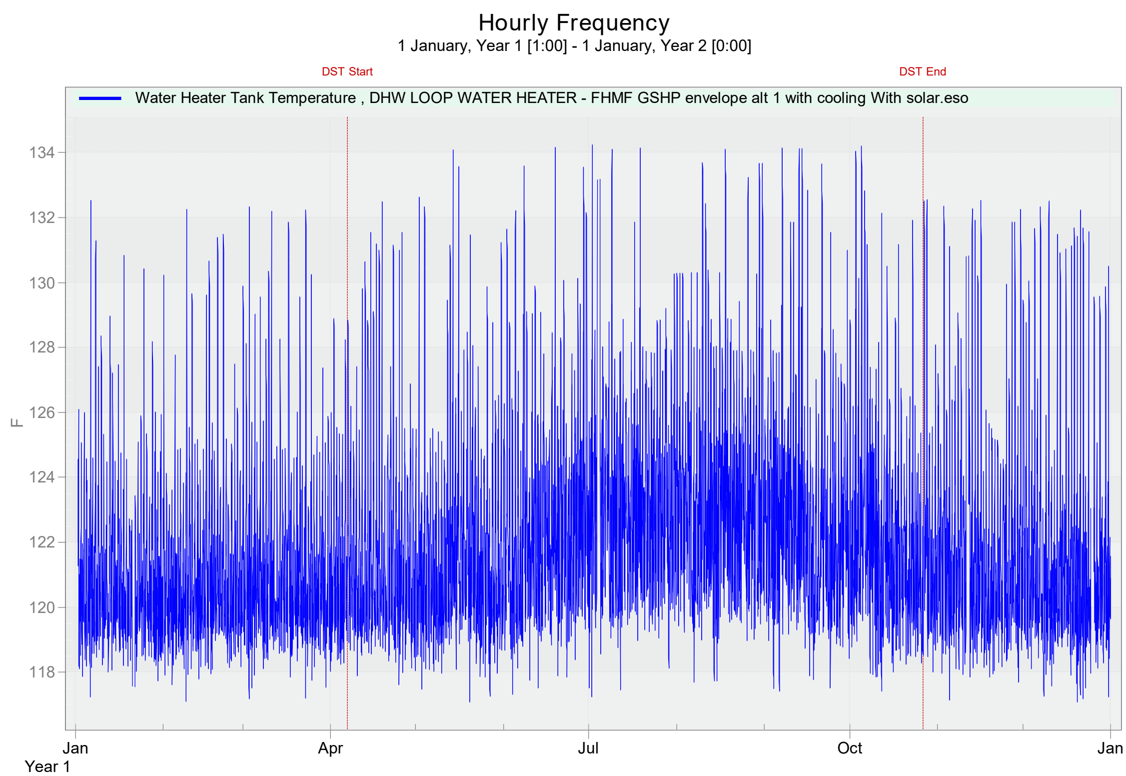


Figure 46 water heater tank temperature for the GSHP alternative.

Solar performance graphs

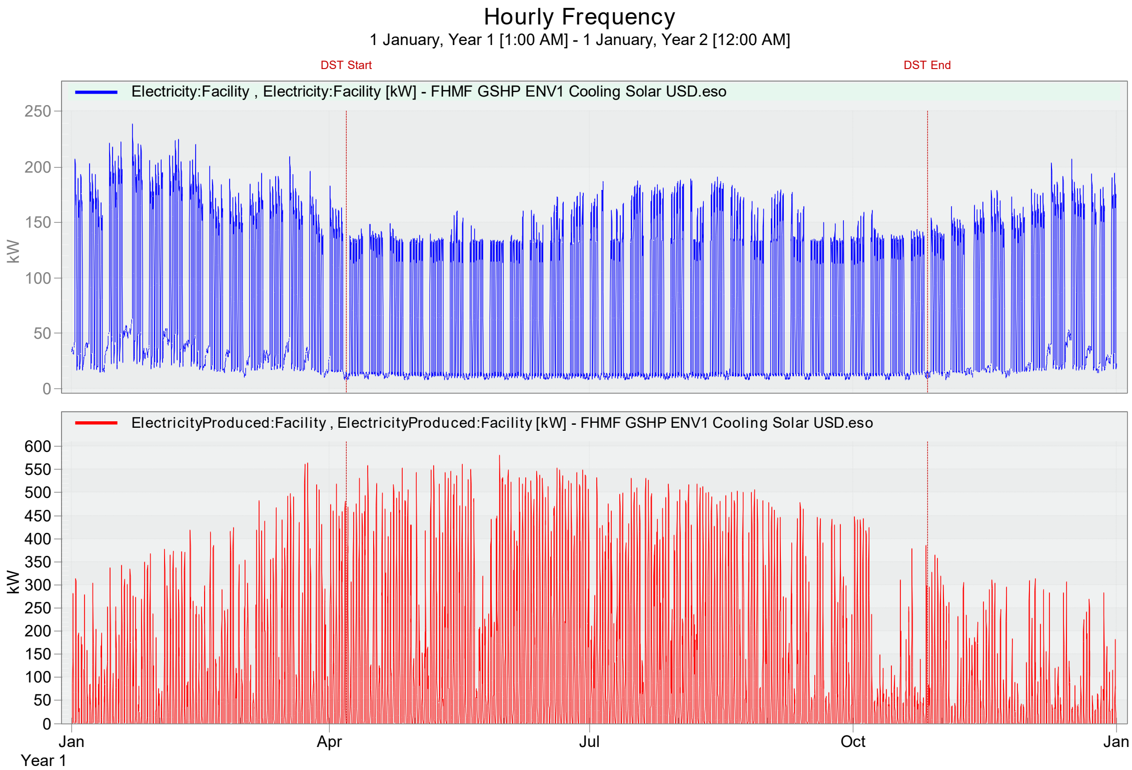


Figure 47 annual profile of the facility electricity consumption (top graph) and the electricity produced (bottom graph) by the PV system.

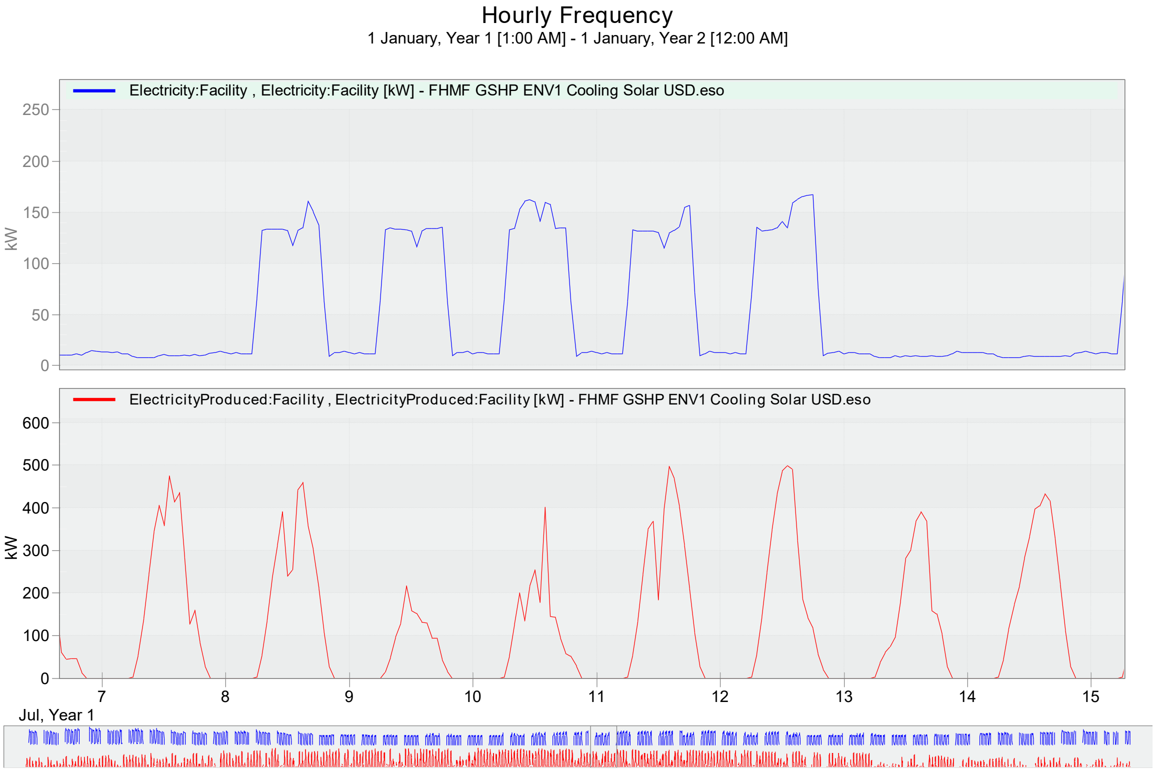


Figure 48 Summer week profile of the facility electricity consumption (top graph) and the electricity produced (bottom graph) by the PV system.

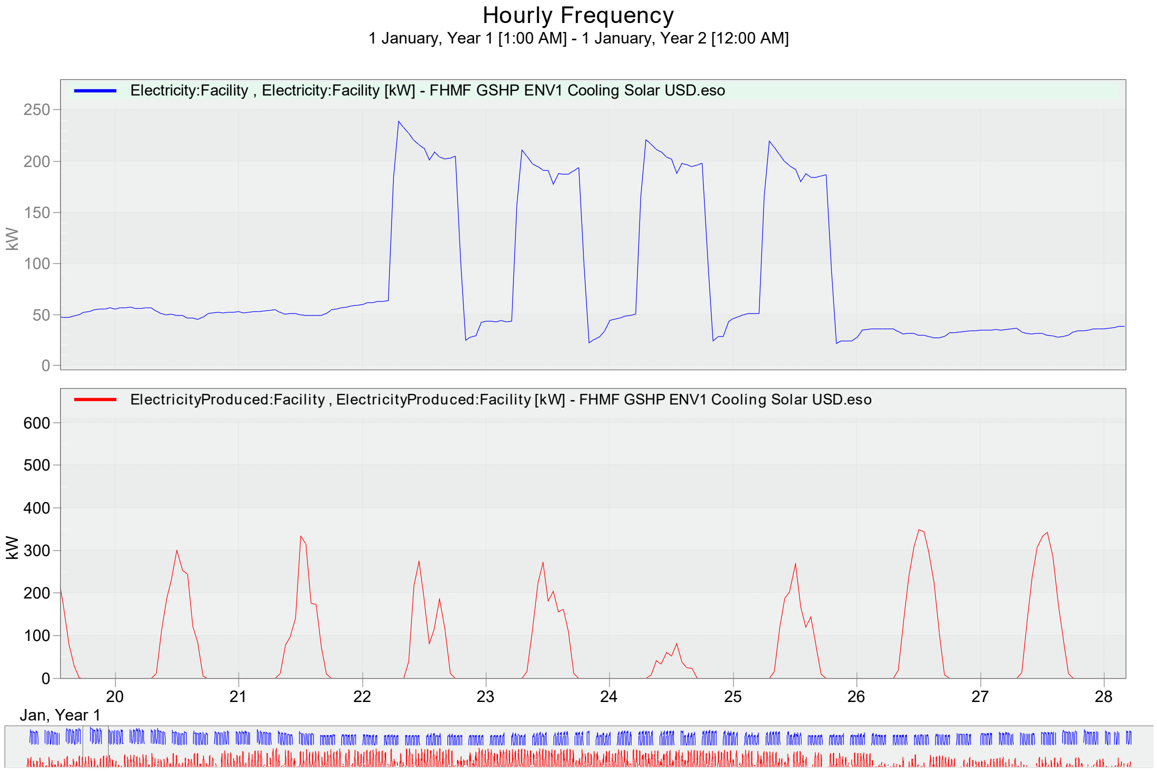


Figure 49 Winter week profile of the facility electricity consumption (top graph) and the electricity produced (bottom graph) by the PV system.

GSHP graphs

This section shows some QAQC plots of the GSHP alternative.

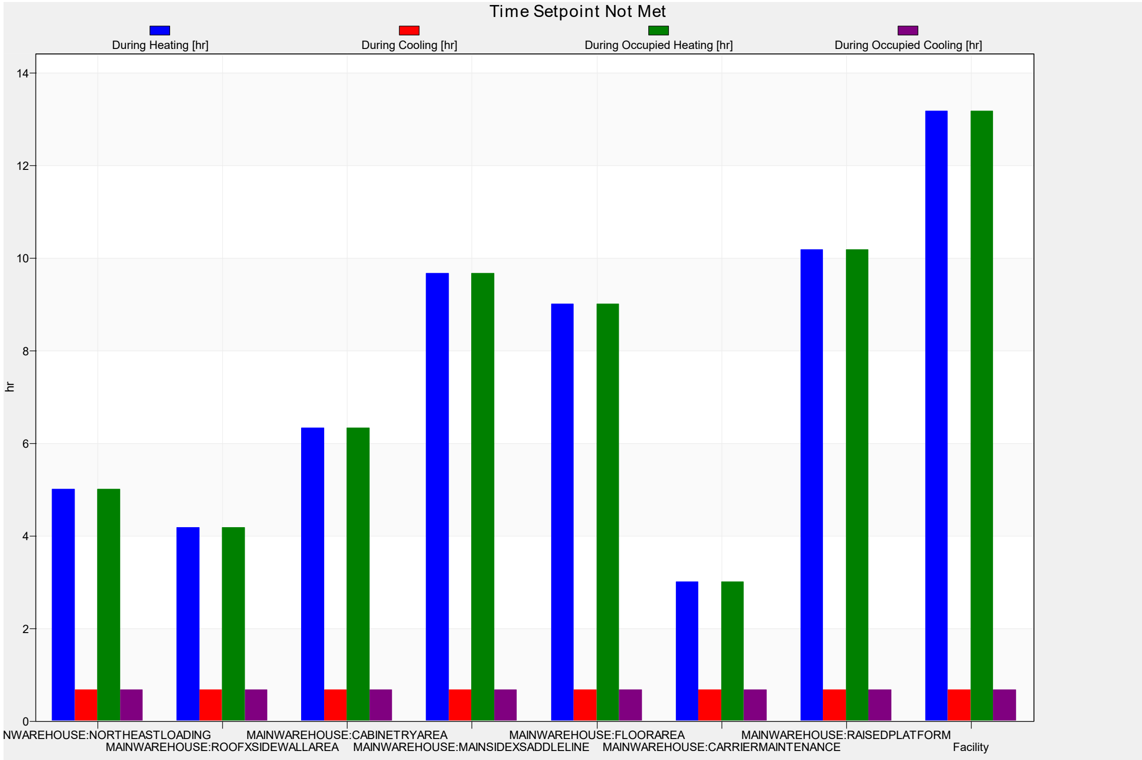


Figure 50 unmet hours for the GSHP, ENV 1, Cooling on, Solar On, iteration.

HVAC Performance graphs

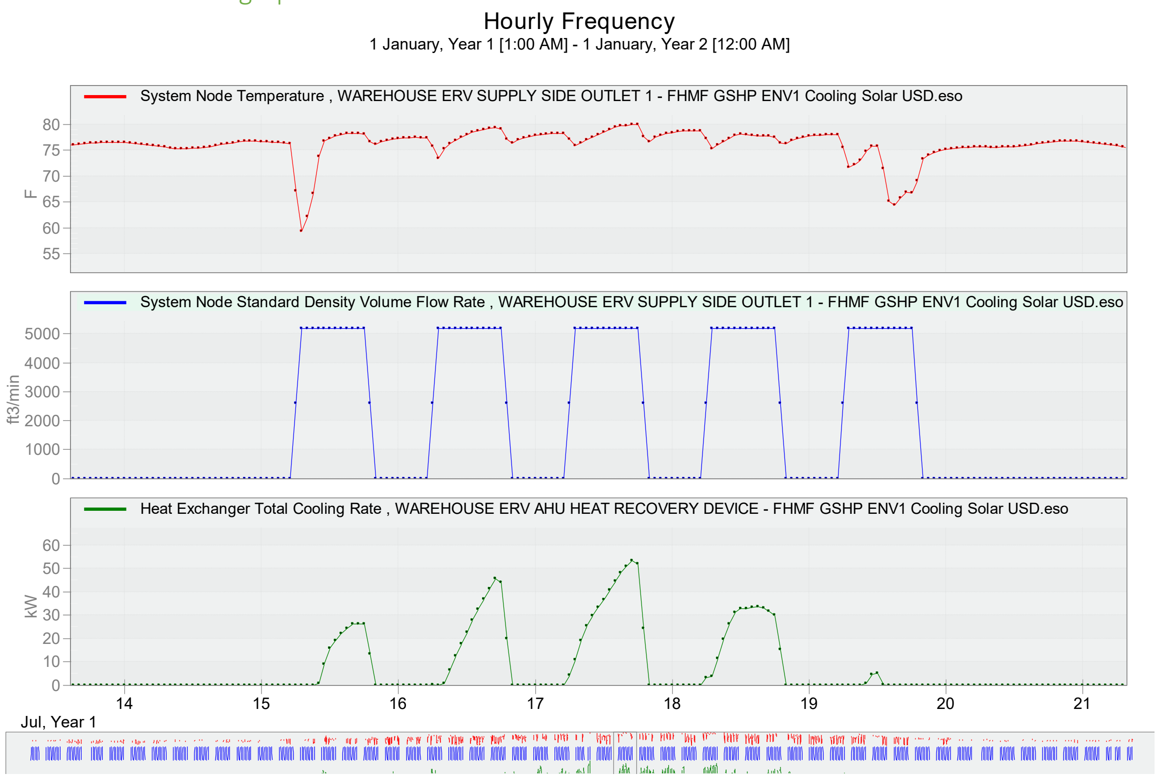


Figure 51 summer week of ERV serving the main production zone. Top graph shows the supply air temperature, middle graph shows the supply air flow rate, and the bottom graph shows the energy recovery total cooling rate.

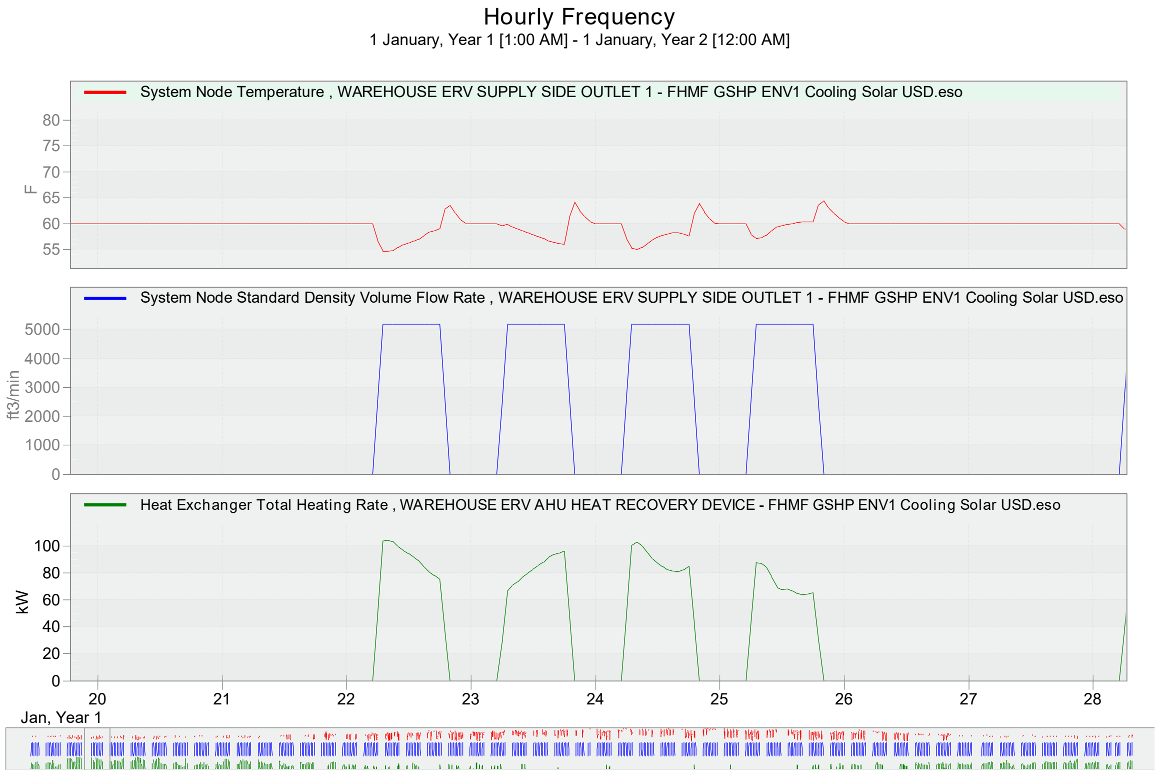


Figure 52 Winter week of ERV serving the main production zone. Top graph shows the supply air temperature, middle graph shows the supply air flow rate, and the bottom graph shows the energy recovery total heating rate.

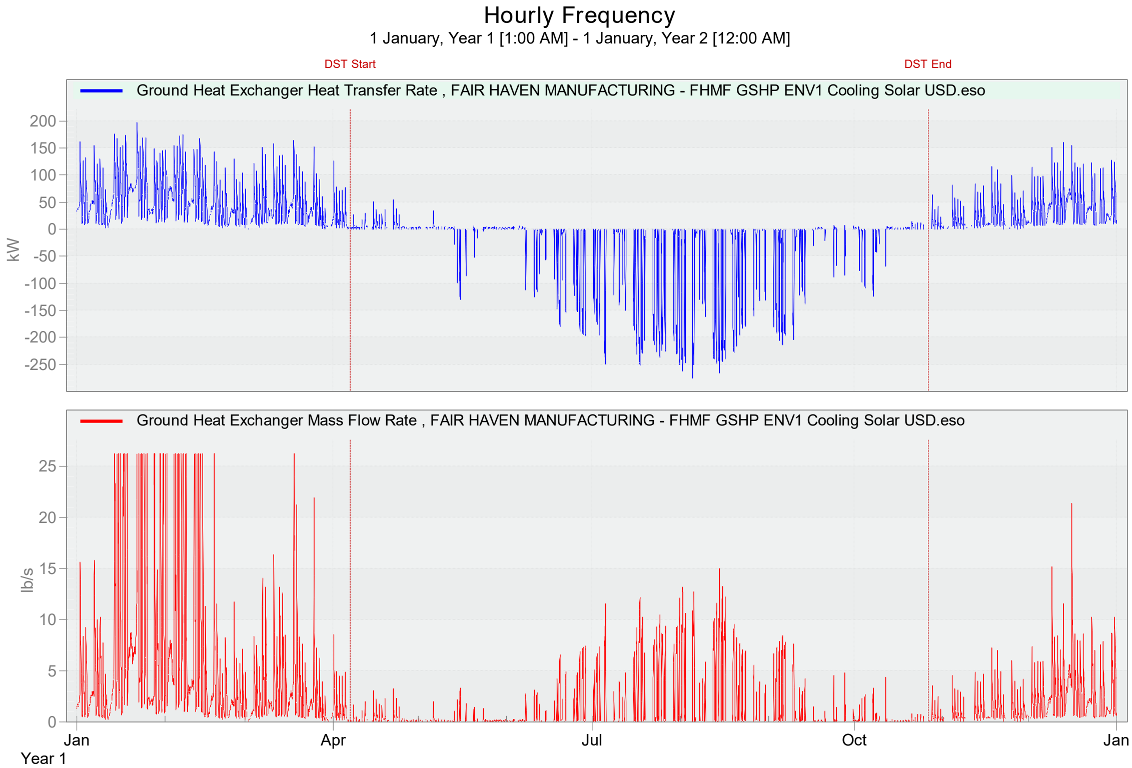


Figure 53 Ground heat exchanger heat transfer rate (top graph) and ground heat exchanger mass flow rate (bottom graph).

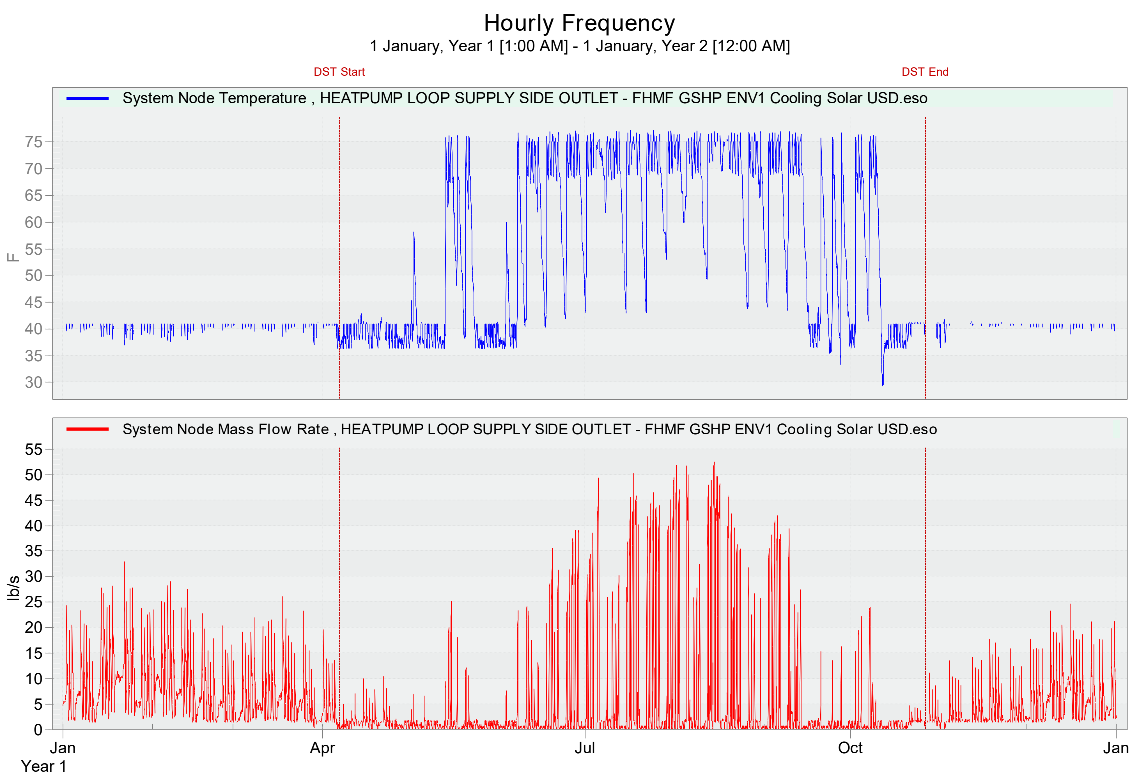


Figure 54 heat pump loop supply water temperature (top graph) and mass flow rate (bottom graph).

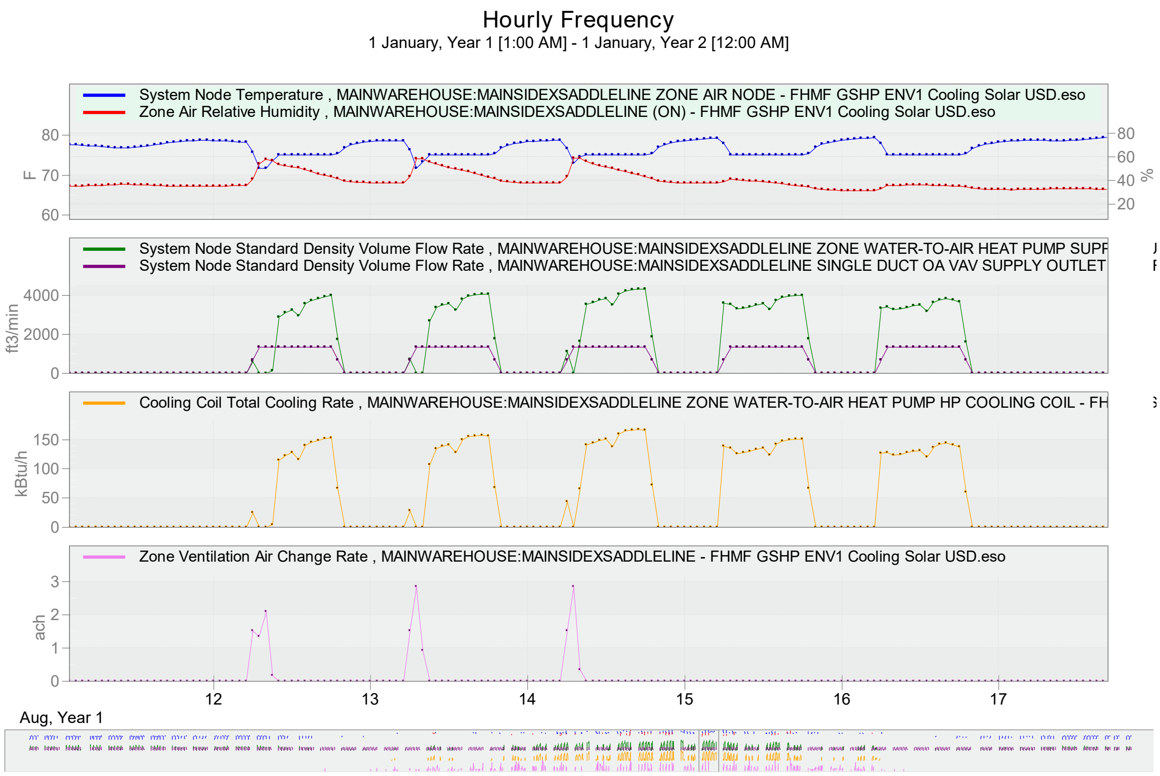


Figure 55 main side saddle line summer HVAC performance. Top graph shows zone air temperature and RH. Next graph shows zWAHP supply airflow rate and ventilation airflow rate. Next graph shows zWAHP total cooling rate. Bottom graph shows the natural ventilation air change rate.

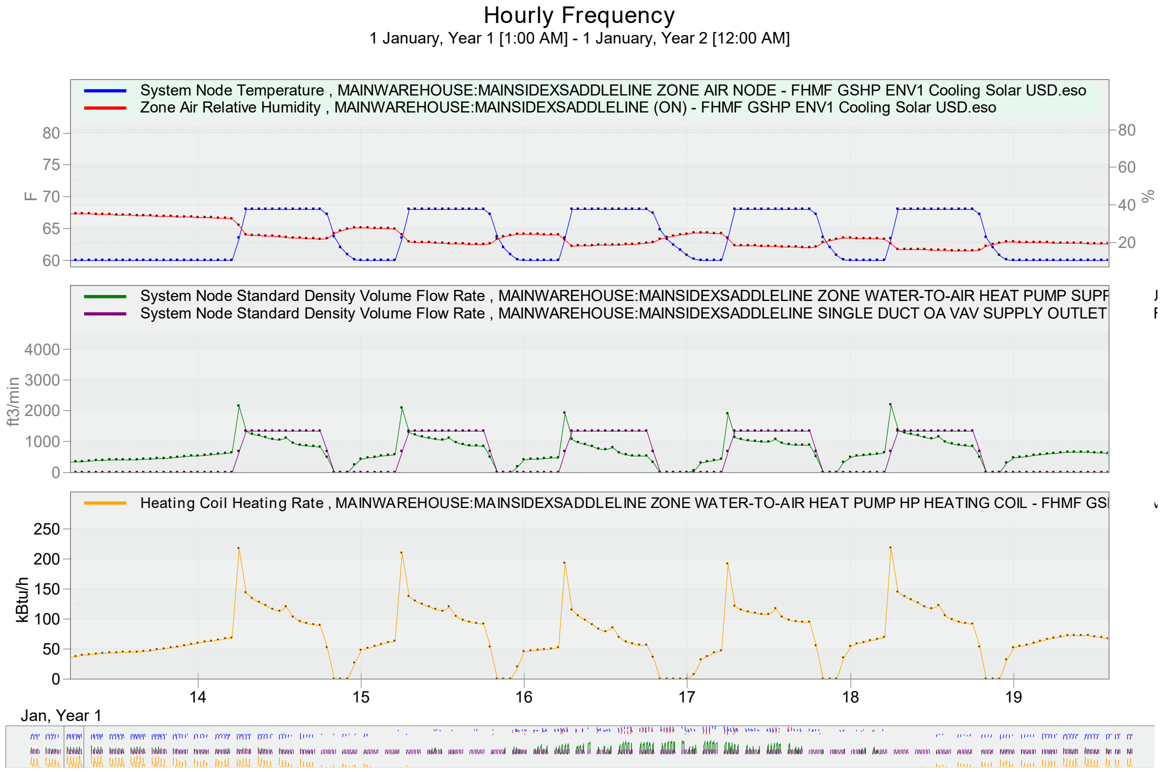


Figure 56 main side saddle line winter HVAC performance. Top graph shows zone air temperature and RH. Next graph shows zWAHP supply airflow rate and ventilation airflow rate. Next graph shows zWAHP total heating rate.

ASHP graphs

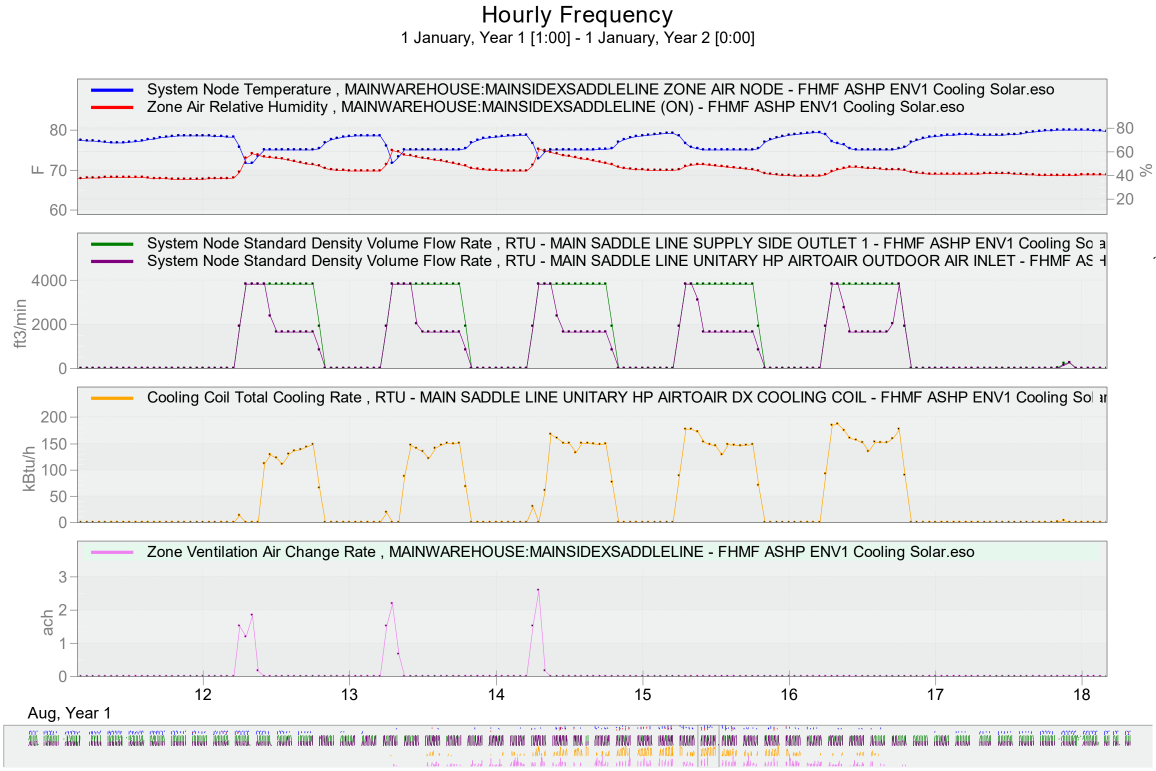


Figure 57 main side saddle RTU summer performance. Top graph shows zone temperature and RH. Next graph shows RTU supply air and outdoor air flow rate (economizer actions show here). Next graph shows total cooling rate and the bottom graph shows natural ventilation air change rate.

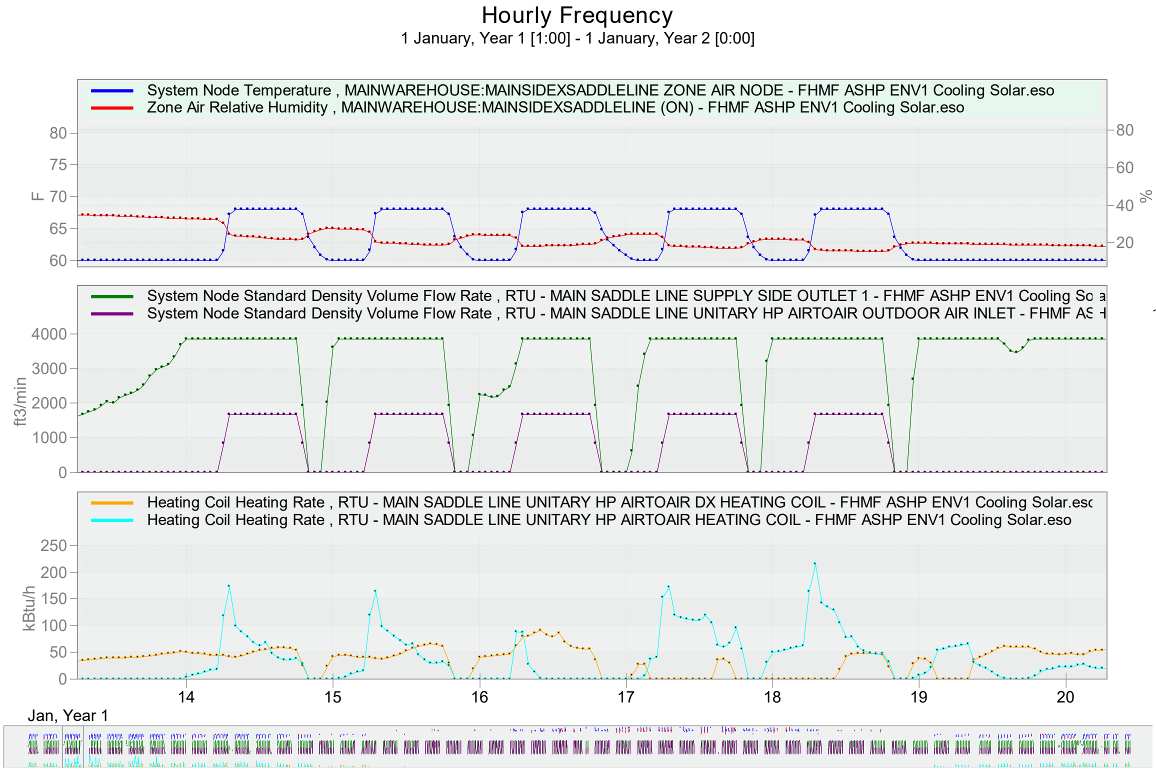


Figure 58 main side saddle RTU winter performance. Top graph shows zone temperature and RH. Next graph shows RTU supply air and outdoor air flow rate (economizer actions show here). Next graph shows total heating rate .

VAV RH graphs

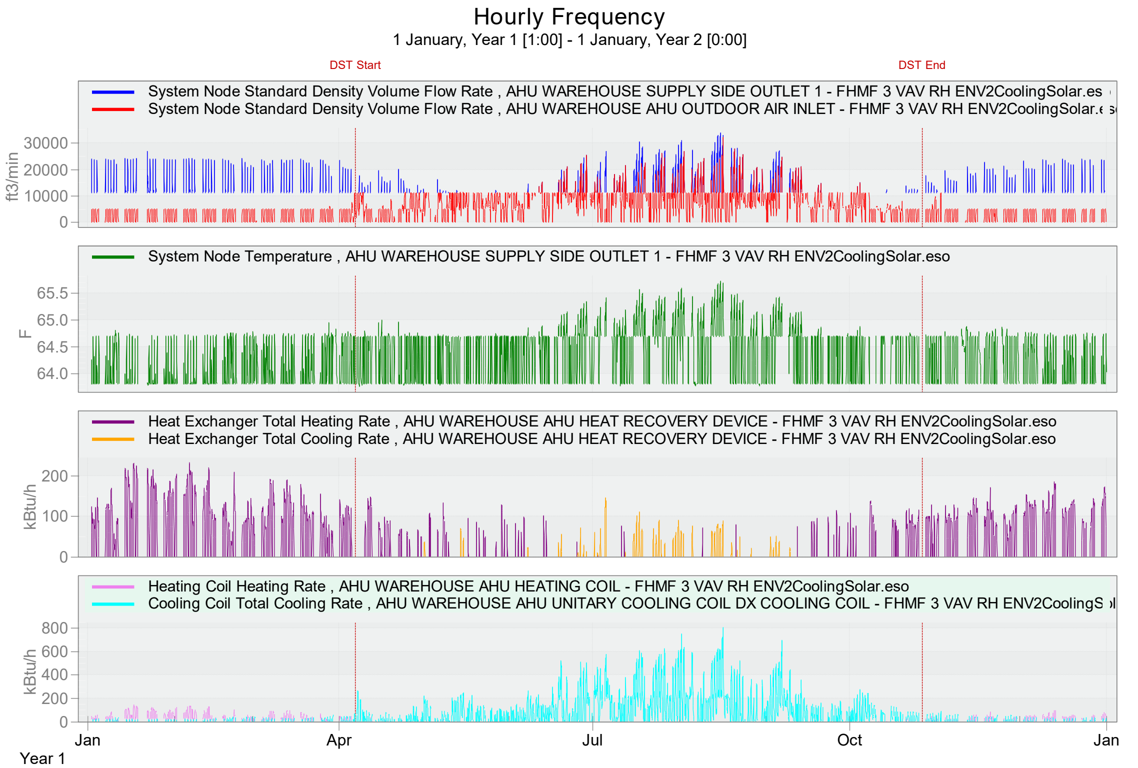


Figure 59 Central VAV AHU serving the main production area. Top graph shows supply and outdoor air flow rates. Next graph shows supply air temperature. Next graph shows energy recover device total heating and cooling rates. Bottom graph shows AHU heating and cooling rates.

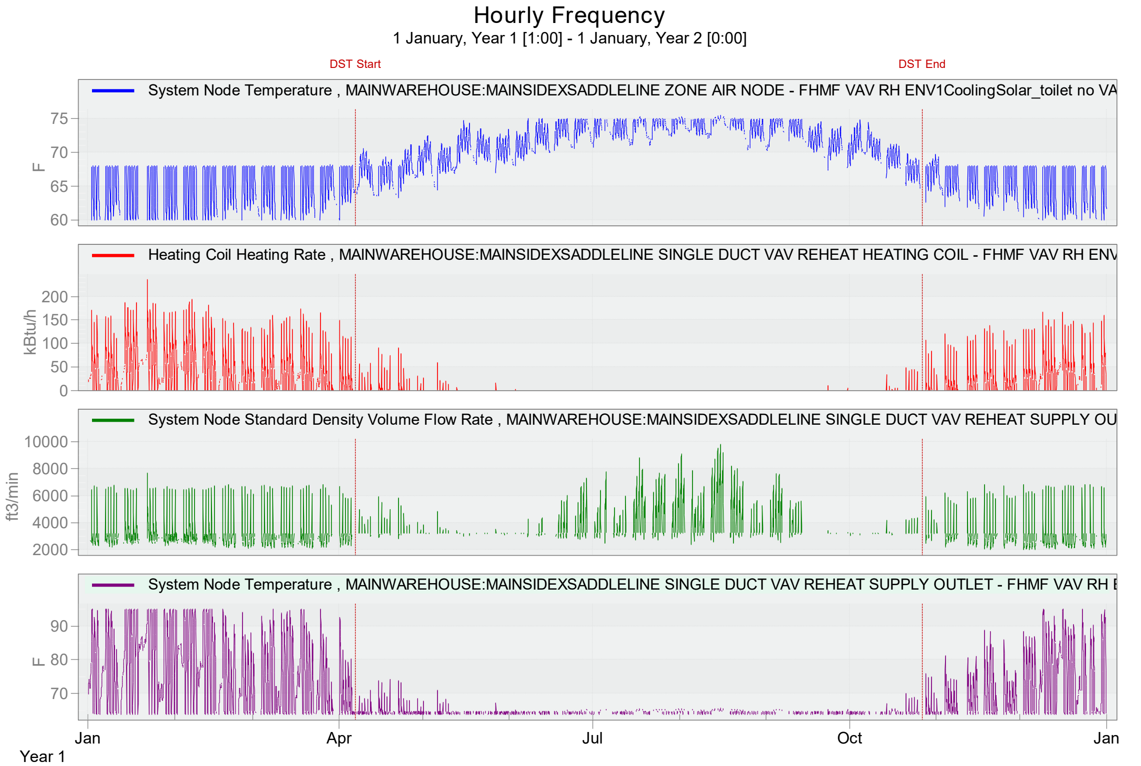


Figure 60 Zone main side saddle line HVAC performance. Top graph shows zone temperature. Next graph shows VAV box heating coil heating rate. Next graph shows VAV airflow rate. Bottom graph shows VAV box supply air temperature.

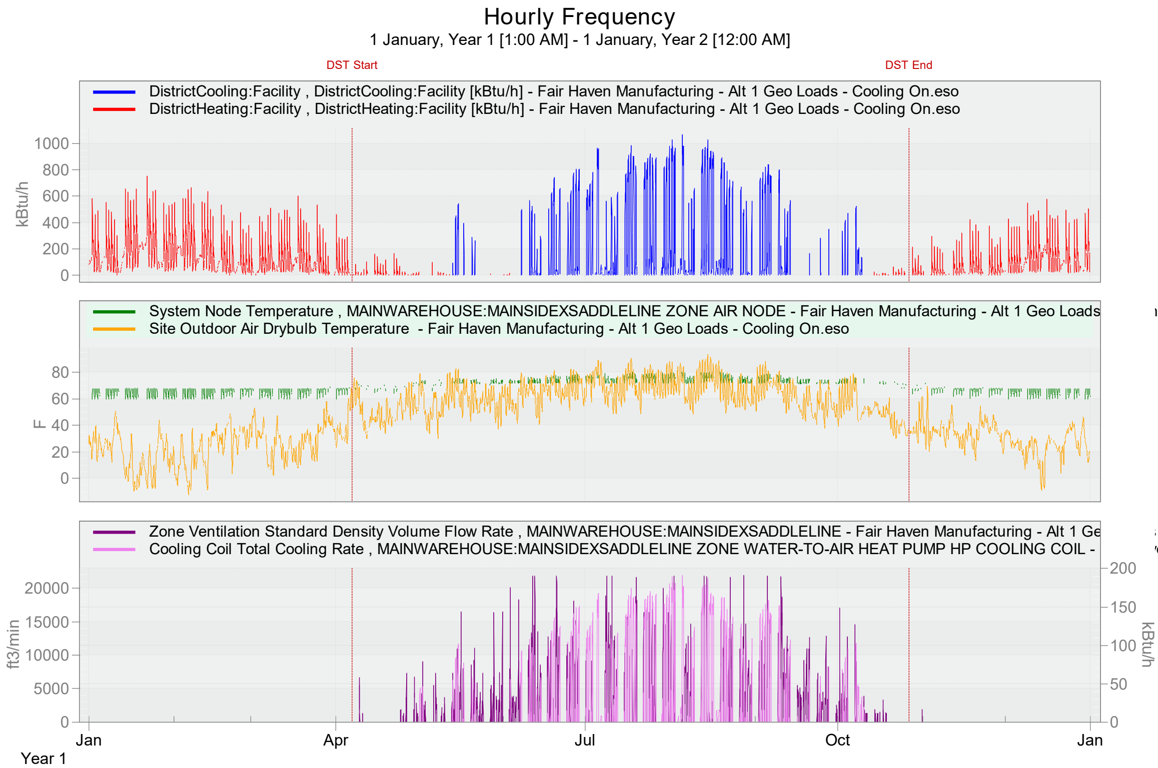


Figure 61 Annual graph showing effects of natural ventilation in the main production area. Top graph shows the district (geothermal) loads. Next graph shows the main side saddle line zone temperature and outdoor air temperature. Bottom graph shows the zone cooling rate and natural ventilation airflow rate. Results are better understood in the next graph.

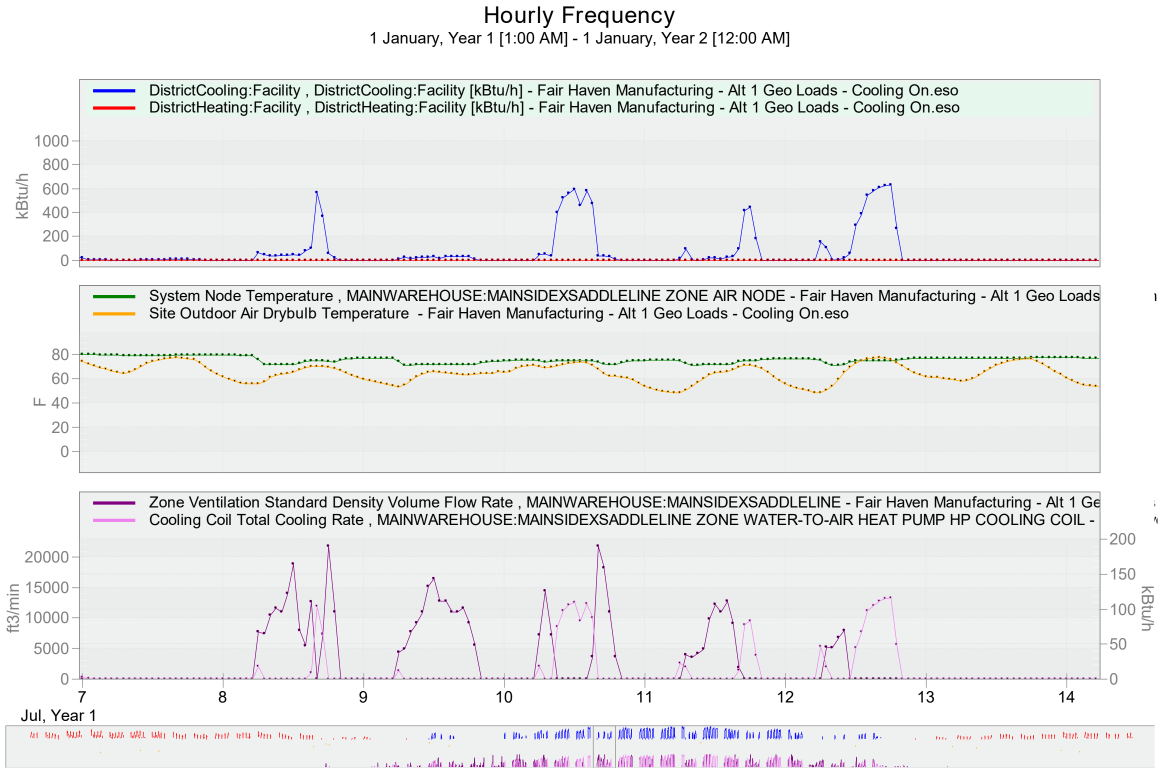


Figure 62 This graph zooms in on a summer week. Top graph shows cooling load to the ground. Next graph shows the zone temperature and outdoor air temperature. Bottom graph shows that the cooling coil does not operate during natural ventilation.

Appendix 5: Purchased energy rates

Electricity

GMP rate 63/65: Commercial and Industrial time of use service.

Rate 63/65

Commercial & Industrial Time-of-Use Service

Rate 63/65 is available to all non-residential and farm customers on an optional basis and required for customers consuming 7,600 kWh or more per month or using more than 200 kW.

This rate is for customers who are interested in saving money by managing the timing of maximum demands and kWh use, thereby taking advantage of lower off-peak kW and kWh rates.

Customer Charge	$4.721/day		
Usage	**Peak kWh** $0.13106/kWh	**Off Peak kWh** $0.09960/kWh	
Demand	**Peak kW** $18.574/kW	**Off Peak kW** $5.348/kW	
Voltage Discounts	**Primary Voltage Discount** 4.00%	**Sub-Transmission Voltage Discount** 21.65%	**Sub-Transmission Voltage Discount >20MW** 23.04%
Credits	**Transformer Ownership Credit** ($0.9979)		

View Tariff Sheet ↗

Figure 63 Green Mountain Power rate 63/65: commercial and industrial time-of-use service. PEAK HOURS: Peak hours shall be a period of 16 consecutive hours selected by the Company between the hours of 6:00 a.m. and 11:00 p.m. on weekdays (Monday through Friday). All other hours are considered off-peak.

Propane

The propane rate was based on a regional search of typical propane pricing. The rate was $3.05 per gallon plus a state excise tax of 2%.

Fair Haven Skyline Feasibility Study

Exhibit H: Naylor and Breen Thermal Upgrade Cost Estimate

NAYLOR & BREEN
BUILDERS, INC.
Commercial • Multi-Family Residential • Institutional • Custom Residential

November 20, 2025

John Guequierre
I-OSC, LLC
887 N. High Point Road
Madison, WI 53717

CC: Peter Schnieder (via email)

Re: Fair Haven Manufacturing
875 South Main Street

Dear John,

Please accept our opinion of probable cost estimate for the project. The budget includes the following scopes:

1. Preparation of the manufacturing exterior walls for new insulated metal panels.
2. Removal of existing manufacturing, office, and cafeteria roofing system to the metal deck and installation of new insulation and EPDM membrane roof.
3. Replacement of exiting overhead doors with new insulated doors and motors. Removal and replacement with new of existing man doors/frames/hardware
4. Provide and install an insulated (4") metal panel system including trims and closure components as required, new man-door canopies, new roof drain leaders and new building mounted lighting.
5. Fit-up of existing office and cafeteria spaces with perimeter wall insulation and interior finishes.

The budget does not include the following:

1. Design fees
2. Local and State of Vermont permit fees.
3. Asbestos or hazardous material removal
4. Removal and/or disposal of any miscellaneous items on the site.

We look forward to reviewing the budget at your convenience. Thank you for the opportunity to assist with the project.

Tom McGinn
Naylor & Breen Builders

Tom McGinn | Senior PM for Preconstruction Services
tmcginn@naylorbreen.com
www.naylorbreen.com
(802) 247-6527 | Fax (802) 247-0048
191 Alta Woods | Brandon, VT 05733

NAYLOR & BREEN BUILDERS, INC.

Commercial • Multi-Family Residential • Institutional • Custom Residential

Fair Haven Manufacturing - 875 South Main Street, Fair Haven VT **11/20/2025**

Demolition - prepare exterior walls for new insulated panels					**TOTALS**
Demo south lean-to (40' L x 24' W) and west canopy (150' L x 10' W)	480/MH	Labor	$70/HR		$ 33,600.00
Demo man-door canopies	2 weeks	Man-lifts (2)	$1,950/week		$ 7,800.00
Demo exterior half-height V-rib wall panels (approx 3500 SF)	8	Dumpsters	$950/each		$ 7,600.00
Disconnect/Remove exterior building mounted lighting/intercom speakers	24 HR	Trucking/Fuel	135/HR		$ 3,240.00
Remove exterior louvers					
Remove roof drain leaders and other misc. attachments				**Total Demolition**	**$ 52,240.00**
Masonry					
Allowance for exterior wall masonry patch/repair	1	allowance		**Total Masonry**	**$ 25,000.00**
Saelants and Caulking					
Allowance for general sealing at CMU openings and penetrations	1	allowance		**Total Sealants/Caulking**	**$ 7,500.00**
Roofing					
Remove esisting EPDM membrane, remove 2" existing insulation, remove original built-up asphalt roof, insulation and protection board at production, office/cafeteria, and north warehouse (92,000 SF)				Doxsee	
Re-roof w/4"poly-ISO insulation mechanically fastened, adhere Firestone (.060) black SA EPDM, flash all walls, curbs and penetrations, install new retrofit drains, flash walls, curbs, penetrations, install 24g. galvalume L edge metal				Doxsee	$ 1,610,000.00
Provide and install new thru wall roof leaders/downspouts (allow 20 - lifts in GC's)	20	EA	$825/EA	allowance	$ 16,500.00
Provide and install new man-door canopies (lifts in GC's)	6	EA	$2400/EA	allowance	$ 14,400.00
				Total Roofing	**$ 1,640,900.00**
Exterior Doors					
Replace (7) existing 14' x 20' and (2) existing 8' x 10' OHD's with new insulated doors and new motors. Includes removal and disposal	1		sum	OHD Burlington	$ 90,000.00
Allowance for misc track support and jamb repairs	9	EA	$500/EA	allowance	$ 4,500.00
Remove and replace (6) exterior man doors HM doors/frames in masonry openings with hardware including labor to install	7 Each		$3,200/EA	allowance	$ 22,400.00
				Total Exterior Doors	**$ 116,900.00**

Insulated Metal Panels (30,330 SF)					
Approx. 28,000 insulated (4") metal wall panels over the exting exterior walls. Panels are 22g embossed with a standard stock color. Includes factory formed break trims at openings and base support angle. Includes horizontal galvanized channel over existing CMU for panel attachment	1		sum	Construx, Inc.	$ 858,000.00
Reinstall exterior louvers, vents	1		allowance		$ 10,000.00
New building mounted lighting - general, man and OH doors	1		allowance		$ 12,000.00
				Total Insulated Metal Panels	**$ 880,000.00**
Office and Cafeteria Fit-Up Office 3,250 SF - Cafeteria 2,885 SF: Total 6,135 SF	160 MH	Labor	$70/HR		$ 11,200.00
Interior demolition: partitions, ACT, flooring, perimiter drywall.	4	Dumpsters	$950/EA		$ 3,800.00
Insulation: interior perimeter walls to deck underside 12' H R-22 3" spray foam	3,900 SF		Sum	CHEY	$ 12,970.00
Sealants/Caulking			allowance		$ 2,500.00
Door/Frames/Hardware: offices - assume 8 new HM frames/wood doors	8		1,200/EA		$ 9,600.00
	24 MH	Labor	$70/hr		$ 1,680.00
Windows: existing to remain					$ -
Framing: perimeter + new office partitions (labor and material)	500 LF		$8.50/LF		$ 4,250.00
Drywall: hung/taped - perimeter + new office partitions	5,000 SF		$10/SF		$ 50,000.00
Flooring: resilient and carpet, vinyl base	6,135 SF		$8/SF		$ 49,080.00
Painting: partitions, perimeter, doors	5,000 SF		$3.50/SF		$ 17,500.00
Acoustic Ceiling	6,135 SF		$8/SF		$ 49,080.00
Appliances: 2 fridges, range, 2 microwaves, dishwasher			allowance		$ 12,000.00
Casework, Shelving, Countertops			allowance		$ 40,000.00
Sprinkler: modify existing distribution			allowance		$ 12,000.00
Plumbing: existing to remain cafeteria, restrooms. Allowance for misc			allowance		$ 12,000.00
HVAC: existing heating/cooling to remain - allow for ERV and branch ductwork modify	6,135 SF		$15/SF		$ 92,025.00
Electric: lighting, power outlets,existing service/panels to remain	6,135		$20/SF		$ 122,700.00
				Total Fit-up	**$ 502,385.00**
General Conditions (16 week construction duration)					
Project Manager	20/hrs/week	320 MH	$105/hr		$ 33,600.00
Superintendent w/truck	40/hrs/week	640 MH	$104/hr		$ 66,560.00
Project Coordinator	6/hrs/week	96 MH	$85/hr		$ 8,160.00
Job Office Supplies	4 months		$100/month		$ 400.00
Procore Service Charge (.0015 project cost)	1		sum		$ 6,568.00
Office Trailer	4 months		$350/month		$ 1,400.00
Manlifts (2)	32 weeks		$950/week		$ 30,400.00
Dumpsters and Debris Disposal	8		$950/each		$ 7,600.00
Mobilization/Demobilization Office/Storage Trailers	1		sum		$ 1,400.00
Portable Toilets (2)	4 months		$350/month		$ 1,400.00
Job-Site Drinking Water	4 months		$120/month		$ 480.00

Temp Water/Power	4 months			By Owner	$ -
Close-Out, Manuals and Punch List	1	sum			$ 3,750.00
Mileage and Vehicle Expenses	4 months		$200/month		$ 800.00
				Total General Conditions	**$ 162,518.00**
Safety Requirements					
Job-site safety inspections	32 hours		$84/hr		$ 2,688.00
Project Safety Plan	1	sum			$ 500.00
Fall Protection, Temp Guardrails, Barriers	1	sum			$ 800.00
Roof work protection				Included in Roofing	$ -
				Total Safety	**$ 3,988.00**
Permits/Insurances/Testing					
Builders Risk Insurance				By Owner	$ -
Local, ACT 250, Division of Fire Safety Permits				By Owner	$ -
Testing Services				By Owner	$ -
				Total Permits/Insurances/Testing	**$ -**
				Subtotal Construction	**$ 3,391,431.00**
				General/Prof. Liabilty 1%	$ 33,914.31
				Subtotal	$ 3,425,345.31
				Contingency 10%	$ 342,534.53
				Overhead and Fee 8%	$ 301,430.39
				Total	**$ 4,069,310.23**

NAYLOR & BREEN BUILDERS, INC.
Commercial • Multi-Family Residential • Institutional • Custom Residential

Fair Haven Manufacturing

Estimate of Probable Cost 11/20/2025

Based on Proposed Plant Lay-Out Drawings 4/8/25 and Skyline Plant Wright Construction Drawings

Schedule of Values

16 week construction duration

Description	Notes	COST CODE	Total
General Conditions and Safety			$166,506.00
Permits, Insurances, Testing Services	By Owner		$0.00
Hazordous Material Abatement	By Owner		$0.00
Demolition			$52,240.00
Masonry			$25,000.00
Roofing			$1,640,900.00
Insulated Metal Panels			$880,000.00
Sealants and Caulking			$7,500.00
Overhead Doors, Man-Doors at warehouse manufacturing			$116,900.00
Office/Cafeteria Fit-Up (6,135 SF)			$502,385.00
Subtotal			$3,391,431.00
General/Prof. Liability		1.00%	$33,914.31
Subtotal			$3,425,345.31
Contingency		10.00%	$342,534.53
Overhead/Fee		8.00%	$301,430.39
TOTAL			**$4,069,310.23**

Fair Haven Skyline Feasibility Study

Exhibit I: Marble Valley 2018 Structural Analysis

MARBLE VALLEY ENGINEERING, PC
CIVIL & STRUCTURAL
775-1181

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

MEMORANDUM

To: Catamount Solar
From: Kevin A. Smith, P.E. KAS
Date: September 6, 2018
RE: Stratified Stone Roof Solar Panel Installation Feasibility

OBSERVATIONS SUMMARY

There are 4 foot/48 inch deep steel joist trusses supporting the roof of the Stratified Stone building. They are spaced approximately 80 inches on center.

Each truss is approximately 84'-6" long and made up entirely of steel angles. The top chord consists of 3½ x 3½ x $^3/_8$ double angles. The bottom chord consists of 3 x 3 x $^3/_8$ double angles. The diagonal web members are 2 x 2 x ¼ single angles and the vertical web members are 1 ½ x 1 ½ x $^3/_{16}$ single angles. The cross bracing between trusses consists of 1 ¼ x 1 ¼ x $^1/_8$ angles approximately 13 ½ feet on center.

The trusses are supported by W18 x 50 beams that run along the center of the building. These beams transfer load to the W10 x 45 columns that are spaced approximately 20'-3" on center.

LOADS ANALYSIS

The analysis was performed using RISA 3D. The system was modeled using 84 foot trusses spaced at 81 inches on center. Four bays were modeled, with only the two interior bays being analyzed to ensure the model is accurate. Both Allowable Stress Design (ASD) and Load and Resistance Factor Design (LRFD) are allowed to be used for design per code. Both design methods were used in this analysis and showed similar trends in their results. The criteria used to determine the impact of loads on the structure is a unity check. This reflects a combination of load to capacity ratios in all directions that a member is undergoing. A unity check over 1.0 theoretically means that the member fails.

The minimum factored roof snow load for a fully exposed, unheated minor storage facility in Fair Haven was determined to be 24.1 pounds per square foot (psf) based upon a minimum ground snow load of 40 psf. Wind loads were also taken into consideration for this location based on a 120 mile per hour wind speed.

The model was first analyzed for self-weight only. This alone resulted in the top members of the cross bracing on each side of the building to fail the unity check. Regardless of how much load will be added to the roof from the solar array, additional bracing or strengthening of existing bracing should be implemented. Then a snow load increment of 24.1 psf was added. Further impact to the trusses resulted.

Not knowing what the loads from the solar panels will be, additional distributed loads in increments of 10 to 20 pounds per square foot (psf) were added to the model in order to determine the limit of the system. The model was analyzed with uniformly distributed loads and also point loads placed at the

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

vertical members, both with a roof snow load plus self-weight background. In general, the point loads seemed to bring the structure to failure more rapidly than the distributed loads.

A distributed load of 30 pounds per square foot (a total of 54.1 psf + dead load) allowed the structure to pass the unity check, with the exception of the cross bracing, under all load combinations for ASD. At 40 pounds per square foot under ASD (total of 64.1 psf + dead load), however, vertical web members start to fail. More vertical web members and diagonal web members fail with more added load. LRFD load combinations allow for a distributed load of 50 pounds per square foot with all members besides cross-bracing passing the unity check. At 60 pounds per square foot, diagonal members began to fail the unity check. The addition of 80 pounds per square foot plus roof snow load and assumed dead load seems to be the point at which the system undergoes complete failure both for ASD and LRFD.

Point loads were applied at all vertical truss members. Tributary areas were adjusted as needed for the given load location. Load levels were based upon their distributed equivalents. A point load distribution approximated the distributed load results quite well but at lesser values.

Since trusses such as these are proprietary products, each manufacturer will provide loading capacity information for their products. One, the Vulcraft Group of Nucor, lists allowable ASD and LRFD loads for a 48 inch truss at a span of 84 feet as a minimum of 346 pounds per linear foot. At a tributary width of 80 inches, under LRFD, minimum truss capacity would be 51.9 pounds per square foot, correlating well to the 50 psf additional load for distributed loading. Of this amount, 24.1 psf minimum would be required for snow load leaving 27.8 pounds per square foot available for the solar array. At an approximate tributary area of 87.75 square feet, allowable ballast plus array loads would be limited to 4,387 per panel point. Under ASD, total load capacity would be 34.6 pounds per square foot of which 24.1 psf would need to be reserved for snow. This shows good correlation with actual loads. That leaves 10.5 psf available for ballast and solar array or 920 pounds per panel point.

Factoring LRFD loads by 100% for safety, the range of load that can be applied at each truss vertical is between 920 and 2,193 pounds or between 10.5 and 25 psf for ASD and LRFD, respectively. Given the age of the building, ASD was the likely design basis so is recommended (920 pounds per vertical; 10.5 psf) to be used in any future analysis or design. Since the distributed loading is approximately that required to balance uplift of a diaphragm at a wind speed of 120 miles per hour (mph), some of the array shall require anchoring as opposed to ballasting to account for the weight of the array and any snow entrapped by it.

MARBLE VALLEY ENGINEERING, PC
CIVIL & STRUCTURAL
775-1181

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

RESULTS

ASD:

Distributed Loads:

Load Case	Additional Load	Physical Changes
Self-Weight Only	N/A	Top of edge cross-bracing only fails unity check
Self-Weight + Snow Load	N/A	Top of all cross-bracing fails unity check
Dead Load	10 psf	Top of all cross-bracing fails unity check
Dead Load	20 psf	Top of all cross-bracing fails unity check
Dead Load	30 psf	Top of all cross-bracing fails unity check
Dead Load	40 psf	Top of all cross-bracing fails unity check
Dead Load	80 psf	Top of all cross-bracing & many diagonal and vertical web members fail unity check
Dead + Snow Load	10 psf	Top of all cross-bracing fails unity check
Dead + Snow Load	20 psf	Top of all cross-bracing fails unity check
Dead + Snow Load	30 psf	Top of all cross-bracing fails unity check
Dead + Snow Load	40 psf	Top of all cross-bracing & diagonal web members near center and outside fail unity check
Dead + Snow Load	80 psf	Structure failure
Dead + Wind Load	10 psf	Top of all cross-bracing fails unity check
Dead + Wind Load	20 psf	Top of all cross-bracing fails unity check
Dead + Wind Load	30 psf	Top of all cross-bracing fails unity check
Dead + Wind Load	40 psf	Top of all cross-bracing fails unity check
Dead + Wind Load	80 psf	Top of all cross-bracing & some vertical and diagonal web members fail unity check

Point Loads:

Load Case	Location	Tributary Area	Load	Physical Changes
Dead Load	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
Dead Load	Outer Verticals	87.75 ft^2	877.5 lb	
Dead Load	Wall Columns	60.75 ft^2	607.5 lb	
Dead Load	Interior Columns	121.5 ft^2	1215 lb	
Dead Load	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
Dead Load	Outer Verticals	87.75 ft^2	1755 lb	
Dead Load	Wall Columns	60.75 ft^2	1215 lb	
Dead Load	Interior Columns	121.5 ft^2	2430 lb	
Dead Load	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing & some vertical web members fail unity
Dead Load	Outer Verticals	87.75 ft^2	2632.5 lb	

MARBLE VALLEY ENGINEERING, PC
CIVIL & STRUCTURAL
775-1181

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

Dead Load	Wall Columns	60.75 ft^2	1822.5 lb	check
Dead Load	Interior Columns	121.5 ft^2	3645 lb	
Load Case	**Location**	**Tributary Area**	**Load**	**Physical Changes**
Dead Load	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & some vertical web members fail unity check
Dead Load	Outer Verticals	87.75 ft^2	3510 lb	
Dead Load	Wall Columns	60.75 ft^2	2430 lb	
Dead Load	Interior Columns	121.5 ft^2	4860 lb	
Dead Load	Interior Verticals	54 ft^2	4320 lb	Top of all cross-bracing & all vertical & some diagonal web members fail unity check
Dead Load	Outer Verticals	87.75 ft^2	7020 lb	
Dead Load	Wall Columns	60.75 ft^2	4860 lb	
Dead Load	Interior Columns	121.5 ft^2	9720 lb	
Dead + Snow Load	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
Dead + Snow Load	Outer Verticals	87.75 ft^2	877.5 lb	
Dead + Snow Load	Wall Columns	60.75 ft^2	607.5 lb	
Dead + Snow Load	Interior Columns	121.5 ft^2	1215 lb	
Dead + Snow Load	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing & some vertical web members fail unity check
Dead + Snow Load	Outer Verticals	87.75 ft^2	1755 lb	
Dead + Snow Load	Wall Columns	60.75 ft^2	1215 lb	
Dead + Snow Load	Interior Columns	121.5 ft^2	2430 lb	
Dead + Snow Load	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing & some vertical web members fail unity check
Dead + Snow Load	Outer Verticals	87.75 ft^2	2632.5 lb	
Dead + Snow Load	Wall Columns	60.75 ft^2	1822.5 lb	
Dead + Snow Load	Interior Columns	121.5 ft^2	3645 lb	
Dead + Snow Load	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & some vertical web members fail unity check
Dead + Snow Load	Outer Verticals	87.75 ft^2	3510 lb	
Dead + Snow Load	Wall Columns	60.75 ft^2	2430 lb	
Dead + Snow Load	Interior Columns	121.5 ft^2	4860 lb	
Dead + Snow Load	Interior Verticals	54 ft^2	4320 lb	Structure failure
Dead + Snow Load	Outer Verticals	87.75 ft^2	7020 lb	
Dead + Snow Load	Wall Columns	60.75 ft^2	4860 lb	
Dead + Snow Load	Interior Columns	121.5 ft^2	9720 lb	
Dead + Wind Load	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
Dead + Wind Load	Outer Verticals	87.75 ft^2	877.5 lb	
Dead + Wind Load	Wall Columns	60.75 ft^2	607.5 lb	
Dead + Wind Load	Interior Columns	121.5 ft^2	1215 lb	
Dead + Wind Load	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
Dead + Wind Load	Outer Verticals	87.75 ft^2	1755 lb	
Dead + Wind Load	Wall Columns	60.75 ft^2	1215 lb	
Dead + Wind Load	Interior Columns	121.5 ft^2	2430 lb	
Dead + Wind Load	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing & some vertical web members fail unity
Dead + Wind Load	Outer Verticals	87.75 ft^2	2632.5 lb	

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

Dead + Wind Load	Wall Columns	60.75 ft^2	1822.5 lb	check
Dead + Wind Load	Interior Columns	121.5 ft^2	3645 lb	

Load Case	Location	Tributary Area	Load	Physical Changes
Dead + Wind Load	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & some vertical web members fail unity check
Dead + Wind Load	Outer Verticals	87.75 ft^2	3510 lb	
Dead + Wind Load	Wall Columns	60.75 ft^2	2430 lb	
Dead + Wind Load	Interior Columns	121.5 ft^2	4860 lb	
Dead + Wind Load	Interior Verticals	54 ft^2	4320 lb	Top of all cross-bracing & some vertical and diagonal web members fail unity check
Dead + Wind Load	Outer Verticals	87.75 ft^2	7020 lb	
Dead + Wind Load	Wall Columns	60.75 ft^2	4860 lb	
Dead + Wind Load	Interior Columns	121.5 ft^2	9720 lb	

LRFD:

Distributed Loads:

Load Case	Additional Load	Physical Changes
1.4D	10 psf	Top of all cross-bracing fails unity check
1.4D	30 psf	Top of all cross-bracing fails unity check
1.4D	50 psf	Top of all cross-bracing fails unity check
1.4D	60 psf	Top of all cross-bracing fails unity check
1.4D	70 psf	Top of all cross-bracing, two rows of diagonal web members fail unity check
1.4D	80 psf	Top of all cross-bracing & many diagonal and vertical web members fail unity check
1.2D + 0.5S	10 psf	Top of all cross-bracing fails unity check
1.2D + 0.5S	30 psf	Top of all cross-bracing fails unity check
1.2D + 0.5S	50 psf	Top of all cross-bracing fails unity check
1.2D + 0.5S	60 psf	Top of all cross-bracing fails unity check
1.2D + 0.5S	70 psf	Top of all cross-bracing, many diagonal web members fail unity check
1.2D + 0.5S	80 psf	Top of all cross-bracing & many diagonal and vertical web members fail unity check
1.2D + 1.6S + 0.8W	10 psf	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	30 psf	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	50 psf	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	60 psf	Top of all cross-bracing, two row of diagonal web members fail unity check
1.2D + 1.6S + 0.8W	70 psf	Top of all cross-bracing & many diagonal and vertical web members fail unity check
1.2D + 1.6S + 0.8W	80 psf	Top of all cross-bracing & many diagonal and vertical web members fail unity check

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

0.9D + 1.6W	10 psf	All members sufficient
0.9D + 1.6W	30 psf	Top of some cross-bracing fails unity check
Load Case	**Additional Load**	**Physical Changes**
0.9D + 1.6W	50 psf	Top of some cross-bracing fails unity check
0.9D + 1.6W	60 psf	Top of all cross-bracing fails unity check
0.9D + 1.6W	70 psf	Top of all cross-bracing fails unity check
0.9D + 1.6W	80 psf	Top of all cross-bracing fails unity check

Point Loads:

Load Case	Location	Tributary Area	Load	Physical Changes
1.4D	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
1.4D	Outer Verticals	87.75 ft^2	877.5 lb	
1.4D	Wall Columns	60.75 ft^2	607.5 lb	
1.4D	Interior Columns	121.5 ft^2	1215 lb	
1.4D	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
1.4D	Outer Verticals	87.75 ft^2	1755 lb	
1.4D	Wall Columns	60.75 ft^2	1215 lb	
1.4D	Interior Columns	121.5 ft^2	2430 lb	
1.4D	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing fails unity check
1.4D	Outer Verticals	87.75 ft^2	2632.5 lb	
1.4D	Wall Columns	60.75 ft^2	1822.5 lb	
1.4D	Interior Columns	121.5 ft^2	3645 lb	
1.4D	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & inner and outer vertical web members fail unity check
1.4D	Outer Verticals	87.75 ft^2	3510 lb	
1.4D	Wall Columns	60.75 ft^2	2430 lb	
1.4D	Interior Columns	121.5 ft^2	4860 lb	
1.4D	Interior Verticals	54 ft^2	4320 lb	Top of all cross-bracing & all vertical web members fail unity check
1.4D	Outer Verticals	87.75 ft^2	7020 lb	
1.4D	Wall Columns	60.75 ft^2	4860 lb	
1.4D	Interior Columns	121.5 ft^2	9720 lb	
1.2D + 0.5S	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
1.2D + 0.5S	Outer Verticals	87.75 ft^2	877.5 lb	
1.2D + 0.5S	Wall Columns	60.75 ft^2	607.5 lb	
1.2D + 0.5S	Interior Columns	121.5 ft^2	1215 lb	
1.2D + 0.5S	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
1.2D + 0.5S	Outer Verticals	87.75 ft^2	1755 lb	
1.2D + 0.5S	Wall Columns	60.75 ft^2	1215 lb	
1.2D + 0.5S	Interior Columns	121.5 ft^2	2430 lb	
1.2D + 0.5S	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing fails unity check
1.2D + 0.5S	Outer Verticals	87.75 ft^2	2632.5 lb	

MARBLE VALLEY ENGINEERING, PC
CIVIL & STRUCTURAL
775-1181

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

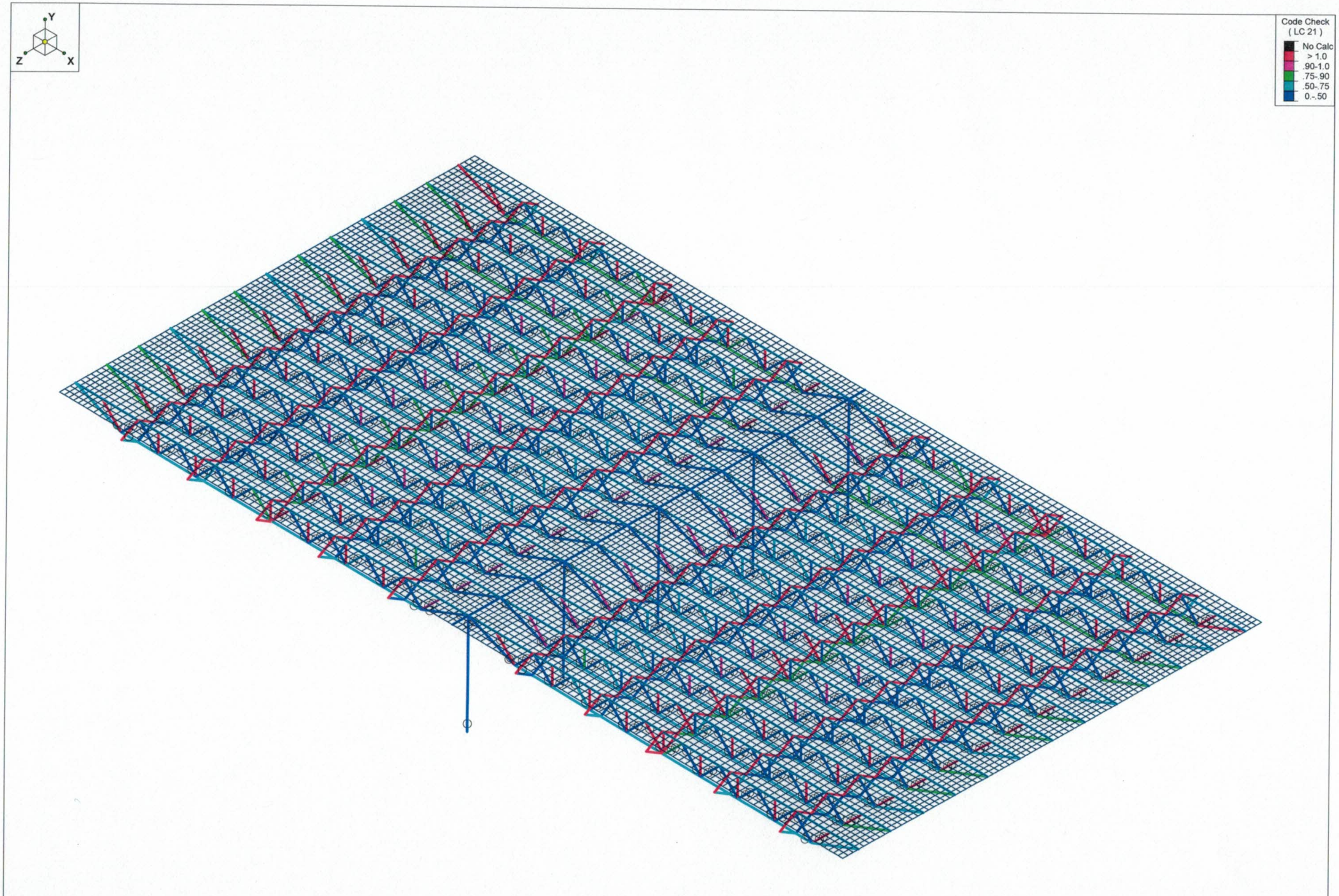
1.2D + 0.5S	Wall Columns	60.75 ft^2	1822.5 lb	
1.2D + 0.5S	Interior Columns	121.5 ft^2	3645 lb	
Load Case	**Location**	**Tributary Area**	**Load**	**Physical Changes**
1.2D + 0.5S	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & some vertical web members fail unity check
1.2D + 0.5S	Outer Verticals	87.75 ft^2	3510 lb	
1.2D + 0.5S	Wall Columns	60.75 ft^2	2430 lb	
1.2D + 0.5S	Interior Columns	121.5 ft^2	4860 lb	
1.2D + 0.5S	Interior Verticals	54 ft^2	4320 lb	Top of all cross-bracing & all vertical web members fail unity check
1.2D + 0.5S	Outer Verticals	87.75 ft^2	7020 lb	
1.2D + 0.5S	Wall Columns	60.75 ft^2	4860 lb	
1.2D + 0.5S	Interior Columns	121.5 ft^2	9720 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	540 lb	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	877.5 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	607.5 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	1215 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	1755 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	1215 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	2430 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	1755 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	1215 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	2430 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	1080 lb	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	1755 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	1215 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	2430 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	1620 lb	Top of all cross-bracing fails unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	2632.5 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	1822.5 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	3645 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	2160 lb	Top of all cross-bracing & some vertical web members fail unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	3510 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	2430 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	4860 lb	
1.2D + 1.6S + 0.8W	Interior Verticals	54 ft^2	4320 lb	Top of all cross-bracing & some vertical and diagonal web members fail unity check
1.2D + 1.6S + 0.8W	Outer Verticals	87.75 ft^2	7020 lb	
1.2D + 1.6S + 0.8W	Wall Columns	60.75 ft^2	4860 lb	
1.2D + 1.6S + 0.8W	Interior Columns	121.5 ft^2	9720 lb	
0.9D + 1.6W	Interior Verticals	54 ft^2	540 lb	All members sufficient
0.9D + 1.6W	Outer Verticals	87.75 ft^2	877.5 lb	

69 Grove Street
Rutland, VT 05701
www.marblevalleyengineering.com
P: 802.775.1181
F: 802.774.1151
E: ksmith@marblevalleyengineering.com

0.9D + 1.6W	Wall Columns	60.75 ft^2	607.5 lb	
0.9D + 1.6W	Interior Columns	121.5 ft^2	1215 lb	
Load Case	**Location**	**Tributary Area**	**Load**	**Physical Changes**
0.9D + 1.6W	Interior Verticals	54 ft^2	1080 lb	All members sufficient
0.9D + 1.6W	Outer Verticals	87.75 ft^2	1755 lb	
0.9D + 1.6W	Wall Columns	60.75 ft^2	1215 lb	
0.9D + 1.6W	Interior Columns	121.5 ft^2	2430 lb	
0.9D + 1.6W	Interior Verticals	54 ft^2	1620 lb	All members sufficient
0.9D + 1.6W	Outer Verticals	87.75 ft^2	2632.5 lb	
0.9D + 1.6W	Wall Columns	60.75 ft^2	1822.5 lb	
0.9D + 1.6W	Interior Columns	121.5 ft^2	3645 lb	
0.9D + 1.6W	Interior Verticals	54 ft^2	2160 lb	Top of some cross-bracing fails unity check
0.9D + 1.6W	Outer Verticals	87.75 ft^2	3510 lb	
0.9D + 1.6W	Wall Columns	60.75 ft^2	2430 lb	
0.9D + 1.6W	Interior Columns	121.5 ft^2	4860 lb	
0.9D + 1.6W	Interior Verticals	54 ft^2	4320 lb	Top of most cross-bracing & some vertical web members fail unity check
0.9D + 1.6W	Outer Verticals	87.75 ft^2	7020 lb	
0.9D + 1.6W	Wall Columns	60.75 ft^2	4860 lb	
0.9D + 1.6W	Interior Columns	121.5 ft^2	9720 lb	

NEXT STEPS

Layout of the solar array will be needed to ensure ballast loads will be properly supported. Additional data may need to be collected depending on the proposed array. Cross bracing will need to be strengthened regardless of added load. Supplemental support may be necessary if loads are placed between trusses. Some level of strengthening is likely. Once strengthened, the roof will be able to support a full solar array load across its surface up to the limits described (920 pounds at each truss vertical maximum; 10.5 psf maximum), the exception being any local discontinuities that would require specific design.



MVE		SK - 1
SMC/KAS	Catamount Solar Array	Sept 6, 2018 at 12:33 PM
P321M	LRFD Model at 70 psf Solar Array Load	Model 8-08-18 LRFD.r3d

69 Grove Street
Rutland, VT 05701

www.marblevalleyengineering.com

P: 802.775.1181
F: 802.774.1151

September 6, 2018

Mr. Zach Lemay
Catamount Solar
4 Randolph Avenue
Randolph, VT 05060

Re: Stratified Stone Solar, Fair Haven, VT

Dear Zach:

At your request, we visited the Stratified Stone building in Fair Haven in order to provide a structural roof support assessment relative to the planned addition of photovoltaic solar panels. Our assessment was based upon ladder access for visual observation of this high-ceilinged structure and subsequent structural modeling...A summary and results of my findings are below:

The Stratified Stone building in question is the former Skyline mobile home manufacturing plant. Roof support consists of steel trusses 4 foot deep and 80.5 inches on center. The trusses are constructed of steel angles. A column line divides the facility in half. Based on field measurements and Code Review, I have determined that the existing design roof loads are as follows:

- Dead Load = 6 psf (assumed calculated dead load)
- Snow Load = <u>24 psf</u> (based on flat roof snow load and ground snow load of 40 psf)
- Total Load = **30 psf**

The roof trusses and columns have been analyzed and been found to have excess capacity more than the approximately 3 psf required for an anchored solar array. Therefore, I have determined that the existing roof structure **<u>has adequate capacity</u>** for the installation of an anchored solar panel array. Note that this adequate capacity is based upon the assumptions including the ability of the structure to limit snow load to just over one foot depth. Please contact this office if any change in roof type or other changes occur, violating the assumptions inherent in the work.

I trust that we have addressed your concerns with this matter. If not, or if we can be of further assistance, feel free to contact us via phone or email.

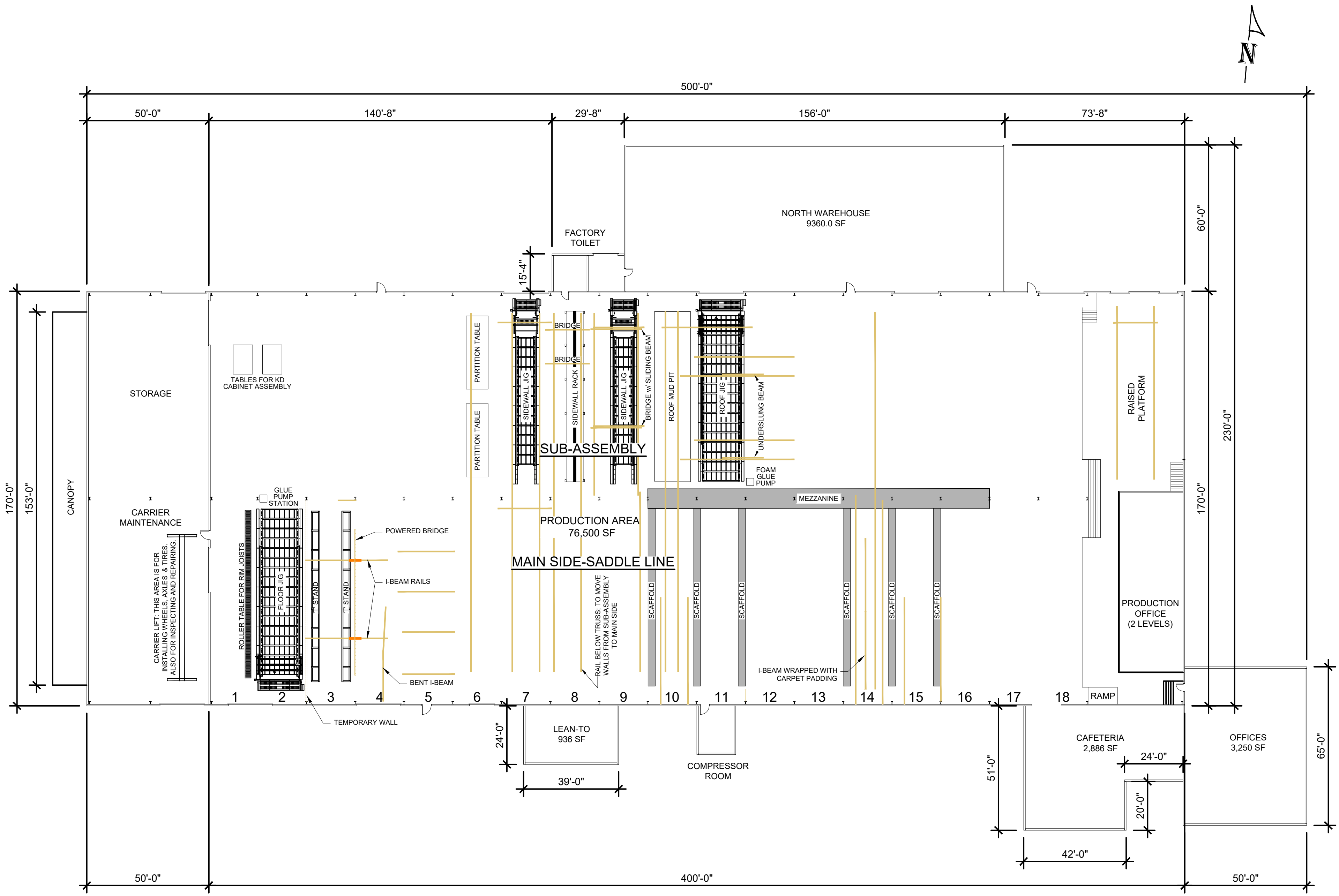
Best regards,
Marble Valley Engineering, PC

STATE OF VERMONT
KEVIN
A.
SMITH
No. 5864
REGISTERED
PROFESSIONAL ENGINEER

Kevin Smith, PE
President

Fair Haven Skyline Feasibility Study

Exhibit J: Suggested Modular Factory Layout



DATE DRAWN: 4/8/25	SCALE: NA		CUSTOMER: John Guequierre, I-OSC, LLC	PAGE DESCRIPTION: .	JOB NO:
REV. DATE:	DRAWN BY: DCS	875 S Main St, Fair Haven, VT 05743	PROJECT: Proposed Plant Layout		PAGE NO:

Fair Haven Skyline Feasibility Study

Exhibit K: Station by Station Modular Process

Fair Haven Modular Plant

STATION-BY-STATION MANUFACTURING PROCESS (preliminary)

This section provides a basic outline a manufacturing process that accommodates multi-family modulars conforming to the International Construction Code as implemented by the State of Vermont. It does not preclude the option of any given assembly or process from starting at a position earlier than or later than shown in the outline within the confines of the factory property. Modular sections need not fill every station.

STATION C (Carrier Preparation and Inspection)

- Welding repairs as necessary
- Mounting of axles and tires as necessary
- Inspection and documentation per DOT standards

STATIONS 1-5 (Floors)

- Rim joist make-up, in-floor electrical sub-assembly (if any), plumbing sub-assembly (if-any) and HVAC sub-assembly (if any) typically in station 1
- Floor framing and decking typically on frame jig typically in station 2
- Floor insulation (if any) can begin as early as station 2
- Under-floor tasks, including attachment of dolly wheels, performed while floor assembly is on raised jig in station 3
- Decking finishes continue in stations 4-5, including installation of sheet vinyl (if any)
- Installation of large appliances and cabinets can begin

STATION 6A (Interior Partition Build)

- Interior partition framing on framing tables
- Application of drywall, shear wall framing or other finishes to one side of partitions

STATIONS 6-7 (Partition Set)

- Interior partitions set
- Installation of appliances and cabinets can continue
- In-wall electrical and plumbing can begin
- Unfished side drywall installation can begin

STATIONS 7A, 8A & 9A (Exterior Wall Build)

- Exterior wall framing on framing jigs in stations 7A and 9A
- Depending on type, insulation may be installed in stations 7A and 9A
- Application of drywall or other finishes to interior surface
- Completed exterior walls temporarily stored in station 8A for transfer to station 8

STATIONS 8-9 (Exterior Wall Set)

- Exterior walls set
- In-wall electrical and plumbing continue
- Unfinished side drywall installation completed

STATIONS 10A-11A (Roof/Ceiling Build)

- Roof or ceiling framed on jig in station 11A, drywall positioned on jig and trusses, ceiling joists, or rafters attached to drywall with adhesives, and miscellaneous framing installed. Sheet vapor barriers may also be installed at this position (if any)

- Roof/ceiling subassembly is moved to station 10A, where it is placed on an elevated jig.
- Spray-on vapor barrier and other ceiling finishes may be installed in station 10A
- Attic/ceiling rough wiring installed in station 10A
- Roof/ceiling subassembly is moved to station 10

STATION 10 (Roof/Ceiling Set)

- Roof/ceiling set

STATIONS 11-17 (Mechanical work)

- Complete rough electrical
- Complete rough plumbing
- Complete HVAC
- Begin installing lighting, other electrical fixtures, and low-voltage fixtures
- Begin installing plumbing fixtures

STATIONS 11-13 (Interior Work and Finishes)

- Install roof insulation
- Complete any remaining drywall and other wall and ceiling finishes
- Install remaining cabinets and other casework
- Install any remaining finish flooring
- Begin installing interior doors
- Tape and mud drywall

STATIONS 11-13 (Exterior Wall Work and Finishes)

- Exterior sheathing applied.
- Depending on type, complete wall insulation
- Install windows
- Install exterior doors
- Install finish siding

STATIONS 14-16 (Roof Sheathing and Finishes)

- Install roof sheathing
- Install sub-roofing
- Install finish roofing
- Complete any-through roof mechanicals
- Complete any fascia and soffit work

STATION 14-17 (Interior Finishes)

- Complete interior drywall finishes
- Apply interior wall and ceiling primer paint
- Install moldings and other trim
- Complete installing lighting, other electrical fixtures, and low-voltage fixtures
- Complete installing plumbing fixtures
- Complete any finish flooring

STATION 18 (Testing, Appliances, Cleaning, Ship Loose)

- Install appliances
- Perform system tests and begin any repairs
- Begin final cleaning
- Begin loading materials that are shipped loose

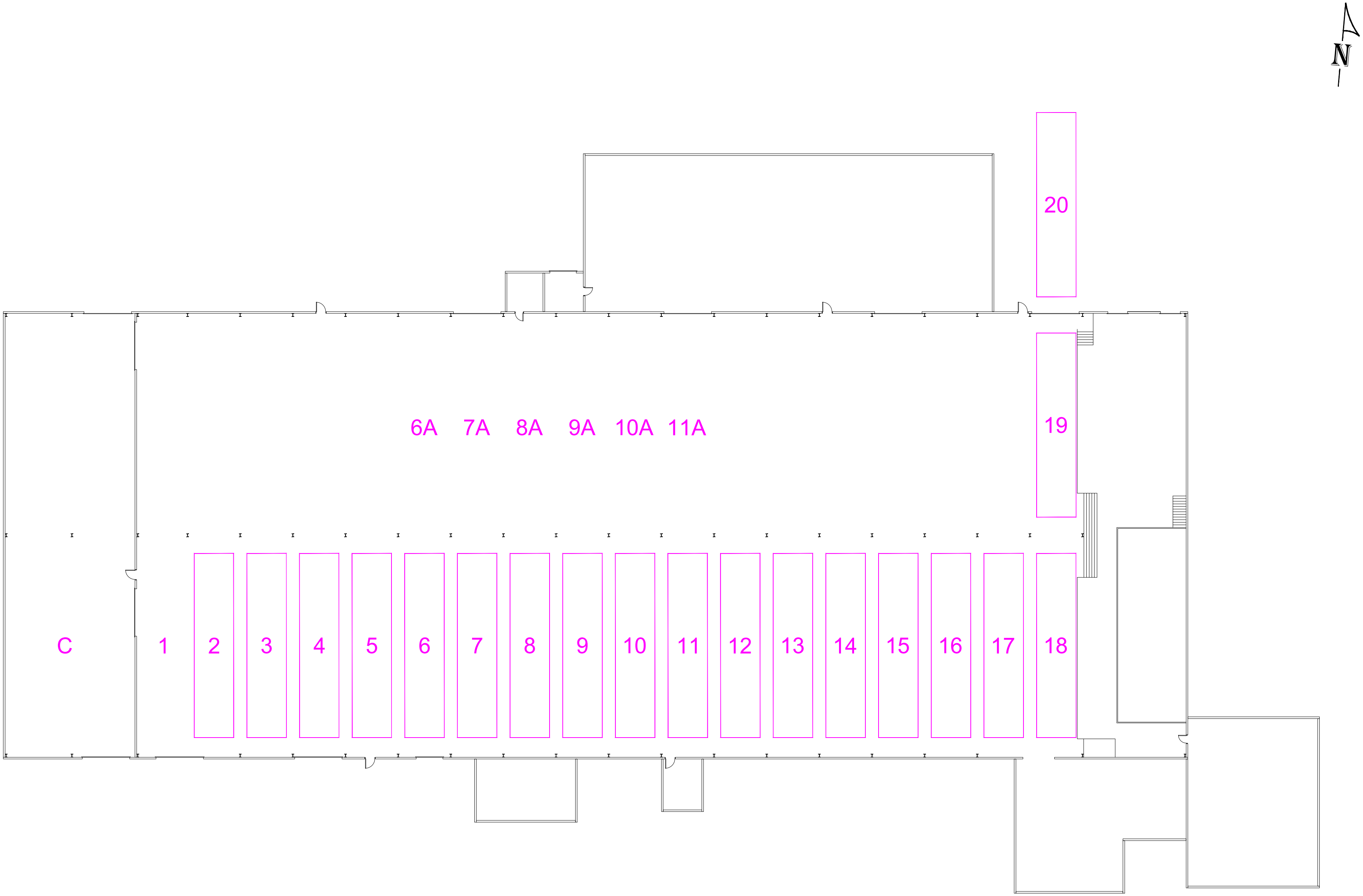
Fair Haven Modular Plant

<u>STATION 19 (Carrier Loading and Transport Preparation)</u>

- Raise module with jacks, back modular transport carrier beneath and complete travel connections
- Install wrap and other transport protections
- Complete any repairs and final inspection
- Complete cleaning
- Complete loading shipped-loose materials
- Load any required documentation

<u>STATION 20 (Yard)</u>

- Shortages completed
- Final inspection citations resolved (if any)



DATE DRAWN: 4/8/25	SCALE: NA	875 S Main St, Fair Haven, VT 05743	CUSTOMER: John Guequierre, I-OSC, LLC	PAGE DESCRIPTION: Stations	JOB NO:
REV. DATE:	DRAWN BY: DCS		PROJECT: Proposed Plant Layout		PAGE NO:

Fair Haven Skyline Feasibility Study

Exhibit L: Subsidy and Grant Programs

Vermont Subsidy and Grant Programs
Links to Relevant Program Pages

Northern Boarders Regional Commission: Up to $1m

Rural Industrial Development Program (RIDP)

Vermont Employment Growth Incentive (VEGI)

Vermont Training Program (VTP)

Brownfields Revitalization Fund (If needed)

International Trade

Fair Haven Skyline Feasibility Study

Exhibit M: Financial Model Assumptions

Fair Haven Modular Housing Factory Financial Model: Assumptions

Item/Category	Base	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Assumptions													
Average SqFt/Module	880	880	880	880	880	880	880	880	880	880	880	880	880
Line moves/day	Learn Curve	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.5	2.5	3	3
Production days/quarter	60	60	60	60	60	60	60	60	60	60	60	60	60
Modules on-line	Learn Curve	15	30	45	60	75	90	105	120	150	150	180	180
Cum modules on-line (max stations)	18	15	18	18	18	18	18	18	18	18	18	18	18
Modules off-line	Learn Curve	0	27	45	60	75	90	105	120	150	150	180	180
Cum modules off-line (avg in yard)	40	0	27	40	40	40	40	40	40	40	40	40	40
Modules shipped	Overflow	0	0	32	60	75	90	105	120	150	150	180	180
Material$/Sq.Ft.	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00	$ 104.00
Markup on Material	183%	183%	183%	183%	183%	183%	183%	183%	183%	183%	183%	183%	183%
Revenue$/SqFt	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32	$ 190.32
Revenue$/Module	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482	$ 167,482
Material scrap %	Learn Curve	10%	10%	9%	9%	8%	8%	7%	6%	5%	5%	5%	5%
SqFt/labor hour	Learn Curve	0.50	0.75	0.75	1.00	1.25	1.50	2.00	2.50	2.75	3.00	3.00	3.00
$/labor hour (avg base wage)	Varies	$ 35.00	$ 27.00	$ 25.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00	$ 24.00
Payroll taxes & benefits % (incl w/c)	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
$/labor hour (payroll taxes & benefits)	Computed	$ 45.50	$ 35.10	$ 32.50	$ 31.20	$ 31.20	$ 31.20	$ 31.20	$ 31.20	$ 31.20	$ 31.20	$ 31.20	$ 31.20
Variable CGS overhead													
Inspection days/qtr	Learn Curve	60	36	24	24	12	12	12	12	12	12	12	12
Inspection fee/day	$775	$775	$775	$775	$775	$775	$775	$775	$775	$775	$775	$775	$775
Waste removal $/modules on-line	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60
Utilities $/modules-on-line	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Design approval $/module-on-line	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00
Repairs & maintenance $/module	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100.00
Fixed CGS overhead													
Production Mgr & Assistant	$ 150,000	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500	$ 37,500
Purchasing Mgr	$ 90,000	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500
QC Mgr	$ 90,000	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 22,500
Engineering management	$ 180,000	$ 22,500	$ 22,500	$ 22,500	$ 22,500	$ 45,000	$ 45,000	$ 45,000	$ 45,000	$ 45,000	$ 45,000	$ 45,000	$ 45,000
Order processors	$ 55,000	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750	$ 13,750
Maintenance and custodial	$ 50,000	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500	$ 12,500
Payroll tax and benefits (see B20)	$ 184,500	$ 39,375	$ 39,375	$ 39,375	$ 39,375	$ 46,125	$ 46,125	$ 46,125	$ 46,125	$ 46,125	$ 46,125	$ 46,125	$ 46,125
ERP/IT	Seats	$ 900	$ 900	$ 1,800	$ 1,800	$ 4,800	$ 4,800	$ 4,800	$ 4,800	$ 4,800	$ 4,800	$ 4,800	$ 4,800
Utilities $/fixed	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000	$ 12,000
Selling, General & Admin													
Sales staff	$ 140,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000
Financial/HR/Admin	$ 500,000	$ 62,500	$ 62,500	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000
Service Mgr	$ 100,000		$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
Payroll tax and benefits (see B20)	$ 222,000	$ 29,250	$ 36,750	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500	$ 55,500
Warranty service per shipped module	Learn Curve			$ 750	$ 750	$ 500	$ 500	$ 500	$ 500	$ 400	$ 400	$ 400	$ 400
Office expense	$ 16,000	$ 1,500	$ 1,500	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000
Banking, legal, audit	$ 6,000	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
Insurance	$ 120,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000
Rent	$ 221,674	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419
Travel	$ 6,000	$ 750	$ 750	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
Working Capital													
Invoiced at on-line (deposit)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%

Fair Haven Modular Housing Factory Financial Model: Assumptions

Item/Category	Base	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Invoiced at off-line	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Invoiced at shipment	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
A/R Days outstanding	15	15	15	15	15	15	15	15	15	15	15	15	15
Material inventory days on hand	20	20	20	20	20	20	20	20	20	20	20	20	20
Average payment terms days	25	25	25	25	25	25	25	25	25	25	25	25	25
WIP value	9.50	6.67	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50

Fair Haven Skyline Feasibility Study

Exhibit N: Financial Model Results

Fair Haven Modular Housing Factory Financial Model: ProForma - Quarterly

Item/Category	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
P&L												
Sales	$ 251,222	$ 2,763,446	$ 6,665,768	$ 10,048,896	$ 12,561,120	$ 15,073,344	$ 17,585,568	$ 20,097,792	$ 25,122,240	$ 25,122,240	$ 30,146,688	$ 30,146,688
Cost of Goods Sold												
Material (including scrap)	$ 151,008	$ 1,661,088	$ 3,970,321	$ 5,985,408	$ 7,413,120	$ 8,895,744	$ 10,282,272	$ 11,641,344	$ 14,414,400	$ 14,414,400	$ 17,297,280	$ 17,297,280
Direct labor	$ 120,120	$ 679,536	$ 1,517,707	$ 1,647,360	$ 1,647,360	$ 1,647,360	$ 1,441,440	$ 1,317,888	$ 1,497,600	$ 1,372,800	$ 1,647,360	$ 1,647,360
Variable overhead	$ 70,275	$ 466,125	$ 754,210	$ 1,137,000	$ 723,750	$ 868,500	$ 1,013,250	$ 1,158,000	$ 1,447,500	$ 1,447,500	$ 1,737,000	$ 1,737,000
Fixed overhead	$ 183,525	$ 183,525	$ 184,425	$ 184,425	$ 216,675	$ 216,675	$ 216,675	$ 216,675	$ 216,675	$ 216,675	$ 216,675	$ 216,675
Total Cost of Goods Sold	$ 524,928	$ 2,990,274	$ 6,426,662	$ 8,954,193	$ 10,000,905	$ 11,628,279	$ 12,953,637	$ 14,333,907	$ 17,576,175	$ 17,451,375	$ 20,898,315	$ 20,898,315
Gross margin	$ (273,706)	$ (226,828)	$ 239,105	$ 1,094,703	$ 2,560,215	$ 3,445,065	$ 4,631,931	$ 5,763,885	$ 7,546,065	$ 7,670,865	$ 9,248,373	$ 9,248,373
Selling, General, and Admin												
Compensation costs	$ 170,625	$ 170,625	$ 170,625	$ 170,625	$ 199,875	$ 199,875	$ 199,875	$ 199,875	$ 199,875	$ 199,875	$ 199,875	$ 199,875
Warranty service	$ -	$ -	$ 24,000	$ 45,000	$ 37,500	$ 45,000	$ 52,500	$ 60,000	$ 60,000	$ 60,000	$ 72,000	$ 72,000
Office expense	$ 1,500	$ 1,500	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000	$ 4,000
Banking, legal, audit	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
Insurance	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000	$ 30,000
Rent	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419	$ 55,419
Travel	$ 750	$ 750	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500	$ 1,500
Total SG&A	$ 259,794	$ 259,794	$ 287,044	$ 308,044	$ 329,794	$ 337,294	$ 344,794	$ 352,294	$ 352,294	$ 352,294	$ 364,294	$ 364,294
EBITDA (Quarterly)	$ (533,499)	$ (486,621)	$ (47,938)	$ 786,660	$ 2,230,422	$ 3,107,772	$ 4,287,138	$ 5,411,592	$ 7,193,772	$ 7,318,572	$ 8,884,080	$ 8,884,080
EBITDA (Cumulative)	$ (533,499)	$ (1,020,120)	$ (1,068,058)	$ (281,399)	$ 1,949,023	$ 5,056,794	$ 9,343,932	$ 14,755,523	$ 21,949,295	$ 29,267,866	$ 38,151,946	$ 47,036,025
Working Capital												
Receivables	$ 62,806	$ 690,862	$ 1,666,442	$ 2,512,224	$ 3,140,280	$ 3,768,336	$ 4,396,392	$ 5,024,448	$ 6,280,560	$ 6,280,560	$ 7,536,672	$ 7,536,672
Materials inventory	$ 457,600	$ 915,200	$ 1,372,800	$ 1,830,400	$ 2,288,000	$ 2,745,600	$ 3,203,200	$ 3,660,800	$ 4,576,000	$ 4,576,000	$ 5,491,200	$ 5,491,200
Worik-in-Process	$ 1,517,347	$ 1,616,007	$ 1,489,981	$ 1,388,547	$ 1,239,336	$ 1,204,558	$ 1,152,392	$ 1,117,614	$ 1,099,435	$ 1,091,531	$ 1,091,531	$ 1,091,531
Finished Goods	$ -	$ 4,592,862	$ 6,273,605	$ 5,846,512	$ 5,218,256	$ 5,071,824	$ 4,852,176	$ 4,705,744	$ 4,629,200	$ 4,595,920	$ 4,595,920	$ 4,595,920
Less Payables	$ (548,596)	$ (703,113)	$ (795,217)	$ (894,152)	$ (979,816)	$ (1,097,266)	$ (1,209,887)	$ (1,327,337)	$ (1,576,510)	$ (1,574,314)	$ (1,828,536)	$ (1,828,536)
	$ 1,489,156	$ 7,111,818	$ 10,007,612	$ 10,683,531	$ 10,906,056	$ 11,693,052	$ 12,394,273	$ 13,181,269	$ 15,008,685	$ 14,969,697	$ 16,886,787	$ 16,886,787