PRE-SUBMITTAL LOAD ASSESSMENT

Reducing heating loads is the single-most important step towards designing a cost-effective zero-carbon building in Somerville.
This calculator provides an easy way to assess and reduce your building's loads.

Instructions:

1 Fill in the blue cells with your project information: All user inputs in blue are required.
2 Review Pre-Submittal Dashboard tab.
3 Compare the Proposed heating load to the heating load of a MA Code Minimum design, and to a Low Load design.
4 For more details, review the 'Detailed Loads' tab. It provides a summary of the assumptions in the MA Code and Low Load options.
5 Consider strategies to cost-effectively reduce the heating load and heating capacity of the Proposed design.

Project Name	Somerbridge Hotel	
Project Address	1 McGrath Highway - Somerville, MA 02143	
Submission date	2021_1105 Revised 09/01/2022	
Filing	For DRA	
Individual responsible of submission	Adam Dash, Esq.	
Firm responsible for submission	Adam Dash & Associates	
Project team		
Owner	Somerbridge Hotel, LLC	
Architect	JAL Hospitality Design, LLC - 10 Cabot Road, Suite 209. Medford, MA 02155	
MEP Consultant	JAL Hospitality Design, LLC - 10 Cabot Road, Suite 209. Medford, MA 02155	
Energy Performance Consultant	TBD	*if applicable*
Envelope Consultant	TBD	*if applicable*
Summary of submission	This submission is for DRA Approval to be heard at the planning board. Thus far, we have completed (2) neighborhood meetings and (2) Urban Design meetings. This submission has been compiled addressing comments from all previous meetings and discussions with City Officials and Neighborhood Residents. As indicated below, all MEP systems will be 100% electric with a highly efficient building envelope allowing us to achieve the LEED Platinum Certifiable level.	*Outline key project goals, progress to date and major takeaways from this submission.*

General Project Inputs			User Comments	Instructions
Number of Stories Above Grade	6			Do not include mechanical penthouse or unconditioned rooftop amenity spaces as a story.
Total Building Gross Floor Area	63,560	GSF		Automatically calculated, based on sum of individual building types input below. Confirm that the value correctly aligns with the total building value
Total Building Net Occupiable Floor Area	54,026	NSF		Automatically calculated, based on sum of individual building types input below.
Total Building Vertical Façade Area	28,740	SF		Automatically calculated, based on sum of individual building types input below.
Roof Area	12,484	SF		Include total roof area as seen from above. Includes mechanical penthouse roofs and spaces throughout the building where ambient air is located outside of the ceiling plane (even if not on top of building)

Primary Building Type			User Comments	Instructions
Primary Building Type	Hotel/motel (>75 rooms)			Select from menu. Primary building type is the use type representing the greatest % of total building floor area. If the specific type of the Proposed building is not listed in the menu, select the type that is most similar. NOTE: If a single development includes multiple separate buildings, project teams are encouraged to use a separate CNBA calculator for each building. Otherwise, the daylight area and code-reference window area calculations will be incorrect. In such cases: the user must provide a separate a summary spreadsheet with total results summary tables and charts similarly formatted to this spreadsheet, including load, construction cost, and emissions summary, combining of all buildings in the development.
Gross Square Feet	63,560	GSF		Input gross square feet associated with the Primary Building Type. Do not include outdoor unconditioned areas or unconditioned garage spaces. If there are more than 3 building use types, input the total value that does not fall under Secondary and Tertiary categories below.
Vertical Façade Area	28,740	SF		Input total exterior façade area associated with the Primary Building Type, including exterior wall and window area, as defined by IECC 2018. Include only façade areas that separate interior conditioned/heated space from the exterior. Exclude other areas, such as: screen walls, parapets, mechanical louvers, and areas that separate non-conditioned space from the exterior. If there are more than 3 building use types, input the total value that does not fall under Secondary and Tertiary categories below.
Window Area (SF)	3,486	SF		Input window area associated with primary building. Calculated by measuring the rough opening of the window assembly. Spandrel area that does not allow light into the interior of the building is excluded. If there are more than 3 building use types, input the total value that does not fall under Secondary and Tertiary categories below.

Secondary Building Type			User Comments	Instructions
Secondary Building Type				Secondary building type is the use type representing the second greatest % of total building floor area.
Gross Square Feet	-	GSF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above.
Vertical Façade Area	-	SF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above.
Window Area (SF)	-	SF		Provide inputs for the Secondary Building Type, similar to the process used for the Primary Building Type, defined above

Tertiary Building Type			User Comments	Instructions
Tertiary Building Type				Tertiary building type is the use type representing the third greatest % of total building floor area.
Gross Square Feet	-	GSF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above.
Vertical Façade Area	-	SF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above.
Window Area (SF)	-	SF		Provide inputs for the Tertiary Building Type, similar to the process used for the Primary Building Type, defined above

Envelope Parameters			User Comments	Instructions
Window Assembly U-value	0.25	Btu/h-F-sf		U-value times Area (UxA) weighted average for all windows. [(U-value window type 1) x (Area window type 1) + (U-value window type 2) x (Area window type 2) ….] / [Total window area]
Wall Assembly U-value	0.051	Btu/h-F-sf		UxA weighted average for all walls. [(U-value wall type 1) x (Area wall type 1) + (U-value wall type 2) x (Area wall type 2) ….] / [Total wall area]. For assembly U-values see ASHRAE 90.1-2016 Normative Appendix A
Roof Assembly U-value	0.029	Btu/h-F-sf		UxA weighted average for all roofs. [(U-value roof type 1) x (Area roof type 1) + (U-value roof type 2) x (Area roof type 2) ….] / [Total roof area] For assembly U-values see ASHRAE 90.1-2016 Normative Appendix A
Infiltration - Maximum at Blower Door Test	0.25	cfm/sf at 75pa		IECC 2018 requires 0.25 cfm/sf @ 75 Pa

HVAC Parameters			User Comments	Instructions
Minimum Outdoor Airflow + Make-Up Rate	9,300	CFM		Input the minimum outdoor airflow rate required by ASHRAE 62.1 and/or ASHRAE 170 (licensed healthcare facilities), or minimum make-up airflow required. Make-up airflow is applicable to spaces with required minimum air-change rates (such as laboratories) or make-up is required due to a dedicated exhaust system (such as fume hoods, kitchen exhaust, etc.).
Proposed Outdoor Airflow + Make-Up Rate	8,300	CFM		Input the as-designed outdoor airflow quantity.
IF LAB OR HEATHCARE Class 3 and 4 Exhaust (CFM)	-	CFM		Class 3 and 4 Exhaust is defined as exhaust meeting the definition of Class 3 and 4 air in ASHRAE/ASHE Standard 62.1-2019, including laboratory fume hood exhaust, laboratory general exhaust when combined with laboratory fume hood exhaust, exhaust where energy recovery is not allowed by ASHRAE/ASHE Standard 170 for use in energy recovery systems with leakage potential, and systems exhausting toxic, flammable, paint or corrosive fumes or dust. The Class 3 and 4 Exhaust system must be capable of reducing exhaust and makeup airflow rates to 50% of the zone design values or the minimum required to maintain pressurization relationship requirements. Excludes Exempt Exhaust. Excludes Class 2 Exhaust. Exludes Class 1 Exhaust: for example, exludes office exhaust, even when the Proposed design has a combined office and laboratory exhaust system.
IF EXEMPT SPECIALTY EXHAUST OR COMMERCIAL KITCHENS INCLUDED Exempt Exhaust (CFM)	2,000	CFM		Exempt Exhaust is defined as exhaust where energy recovery systems are prohibited by 780 CMR or the International Mechanical Code. This includes exhaust from commercial kitchen hoods used for collecting and removing grease vapors and smoke. It also includes radioactive isotope exhaust. If exhaust heat recovery is included in the proposed design, the exhaust should not be classified as Exempt.
IF MECHANICALLY HUMIDIFIED Humidification Load	-	MBH		If the building, or a portion of the building is humidified, input the humidification load here. This value is carried consistently across all options.
IF APPLICABLE Process Heating Load	-	MBH		If the building heating plant supplies heating energy for process loads, input the total of all process loads supplied by the building heating system, such as: pool heating, sterilization, domestic hot water. Do NOT include process loads supplied by systems other than the building heating plant. This value is carried consistently across all options.
Ventilation Heating Sensible Recovery Effectiveness	90%	%		Sensible Energy Recovery Effectiveness is defined as the change in the dry-bulb temperature of the outdoor air supply achieved by the heat recovery device, divided by the difference between the outdoor air and entering exhaust air dry-bulb temperatures, at 0˚F winter design condition, expressed as a percentage. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
Ventilation Cooling Total Enthalpy Recovery Effectiveness	80%	%		Enthalpy Energy Recovery Effectiveness is defined as the change in the enthalpy of the outdoor air supply achieved by the heat recovery device, divided by the difference between the outdoor air and entering exhaust air enthalpy, at summer design condition, expressed as a percentage. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
Class 3 and 4 Exhaust Sensible Recovery Effectiveness	0%	%		Sensible Energy Recovery Effectiveness is defined above. For buildings with multiple types of exhaust heat recovery, this value shall be the cfm-weighted average value.
Electric Space Heating Plant Capacity (at 35°F ambient)	6,204	MBH		Input the proposed capacity (useful heating output at 35˚F ambient condition) of the building's electric space heating system (heat pump for labs and healthcare; heat pump or electric resistance for all other building types). EXCLUDE the capacity of redundant equipment that is intended to operate only when heating equipment fails (commonly referred to as an N+1 configuration). Also EXCLUDE the capacity of redundant equipment that is intended to operate when ventilation heat recovery devices fail. This can be generated from preliminary calculations used to size the heating plant in the conceptual stages of design. EXCLUDE humidification and process heating loads (these are accounted for separately below).
Non-Electric Space Heating Plant Capacity	-	MBH		Input the proposed capacity (useful heating output at design conditions) of the building's non-electric space heating system (e.g. fossil-fuel or district steam). EXCLUDE the capacity of redundant equipment that is intended to operate only when heating equipment fails (commonly referred to as an N+1 configuration). Also EXCLUDE the capacity of redundant equipment that is intended to operate when ventilation heat recovery devices fail. This can be generated from preliminary calculations used to size the heating plant in the conceptual stages of design. EXCLUDE humidification and process heating loads (these are accounted for separately below).
Total (Non-Redundant) Space Heating Plant Capacity	6,204	MBH		If the electric + non-electric heating system does not include redundancy, add rows 79 and 80. EXCLUDE the capacity of redundant equipment that is intended to operate only when other equipment fails (commonly referred to as an N+1 configuration). If there is redundancy between electric + non-electric heating systems, EXCLUDE redundant capacity. For example, if the non-electric heating plant is designed to handle the entire heating load, and the electric heating plant is redundant, then only enter the non-electric heating plant capacity. This can be generated from preliminary calculations used to size the heating plant in the conceptual stages of design.
Will the building's heating system be 100% electric?	Yes			This aligns with the City of Somerville's goals for carbon neutral ready buildings
Will the building's DHW be 100% electric?	Yes			This aligns with the City of Somerville's goals for carbon neutral ready buildings
Cooling Plant Capacity	250	Tons		Input the proposed cooling system capacity. This may include capacity for all uses such as: space cooling, dehumidification, process cooling loads, etc

Envelope Outputs			User Comments	Instructions
Window-to-wall ratio	12%			Automatically calculated value. Review and confirm this aligns with the design intent. If inputs above are correct, this is the value following IECC 2018 protocol. Note: this is a simplified calculation and does not account for some envelope components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Design	0.061	Btu/h-F-sf		Automatically calculated value. Review and confirm this aligns with the design intent. If inputs above are correct, this is the value following IECC 2018 protocol. Note: this is a simplified calculation and does not account for some envelope components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Maximum per Code	0.081	Btu/h-F-sf		Automatically calculated value. If inputs above are correct, this is the approximate maximum allowable value following IECC 2018 protocol. Note: this is a simplified calculation and does not account for some envelope components, such as foundations and exposed floor areas.
Average Envelope U-value (UxA / A) - Aligns with Code?	Yes	Btu/h-F-sf		If "NO" is shown in red, the envelope likely does not comply with MA Energy Code (780 CMR revised 9th edition / IECC 2018, mandatory as of January 2021) and should be revised. Note: this is a simplified calculation and does not account for some envelope components, such as foundations and exposed floor areas. Therefore, it is not proof or equivalence of the envelope backstop code compliance.

Heating Capacity			User Comments	Instructions
Low Load Building - Heating Plant Capacity	10.0	Btu/h-sf		Automatically calculated value. Indicates a Low-Load target value, intended to optimize cost-effective electrification and procurement of renewable energy to achieve Zero Net Carbon (ZNC).
Proposed Building - Heating Plant Capacity	97.6	Btu/h-sf		Automatically calculated value. Indicates the Proposed Design value, per the inputs above. Design teams should pursue low-load, cost-effective solutions to meet the City of Somerville's Climate Action goals.
MA Code Minimum Building - Heating Plant Capacity	15.1	Btu/h-sf		Automatically calculated value. Indicates the value for a building that meets the MA Code Minimum envelope and exhaust heat recovery performance.