



50 ROGERS ST | PLANNING BOARD SPECIAL PERMIT # 243

DESIGN REVIEW NON-GRAPHIC MATERIAL | 03.13.2018

PROJECT ADDRESS

50 Rogers Street
Cambridge, MA

OWNER
ARE- MA Region No.21, LLC + ARE- MA Region No.32, LLC c/o
Alexandria Real Estate Equities, Inc.
400 Technology Square, Suite 101
Cambridge, MA 02139

PROJECT DESCRIPTION FOR DESIGN REVIEW PER PUD / SPECIAL PERMIT #243

50 ROGERS STREET

ALEXANDRIA CENTER AT KENDALL SQUARE

Alexandria Real Estate Equities, Inc.

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Structural Engineering L.A. Fuess Partners		
Mechanical, Electrical, Plumbing and Fire Protection Consulting Engineering Services		
Geotechnical Engineers Haley & Aldrich, Inc.		
Code Consultant Howe Engineers, Inc.		
LEED Consultant New Ecology		
Acoustical Consultant Acentech		
Legal Adams & Rafferty Wilmer Hale		

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ALEXANDRIA

February 12, 2018

Mr. H. Theodore Cohen, Chair
Cambridge Planning Board
341 Broadway
Cambridge, MA 02139

**Re: 50 Rogers Street Design Review--PUD Special Permit and
Project Review Special Permit, Planning Board Case No. 243**

Dear Mr. Cohen:

Pursuant to PUD Special Permit and Project Review Special Permit, Planning Board Case No. 243 ("Special Permit"), Alexandria Real Estate Equities, Inc. (ARE) is pleased to submit the enclosed material for Design Review of 50 Rogers Street, a residential building of approximately 136 units and 132,000 square feet.

The Alexandria Center at Kendall Square includes more than 220,000 square feet dedicated to residential use, including affordable housing. The first residential building in the project was 270 Third Street, which includes 91 units and 87,799 square feet of residential use. 50 Rogers Street will contain approximately 136 units and 132,231 square feet of residential use, and will complete the residential component of the project.

50 Rogers Street is a six-story structure in a U-shaped configuration with a courtyard. There are 6 residential units on the ground floor and 26 residential units on floors 2-6. A new two-level subsurface garage is planned for parking bicycles and vehicles. The 50 Rogers Street project includes some new elements (including the on-site parking garage) and we are concurrently seeking Planning Board approval of these changes.

We are excited about the architectural design of the building and proud of its sustainable elements. In this connection, we have met with East Cambridge Planning Team and Community Development staff and are grateful for their input. We look forward to presenting our design to the Planning Board.

Thank you for your time and effort in this matter.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Joseph Maguire".

Joseph Maguire
Senior Vice President--Real Estate Development & Asset Services
Alexandria Real Estate Equities, Inc.

Alexandria Real Estate Equities, Inc.
400 Technology Square, Suite 101 | Cambridge, MA 02139 617.661.6962 |
www.are.com

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Project Description

Located at 50 Rogers Street, this project will be the second residential building of Alexandria's Binney Street approved PUD Special Permit project. Developed by Alexandria Real Estate Equities, Inc., the project will occupy the lot between 161 First Street and 65 Binney Street and is bound between Rogers Street and Binney Street. The property line of existing 50 Rogers Street is to be relocated such that it is 20'-0" from the main portion of the four-story structure of 161 First Street (see the figures on pages 5 and 6 of the graphic materials). The existing rear portion of the 161 First Street building is to be demolished. Cambridge Zoning District PUD-4C governs development of the block, which is subject to the requirements of Cambridge Zoning Ordinance Article 13.5, Project Review Article 19, Eastern Cambridge Design Guidelines, and the PUD and Project Review Special Permit #243, as amended. Concurrently with Design Review for the 50 Rogers Street project, Alexandria also is seeking: (i) an amendment to the PUD and Project Review Special Permits; and (ii) a special permit to waive the five foot driveway setback of Section 6.44.1(b) of the Zoning Ordinance. We refer you to the concurrently filed application for the amendment and the special permit for additional information. Subject to obtaining this requested relief, the project is designed in all respects to meet the above referenced requirements.

50 Rogers Street is a six-story structure in a U-shaped configuration, with the ground floor dedicated to the entrance lobby, residential amenity spaces and mechanical/ electrical and rubbish removal support spaces to serve the building. The two basement levels will house vehicular parking and bicycle storage along with additional building support spaces. Floors 2 through 6 contain the residential units, with 26 apartments on each floor. There are 6 residential units on the ground floor.

This project will complete the 220,000 square feet of housing required in the Binney Street PUD, Special Permit #243.

Zoning

As part of the property subdivision between 50 Rogers Street and 161 First Street, the appropriate zoning ordinances applicable to the two properties have been reviewed for compliance. The two properties are located in the PUD-4C District and must comply with Article 13.000: Planned Unity Development Districts - see also APPENDIX I.

- Section 13.52 - Uses Allowed in PUD-4:
The proposed and existing uses are allowed in the district.
- Section 13.53 District Dimensional Regulations:
 - 13.53.1 - Max. FAR 3.0 - *Development complies*
 - 13.53.2 - Min. Development Parcel - *Development complies*
- Section 13.53.3 - Dwelling Unit Density, min. land area per dwelling unit permitted is 300:
Development complies

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- Section 13.53.4 - Other Dimensions:
The article clearly states that there shall be no minimum widths for lots within the Development Parcel. There shall be no minimum required front, rear, and side yard requirements. Sub-numbers 1 and 2 are not applicable to this site. Yet though there are no required setbacks, the Planning Board does reserve the right to approved the actual setbacks as part of its site plan review (last sentence of first paragraph 13.53.4).
- Section 13.54 - Maximum height: *Development complies*

In addition to the zoning requirements as part of the new subdivision and property line placement, the building will comply with the requirements set forth by Table 705.8 of the 2009 International Building Code (IBC) which describes the maximum area of exterior wall openings based on fire separation distance and degree of opening protection. The new property line between 161 First Street and 50 Rogers Street is located 20'-0" from and parallel to the west elevation of the main structure of 161 First Street, and the east face of 50 Rogers Street is 6'-0" from the property line. The new building will have unprotected openings but will be sprinklered, so that the maximum area of openings in the east facade of 50 Rogers Street is 25% of the total wall area.

Development complies

Urban Space

The location of the new building on the site results in a 15 foot wide buffer zone between 50 Rogers Street and 65 Binney Street (Church of Latter Day Saints) which is designed as a visual connection across the block. This area will contain some outdoor living space associated with three ground floor dwelling units facing this side yard. This is also an ideal place for visitor bicycle storage racks at the north end near Rogers Street. Heavily landscaped zones will discourage pedestrian foot traffic from traversing this area.

Streetscape and Massing

The main entrance to the building on Rogers Street is located just opposite the entrance to the Axiom apartment building at 33 Rogers Street. This entrance, along with the narrow scale of the street, the parallel parking spaces, new street trees, and the landscaped planting beds in front of the buildings, reinforces the residential scale of this block of Rogers Street and provides an improved pedestrian experience between Charles Park along the river and the new Rogers Street Park a block to the west.

The building's form and expression take their cues from the turn-of-the-century industrial buildings of the Kendall Square area--substantial masonry buildings with regular punched windows. The response for 50 Rogers Street is a building of simple rectilinear massing, primarily brick exterior, and well-proportioned repetitive window placement.

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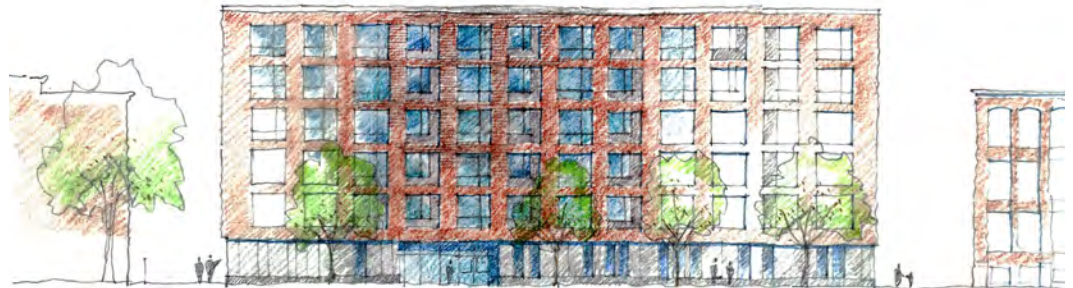
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Neighborhood context

The outside of the building's U-shaped massing is clad in brick with a simple grid of 8 foot square openings on the Rogers and Binney Street facades. The openings are regular but the windows within them vary in width, reflecting the variety of living spaces behind them. An accent panel of fibre cement fills the openings adjacent to the smaller windows.



Concept sketch

The large square openings are lined with a metal frame that extends out slightly proud of the face of brick, which visually sets the window plane further back into the wall and also casts a glancing shadow on the face of the brick, lending a contemporary execution to this typical punched window detail.

The brick-clad main portion of the building (upper residential floors) sits on top of a slightly undercut base. This is also consistent with the neighboring buildings along Binney Street to the west and extends the "different ground floor" expression across these two blocks. The ground floor wall material will be pre-cast concrete panels with a heavy vertical texture, accented with vertical trellises to support climbing plant growth from the landscaped planting beds between the sidewalk and the building face. This will soften how the building meets the ground and enhance the pedestrian experience while walking along the building.



Main volume of buildings above a ground floor base

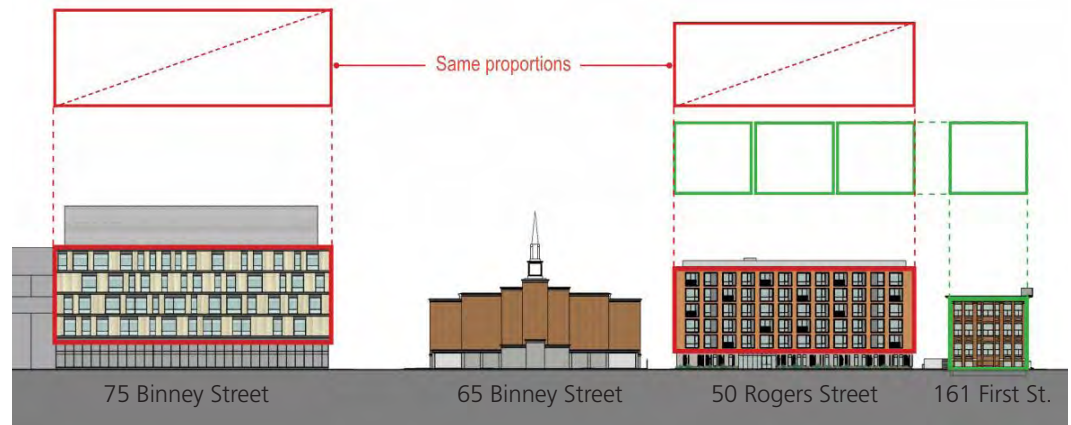
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The proportions of the proposed new building were studied in relation to its neighboring buildings, revealing an almost identical height and breadth of the upper floors as at 75 Binney Street in the next block. There is also a sympathetic proportional relationship to 161 First Street next door in that the upper floors constitute three blocks of the corresponding end of 161 First Street. These relationships work together to create a harmonious and integrated scale and proportion to the buildings in this area.



The inner courtyard of the building encloses a private garden which serves as an outdoor extension of the main gathering space for the residential community. Some of the ground floor units also open up to this courtyard. The same precast concrete base of the building lines the courtyard at the ground floor, while the upper floors are treated differently, as a liner that wraps the inner walls of the courtyard. These upper walls are clad in a lighter color that helps reflect natural light into the courtyard and serves as a counterpoint to the darker brick facades. The windows are organized horizontally in random groupings to animate the courtyard walls.

Building Height

Consistent with applicable zoning requirement, the building height will not exceed the 65'-0" limit above mean grade, exclusive of mechanical penthouse enclosures and screen walls to hide rooftop equipment (approximately 8 feet tall). The screen wall enclosures are designed to be a volumetric extension of the "U" shaped building and to both visually and acoustically screen exhaust fans, condensing units and the emergency generator.

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Sustainability

Energy efficiency will be integrated into all aspects of the design including a high-performance building envelope, efficient mechanical systems with heat recovery ventilation, and day lighting strategies. Cambridge is a Stretch Code Community and the project will be compliant with Appendix AA: Stretch Energy Code as referenced by the 9th edition of the Massachusetts State Building Code (780 CMR). Stretch Energy Code requires a reduction in energy consumption at the site by 10% as compared to a baseline building defined by ASHRAE 90.1-2013. The project will incorporate water conservation strategies, and extensive storm water management provisions. This project design is integrated into the site design of the Binney Street development "campus," which is pursuing LEED credits under Sustainable Sites and Regional Priority alternative transportation access plan, including additional mass transit, and ample bicycle storage (1 per unit) to encourage bicycle usage for the residents and commercial users. The project will comply with the requirements of Article 22 and will be LEED BD+C Multifamily Midrise Gold certified - See APPENDIX A.

Acoustics

The project will be compliant with the Noise Ordinance of the City of Cambridge. The project will also be compliant with the PUD Special Permit, Cambridge Zoning Ordinance 13.59.1 Rooftop Mechanical Equipment Noise Mitigation, which requires at a minimum, that any noise or vibration shall not be normally perceptible at ground level without instruments at a distance of one hundred (100) feet from the source lot line. The special permit also requires noise control review by an acoustic engineer during design and a post completion noise survey. A letter from the acoustical engineer is included at the end of this project description document.

Landscape

Canopy trees and benches provide shaded places to sit. Rogers and Binney Streets will feature street trees of a native deciduous species to create a contrasting character. The lighting will be at the pedestrian scale and will be designated to enhance the activity in the public spaces around the building, while minimizing light spilling to the night sky or beyond the property line.

Transportation

The residential building at 50 Rogers Street will be located within proximity to excellent regional transit and bicycle access in Cambridge, including the MBTA Green line, the MBTA Red line, and on-street bicycle lanes. Long term bicycle parking will be provided for the residents on the ground floor and in the basement of the building and will be covered and secure, containing a total of 142 spaces. Additional bicycle parking will be located outside on the site to accommodate 14 spaces for short term bicycle parking. Vehicular parking for the residential building at a ratio of 0.75 space per residential unit will be located in the Basement and Sub-Basement.

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Water Services

Per the City's regulations, the project will incorporate a domestic water service and a fire protection service. The services will enter the first level from Rogers Street. As part of the Binney Street Infrastructure Improvement Project previously completed by ARE, the existing water main in Rogers Street (from Third Street to First Street) was upgraded with a new 12" water main. All work will be installed per the Cambridge Water Department standards.

Stormwater

The stormwater management approach incorporates features into the building and site design to keep stormwater on-site, improve water quality and comply with existing regulations. Key features will include on-site detention, best practices for water quality management and reduction of total phosphorus. This site will be serviced by infiltration facilities and be constructed on the adjacent 161 First Street site. Stormwater from the 50 Rogers Street site had been previously discharged to the combined sewer in Binney Street. The proposed project will redirect excess stormwater to the new Binney Street stormwater trunk line drain constructed by Alexandria.

Sanitary Sewer Services

As part of the overall development, Alexandria has removed approximately 611,800 gallons of stormwater from the sanitary and combined systems. By doing so, the 4:1 inflow removal ratio required by MASS DEP will be achieved. Stormwater flows from the property will be completely separate from the sanitary sewer flows. As an additional measure to help mitigate project sanitary flows, a sanitary sewer storage tank will be provided to retain and attenuate sanitary flows and allow reduced constant discharges of sanitary flows during flooding events. Alexandria and Cambridge DPW have jointly developed this approach.

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Areas & Unit Counts									
Level	Gross area (gsf)	Non-housing area (gsf)	Unit accommodation				Unit totals	Parking	
			2 BR/2 ba 1,100 sf	1+BR/1 ba 810 sf	1 BR/1 ba 675 sf	Studio/1 ba 528 sf		Car	Bicycle
Sub-basement	29,875	29,875						62	
Basement	29,875	29,875						40	130
Ground Floor	23,615	7,814	3	0	3	0	6		12
Floor 2	24,379	1,093	6	2	10	8	26		
Floor 3	24,379	1,093	6	2	10	8	26		
Floor 4	24,379	1,093	6	2	10	8	26		
Floor 5	24,379	1,093	6	2	10	8	26		
Floor 6	24,379	1,093	6	2	10	8	26		
Penthouse	0	0							
Total	205,260	73,029	33	10	53	40	136	102	142
Housing area (gsf) =	132,231		24%	7%	39%	29%	100%		
Minimum to build=	132,201								
Difference	30								
Car Parking									
Total spaces	102	Required for commercial	0	Left for residential	102	Ratio (car : unit)	0.75		
Bicycle Parking									
Long term		1.00 x 20 = 20							
		1.05 x 116 = 122							
		142 spaces							
									5% (8 spaces) need to accommodate tandems or trailers (3' x 10')
Short term		0.10 x 136 = 14 spaces							

UNIT MATRIX

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DIMENSIONAL FORM

Project Address: 50 Rogers Street

Application Date: ###/###/2018

	Existing	Allowed or Required (max/min)	Proposed	Permitted
Lot Area (sq ft)	NA (a)	NA	NA	
Lot Width (ft)		none		
Total Gross Floor Area (sq ft)				
Residential Base	87,799 SF	220,000 (a)	132,231SF	
Non-Residential Base	NA	1,533,200 (b)	NA	
Inclusionary Housing Bonus		NA (a)		
Total Floor Area Ratio				
Residential Base	NA	NA	NA	
Non-Residential Base	3.0	3.0 max (b)	3.0	
Inclusionary Housing Bonus		NA		
Total Dwelling Units				
Base Units	91	NA (a)	136	
Inclusionary Bonus Units		NA (a)		
Base Lot Area / Unit (sq ft)				
Total Lot Area / Unit (sq ft)				
Building Height(s) (ft)	NA	65 feet (c)	65 feet (c)	
Front Yard Setback (ft)		0'	NA	
Side Yard Setback (ft)		0'	NA	
Side Yard Setback (ft)		0'	NA	
Rear Yard Setback (ft)		0'	NA	
Open Space (% of Lot Area)				
Private Open Space	0	(e)	compliant (e)	
Permeable Open Space				
Other Open Space (Specify)				
Off-Street Parking Spaces	69 spaces	.75 / res. unit	102 spaces	
Long-Term Bicycle Parking		1X20 / 1.05X116	142	
Short-Term Bicycle Parking		0.10 X 136	14	
Loading Bays		NA	0	

Use space below and/or attached pages for additional notes:

- (a) CZO 13.59.4 : Required Housing - 87,799 GFA developed at 270 Third Street, and 132,511 GFA being developed at 50 Rogers Street of the 220,000 GSF required of which 47,000 GFA should be Middle Income and 33,000 GFA should be Low Income
- (b) CZO 13.53.1 (4): 3.0 FAR total PUD allowed
- (c) CZO 13.54 (4) (a) (i): 65 feet for a building devoted to residential
- (d) CZO 13.53.2: Development Parcel
- (e) CZO 13.59.9: Proposal in compliance with Development Parcel open space guidelines

APPENDIX A



15 Court Square, Suite 420
Boston, MA 02108

Article 22 Permit Issue Compliance

50 Rogers Street

Cambridge, MA

Submitted To:

DiMella Shaffer Architects
281 Summer Street
Boston, MA 02210

APPENDIX A

I. Project Description

The 50 Rogers Street project complies with the Special Permit application requirements as defined in Article 22: Sustainable Design and Development ordinance in the City of Cambridge. The project will be designed under the guidelines of U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) for Building Design and Construction (BD+C): Multifamily Midrise (MR) Version 4 (V4). The building will meet or exceed the minimum required rating of Gold for a building located in the Kendall Square Commercial District.

As described further in the document, Alexandria Real Estate Equities, Inc. (Alexandria) has committed to creating efficient and healthy living environment for its tenants as well as a welcoming design for the neighborhood while assuring that the building operates efficiently. The team is working collaboratively through the design process and will continue oversight of the building's construction.

The team responsible for delivering the design of the project is:

- DiMella Shaffer Architects – Architect of Record
- Consulting Engineering Services – MEP/FP Engineer
- L.A. Fuess Partners – Structural Engineer
- Kleinfelder Inc. – Civil Engineer
- Bristol Engineering – Permitting
- Bohler Engineering – Landscape Architect
- New Ecology, Inc. – Sustainability Consultant

APPENDIX A

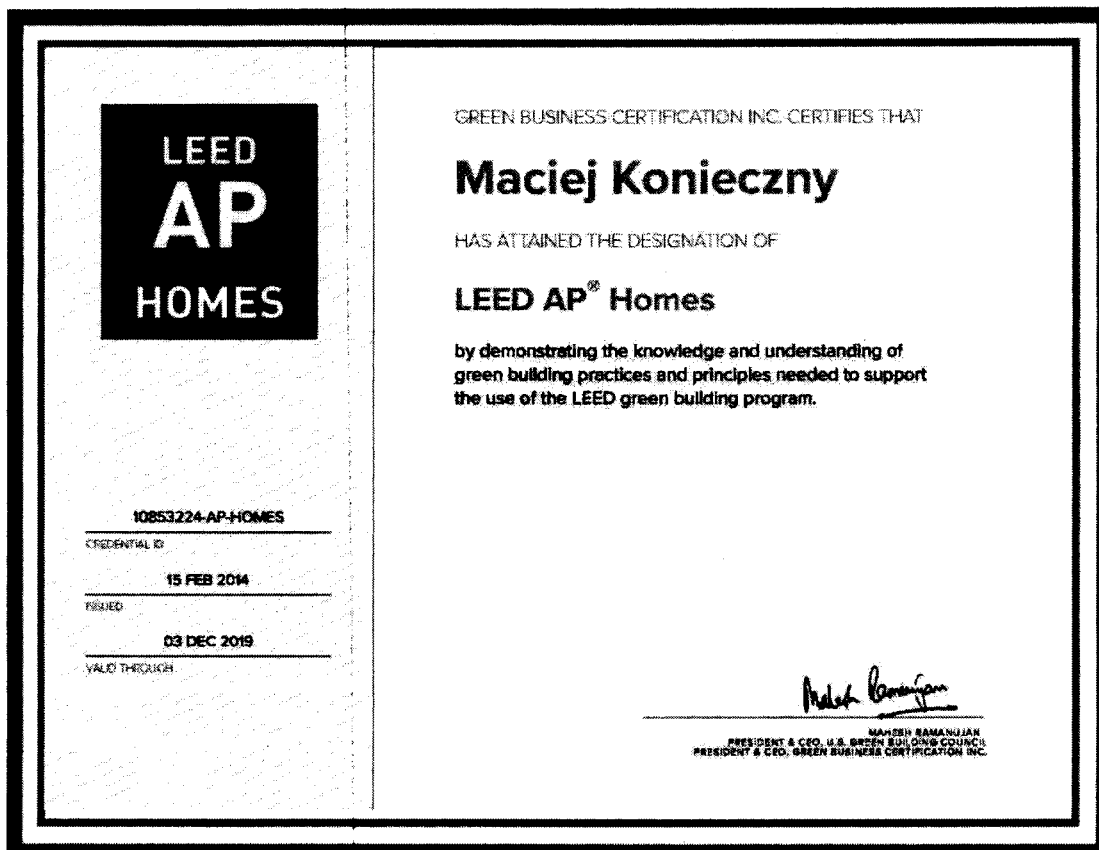
II. Affidavit

As the LEED Project Administrator, I have reviewed the project documents and consulted with the Owner and Design and Construction team to address LEED related items and will compile LEED documentation that meets the review requirements stated in the LEED Reference Guide. Furthermore, I will oversee the submission of the documentation to the USGBC through the LEED Provider and the ultimate certification of the project. The project will meet the LEED Gold rating level. The Special Permit application is submitted with a Preliminary rating of Gold with 64.5 points and 21.5 maybe points, where a Gold rating is achieved with 60+ points.

Sincerely,

Maciej Konieczny *2/1/2018*

Maciej Konieczny, LEED AP BD+C, H, CEM
Senior Project Manager
New Ecology, Inc.
Registered Since Dec 2013.



APPENDIX A

III. LEED BD+C: H MR V4 Scorecard

New Ecology reviewed the project scope and understands the credit summary presented in Table 1: Summary Scorecard to be reasonable and achievable. The property will be certified as LEED Gold. Attached in Appendix A, please find the official preliminary checklist and attached in Appendix B, please find the energy model inputs and assumptions.

Table 1: Summary Scorecard

Category	Yes Points	Maybe Points
Integrative Process	1	1
Location and Transportation	15	0
Sustainable Sites	4	1
Water Efficiency	6	2
Energy and Atmosphere	21.5	8
Materials and Resources	3.5	1.5
Indoor Environmental Quality	10.5	5
Innovation	1	3
Regional Priority	2	0
<i>Total Points</i>	<i>64.5</i>	<i>21.5</i>

IV. Narrative for LEED Credits

The 50 Rogers Street Project fulfills all requirements for all prerequisites in every category and will follow the described path below to meet the prerequisites and credits.

A. Integrative Process

IP Integrative Process	1 yes point; 1 maybe point
Option 1: Integrative Project Team (maybe) 50 Rogers Street Project has assembled a comprehensive design team that includes skills required to comply with this Credit including Architect, MEP, building science and performance testing, green building, civil, and landscape architecture specialists. Project has already completed integrative design meetings including Conceptual design, LEED planning (4-hour charrette) and is committed to continue close coordination between professions.	
Option 3: Trades Training (yes) 50 Rogers Street Project has committed to complete at least 8 hours of trades training during the construction phase. The training will include a kick off meeting with trades where project specific details will be reviewed and will be followed with multiple shorter meetings throughout the construction as relevant details are constructed.	

B. Location and Transportation

LT Floodplain Avoidance	Required
50 Rogers Street Project is not located within FEMA 100-year floodplain (per FEMA map: 25017C0577E).	

APPENDIX A

LT Site Selection	8 yes points
Option 1: Path 1: Previously Developed. 50 Rogers Street Project will be sited where at least 75% of the total buildable land is previously developed. The current use is parking lots and 1, 2, and 3 story building with a total building footprint of 5,340 square feet. Landscaping and non-paved areas are less than 5% of the site.	
Option 2: Infill Development. 50 Rogers Street Project site will be completely located within ½ mile from previously developed land. The site is located in a densely populated area of East Cambridge.	
Option 3: Open Space. 50 Rogers Street Project is located within less than ½ mile of three publicly accessible open spaces that together significantly exceed the ¾ Acre minimum. The three locations are: <ul style="list-style-type: none"> • Anthony Costa Playground – 0.58 Ac • Hurley Park – 0.31 Ac • John A Ahern Field and Playground – 2.60 Ac 	
Option 5: Bicycle Network and Storage. 50 Rogers Street Project will comply with City of Cambridge bicycle storage requirements and will far exceed the LEED requirement. The project will provide 14 short term spaces (LEED requires 4) and 142 bike parking spaces for tenants (LEED requires 42).	
LT Compact Development	3 yes points
50 Rogers Street Project will achieve a density of 120 units per acre (136 units/1.13Ac), significantly exceeding the 80 unit per acre credit requirement.	
LT Community Resources	2 yes points
50 Rogers Street Project is located in the Kendal Square area of Cambridge that provides significant community resources. The project will easily meet the credit requirement of 12 uses and may qualify for exceptional performance credit. These include minimum of: <ul style="list-style-type: none"> • Bakery: Tattle Bakery and Café • Restaurants: Helmund, Fuji at Kendall • Clothing department store: Macy's, H&M • Banks: Eastern Bank, Citizens Bank • Health clubs: Cambridge Athletic Club, Kendall Square Crossfit • Laundry: Cleavergreen Cleaners, Court Cleaners • Child care facilities: Pine Village Preschool, Whitehead Institute at Bright Horizons • Government office: Cambridge City Police, Middlesex Probate and Family Court • Schools: Kennedy Longfellow School 	
LT Access to Transit	2 yes points
50 Rogers Street Project is located within ½ mile of rapid transit (MBTA Red Line Kendall Square stop and MBTA Green Line Lechmere Stop) and the ride frequency requirement of this credit will be easily met.	

C. Sustainable Sites

SS Construction Activity Pollution Prevention	Required
50 Rogers Street Project construction documents will include a Soil Erosion Sedimentation Control Plan to be developed in accordance with the EPA Construction General Permit of the NPDES. A Stormwater Pollution Prevention Plan (SWPPP) will also be developed for the site in accordance with the requirements for the US EPA's National Pollutant Discharge Elimination System Construction General Permit. These documents will be used to document compliance with this prerequisite.	
SS No Invasive Plants	Required

APPENDIX A

50 Rogers Street Project is committed to meeting this prerequisite and complying with US Department of Agriculture’s GRIN Taxonomy for Plants database, the National Association of Exotic Pest Plant Council, or the UMass Extension school list. The project team includes a Massachusetts licensed landscape architect that will adhere to these guidelines during design.	
SS Rainwater Management	2 yes points, 1 maybe point
50 Rogers Street Project is committed to complying with the National Pollutant Discharge Elimination System Guidelines. Project will manage on site at least 95 th percentile rainfall event as defined by the US EPA’s Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects, under Section 438 of the Energy Independence and Security Act. Depending on final design, the project may achieve an additional point if it will be able to manage 98 th percentile rain event.	
SS Nontoxic Pest Control	2 yes points
50 Rogers Street Project is committed to complying with this credit by incorporating the following strategies: <ul style="list-style-type: none"> • Use solid concrete foundation walls • Seal all external cracks, joints, penetrations and entry points • Design discharge points for rain gutters, A/C condensate lines, • Design Landscape features to provide a minimum 18” space between exterior wall and any plantings • Develop an integrated pest management policy 	

D. Water Efficiency

WE Water Metering	Required
50 Rogers Street Project will comply with the requirements of this credit by installing a water meter for each unit within the development.	
WE Total Water Use	6 yes points, 2 maybe points
50 Rogers Street Project will reduce demand for water through high efficiency fixtures and efficient landscaping practices. By using efficient fixtures such as: <ul style="list-style-type: none"> • Shower: 1.5 GPM • Kitchen: 1.5 GPM • Bath Lavatory: 0.5 GPM • Toilet: 1.1 GPF • Clothes washers: 4.5 WF • Dishwashers: 4.5 GPC The project will achieve 41.7% total reduction of indoor and outdoor water consumption. We are approaching this credit conservatively, where 35% reduction is needed to reach 6 points.	

E. Energy and Atmosphere

EA Minimum Energy Performance	Required
50 Rogers Street Project will be complying with the requirements of this prerequisite by meeting the following requirements: <ul style="list-style-type: none"> • Multifamily Midrise Whole Building Energy Simulation. Project will demonstrate a 5% improvement over baseline building performance rating according to the building performance rating method of USGBC’s residential midrise simulation guidelines, based on ASHRAE Standard 90.1-2010, Appendix G. Attached along with this document is a performance summary of the assumed (or known) mechanical, electrical, plumbing, architectural systems designed or planned for this project. Due to the early phase of this project, actual EQuest model is not feasible, however the performance summary includes both ‘Baseline’ and “as – designed’ input assumptions. New Ecology, is confident that the project will far exceed the 5% threshold. 	

APPENDIX A

<ul style="list-style-type: none"> • Multifamily Midrise Commissioning Option 2: Commissioning using Prescriptive Path which includes the following: <ul style="list-style-type: none"> ○ Reduced Heating and Cooling Distribution system losses for In-unit HVAC. The project has retained the services of a rating company to test and verify design elements including duct air leakage rates. ○ Fundamental Commissioning of Central HVAC Systems. The project will retain the services of a 3rd party commissioning authority to confirm correct operation and functionality of centralized mechanical systems. ○ Construction Document Specifications. The project has retained the services of a sustainability consultant to review construction documents and assure the team that appropriate air sealing details and protocols are used ○ MFHR Thermal Enclosure Inspection Checklist. The project has retained the services of a 3rd party Green Rater to verify envelope design elements are correctly implemented during construction. 	
EA Energy Metering	Required
50 Rogers Street Project will comply with this prerequisite by submetering every unit for electric and gas consumption.	
EA Education of the Homeowner, Tenant, or Building Manager	Required
50 Rogers Street Project will comply with this prerequisite by providing the to the owner an operations and maintenance manual with all LEED/sustainability related requirements.	
EA Annual Energy Use	18.5 yes points, 5 maybe points
50 Rogers Street Project will achieve additional energy savings beyond the 5% required by the prerequisite. At this stage, we anticipate the project to achieve 15% savings over baseline as defined by ASHRAE 90.1-2010; (10 points). In addition, we anticipate additional 8.5 points for units smaller than baseline per the USGBC home size adjustment. By assuming 18.5 points for this credit we are keeping a conservative approach.	
EA Efficient Hot Water Distribution System	2 yes points, 3 maybe points (testing)
50 Rogers Street Project will comply with the following requirements to achieve 2 or 5 credits. <ul style="list-style-type: none"> • Option 1 – 50 Rogers Street project will design and construct a hot water delivery system where no DHW pipe will exceed the following distances between the source of the water heater and the most distant water fixture: <ul style="list-style-type: none"> ○ 3/8" diameter – maximum length = 50' ○ 1/2" diameter – maximum length = 43'; OR Option 2 – Additionally, the performance will be tested by a HERS rater to demonstrate that no more than 0.5 gallons of cold water sites in the pipe; OR • Option 3 – 50 Rogers Street Project will insulate all hot water piping to a min of R-4. 	
EA Advanced Utility Tracking	1 yes point
50 Rogers Street Project will comply with utility tracking credit by following: <ul style="list-style-type: none"> • Option 2; path 1: Third party utility reporting via a single master meter. 	

APPENDIX A

F. Materials and Resources

EA Certified Tropical Wood	Required
50 Rogers Street Project has committed to using non-tropical woods, or when tropical woods are required, to use only FSC Certified woods. Every effort will be made to avoid tropical woods.	
EA Durability Management	Required
50 Rogers Street Project has committed to complying with this prerequisite to promote durability and performance of the building enclosure and its components and systems through appropriate measures as appropriate and as outlined by the USGBC including: <ul style="list-style-type: none"> • Use of nonpaper faced backer board in specific bath areas • Use of water resistant flooring in kitchen and baths • Design and install drain pan and automatic water shutoff valve 	
EA Durability Management Verification	1 yes point
50 Rogers Street Project has retained the services of a 3 rd party verification team to confirm that designed durability measures have been installed correctly.	
EA Environmentally Preferable Products	0.5 yes points, 1.5 maybe points
50 Rogers Street Project is committed to providing a healthy living environment to its tenants and to install components that minimize material consumption through recyclable content, reclamation, or overall reduced life cycle impact. During the design and construction, including submittal review process, the team will strive to further maximize the product points in this section.	
EA Construction Waste Management	2 yes points
50 Rogers Street Project is committed to reducing construction waste 40% below USGBC's baseline.	

G. Indoor Environmental Quality

EQ Ventilation	Required
50 Rogers Street Project will meet all requirements of ASHRAE Standard 62.2-2010 (with errata). Each unit will have kitchen and bath exhaust fans as required by the Standard. In addition, fresh air will be mechanically supplied directly to each unit through an individual ERV.	
EQ Combustion Venting	Required
50 Rogers Street Project will meet the requirements of this prerequisite by installing only sealed combustion equipment.	
EQ Garage Pollutant Protection	Required
50 Rogers Street Project will meet the requirements of this prerequisite by completely separating living spaces from the garage spaces. In addition, the garage will be mechanically ventilated to further reduce the potential for CO contamination to the living areas. Controls of the garage ventilation systems will be based on CO2 and CO concentrations.	
EQ Radon Resistant Construction	Required
50 Rogers Street Project is located in EPA radon zone 1 which means that LEED requires for the project to mitigate radon risk. The project is complying with this prerequisite by installing a garage under the building. Although not required by LEED, the garage will be mechanically ventilated.	

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EQ Air Filtering	Required
50 Rogers Street Project will comply with the requirements of this prerequisite by installing air handling equipment in each unit with air filters rated MERV 8.	
EQ Environmental Tobacco Smoke	Required
50 Rogers Street Project will comply with the requirements of this prerequisite completely banning smoking within the building and on the site. The ban will be communicated with tenants through leasing documents as well as strategically located signage.	
EQ Compartmentalization	Required
50 Rogers Street Project will comply with the requirements of this prerequisite by developing a comprehensive set of air sealing details and specifications and by using a 3 rd party to verify that the constructed building complies with LEED requirements. Design documents will comply by incorporating dedicated air sealing and compartmentalization sheets in the project documents.	
EA Enhanced Ventilation	3 yes points
50 Rogers Street Project will comply with the requirements of this credit by installing continuously operating exhaust fans, by meeting ASHRAE 62.2-2010 Standard and by not exceeding ASHRAE requirements by more than 10%.	
EA Contaminant Control	0.5 yes points, 1.5 maybe points
50 Rogers Street Project will comply with the requirements of this credit by designing and installing complying walk-off mats at each primary entrance that are at least 10 feet long in the direction of travel. As determined during construction, the project team will strive to complete air testing and a preoccupancy flush.	
EQ Balancing of Heating and Cooling Distribution Systems	1 yes point, 2 maybe points
<p>50 Rogers Street Project will comply with the requirements of this credit using case 1: Forced Air Systems as follows:</p> <ul style="list-style-type: none"> • Option 1 Multiple Zones – The average unit size in this multifamily building is less than 1,200 square feet, therefore the project automatically meets the requirements of this credit (1 point) • Option 2 Supply Air Flow Testing – HERS rater will confirm that air supply delivery rate is within 25% of designed value as calculated using Manual J (1 point). • Option 3 Pressure Balancing – HERS Rater will confirm that pressure differential between any bedroom and the rest of each unit will not exceed 3Pa. (1 point) <p>Testing based credits are assumed to be maybe until the performance can be confirmed.</p>	
EQ Enhanced Compartmentalization	1 maybe point
50 Rogers Street Project will attempt to comply with the requirements of this credit. Through contractor training and performance testing, the project will attempt to meet the allowable maximum leakage rate of 0.15 CFM50 per square foot of enclosure.	
EQ Enhanced Combustion Venting	2 yes points
50 Rogers Street Project will comply with the requirements of this credit by not installing fire places or wood stoves in any of the units.	

APPENDIX A

EQ Enhanced Garage Pollutant Protection	1 yes point
50 Rogers Street Project will comply with the requirements of this credit by following the requirements in ASHRAE 62.1–2010. The garage will be exhaust sufficiently to create negative pressure with respect to adjacent spaces with the doors to the garage closed. The project will provide self-closing doors and deck-to-deck partitions or a hard lid ceiling. The pressure differential with the surrounding spaces must be at least 5 Pascals (Pa) (0.02 inches of water gauge) when all doors are closed. The garage fan ventilation sequence of operation will be based on CO sensors that will ramp up fans once CO levels reach 35 ppm.	
EQ Low Emitting Products	2 yes points; 0.5 maybe points
50 Rogers Street Project will comply with the requirements of this credit by specifying and confirming the application of paints, coatings, flooring, adhesives, and sealants comply with California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B, New Single-Family Residence Scenario.	
EQ No Environmental Tobacco Smoke	1 yes point
50 Rogers Street Project will comply with the requirements of this credit by requiring that the maintenance company enforce the total ban on smoking on site. The prohibition will be communicated in building lease agreements or in condo or co-op association covenants and restrictions, and provisions for enforcement will be included.	

H. Innovation in Design

ID Green Vehicles	1 maybe point
50 Rogers Street Project will attempt to comply with the requirements of this credit by designating 5% of all parking spaces used by the project as preferred parking for green vehicles. Part of this credit requires that 2% of parking spaces be provided with a Level 2 charging station.	
ID Green Cleaning Product Purchasing	1 maybe point
50 Rogers Street Project will comply with the requirements of this credit by closely following EBOM v4 EQp3 Green Cleaning Product Purchasing.	
ID Green Power and Carbon Offsets	1 maybe point
50 Rogers Street Project will comply with the requirements of this credit by offsetting 50% of the project's energy for a period of 5 years using Green-e Energy certified RECs.	
ID LEED Accredited Professional	1 yes point
50 Rogers Street Project will comply with the requirements of this credit by hiring a LEED accredited professional: Maciej Konieczny	

I. Regional Priority

RP various	2 yes points, 2 maybe points
50 Rogers Street Project will attempt to comply with the requirements of this credit by achieving regional priority credits: <ul style="list-style-type: none"> • Annual Energy Use (1 yes point) • Access to transit (1 yes point) • Rainwater Management (1 maybe point) • Nontoxic Pest Control (1 maybe point) 	

APPENDIX A

Appendix A: Project Specific LEED Checklist

LEED BD+C: Homes and Multifamily Lowrise v4 - LEED v4

50 Rogers St. Scorecard

Note: The information on this tab is READ-ONLY. To edit this information, see the Credit Category tabs.



Integrative Process		Preliminary	Y 1 of 2	M 1	Verified 0
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IPc	Integrative Process		1 of 2	1	
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Location and Transportation		Preliminary	Y 15 of 15	M 0	Verified 0
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LTp	Floodplain Avoidance		Required		Not Verified
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Performance Path

LTc	LEED for Neighborhood Development		0 of 15	0	
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Prescriptive Path

LTc	Site Selection		8 of 8	0	
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LTc	Compact Development		3 of 3	0	
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LTc	Community Resources		2 of 2	0	
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LTc	Access to Transit		2 of 2	0	
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Sustainable Sites		Preliminary	Y 4 of 7	M 1	Verified 0
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SSp	Construction Activity Pollution Prevention		Required		Not Verified
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SSp	No Invasive Plants		Required		Not Verified
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SSc	Heat Island Reduction		0 of 2	0	
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SSc	Rainwater Management		2 of 3	1	
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SSc	Nontoxic Pest Control		2 of 2	0	
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Water Efficiency		Preliminary	Y 6 of 12	M 2	Verified 0
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WEp	Water Metering		Required		Not Verified
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Performance Path

WEc	Total Water Use		6 of 12	2	
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Prescriptive Path

WEc	Indoor Water Use		0 of 6	0	
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WEc	Outdoor Water Use		0 of 4	0	
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Energy and Atmosphere		Preliminary	Y 21.5 of 38	M 8	Verified	0
EAp	Minimum Energy Performance	Required				Not Verified
EAp	Energy Metering	Required				Not Verified
EAp	Education of the Homeowner, Tenant or Building Manager	Required				Not Verified
<i>Performance Path</i>						
EAc	Annual Energy Use		18.5 of 29	5		
<i>Performance and Prescriptive Paths</i>						
EAc	Efficient Hot Water Distribution System		2 of 5	3		
EAc	Advanced Utility Tracking		1 of 2	0		
EAc	Active Solar-Ready Design		0 of 1	0		
EAc	HVAC Start-Up Credentialing		0 of 1	0		
<i>Prescriptive Path</i>						
EAp	Home Size	Required				Not Verified
EAc	Building Orientation for Passive Solar		0 of 3	0		
EAc	Air Infiltration		0 of 2	0		
EAc	Envelope Insulation		0 of 2	0		
EAc	Windows		0 of 3	0		
EAc	Space Heating & Cooling Equipment		0 of 4	0		
EAc	Heating & Cooling Distribution Systems		0 of 3	0		
EAc	Efficient Domestic Hot Water Equipment		0 of 3	0		
EAc	Lighting		0 of 2	0		
EAc	High-Efficiency Appliances		0 of 2	0		
EAc	Renewable Energy		0 of 4	0		



Materials and Resources		Preliminary	Y 3.5 of 10	M 1.5	Verified	0
MRp	Certified Tropical Wood	Required				Not Verified
MRp	Durability Management	Required				Not Verified
MRC	Durability Management Verification		1 of 1	0		
MRC	Environmentally Preferable Products		0.5 of 4	1.5		
MRC	Construction Waste Management		2 of 3	0		
MRC	Material-Efficient Framing		0 of 2	0		



Indoor Environmental Quality		Preliminary	Y 10.5 of 16	M 5	Verified	0
EQp	Ventilation	Required				Not Verified
EQp	Combustion Venting	Required				Not Verified
EQp	Garage Pollutant Protection	Required				Not Verified
EQp	Radon-Resistant Construction	Required				Not Verified
EQp	Air Filtering	Required				Not Verified
EQp	Environmental Tobacco Smoke	Required				Not Verified
EQp	Compartmentalization	Required				Not Verified
EQc	Enhanced Ventilation		3 of 3	0		
EQc	Contaminant Control		0.5 of 2	1.5		
EQc	Balancing of Heating and Cooling Distribution Systems		1 of 3	2		
EQc	Enhanced Compartmentalization		0 of 1	1		
EQc	Combustion Venting		2 of 2	0		
EQc	Enhanced Garage Pollutant Protection		1 of 2	0		
EQc	Low-Emitting Products		2 of 3	0.5		

APPENDIX A



Innovation		Preliminary	Y 1 of 6	M 3	Verified	0
INp	Preliminary Rating	Required			Not Verified	
INc	Innovation	0 of 5		3		
INc	LEED Accredited Professional	1 of 1		0		



Regional Priority		Preliminary	Y 2 of 4	M 0	Verified	0
RPc	Regional Priority	2 of 4		0		

Point Floors

The project earned at least 8 points total in Location and Transportation and Energy and Atmosphere	<input type="text" value="No"/>
The project earned at least 3 points in Water Efficiency	<input type="text" value="No"/>
The project earned at least 3 points in Indoor Environmental Quality	<input type="text" value="No"/>

Total	Preliminary	Y 64.5 of 110	M 21.5	Verified	0
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Certification Thresholds Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80-110

APPENDIX B

Appendix B: Energy Model Inputs



Project: 50 Rogers
 Location: Boston, MA
 Energy Model Purpose: LEED V4
 Modeling Guideline: ASHRAE 90.1-2010

Summary of Assumptions for Energy Model		
Model Input Parameter	ASHRAE 90.1-2010 Baseline Model	Proposed Design Model
Space Use Type	Residential and Retail	Residential and Retail
Building Area	190,000 SF	190,000 SF
Conditioned Area in eQUEST	Per Design Drawing	Per Design Drawing
Operating Schedule	24/7/365	24/7/365
Temperature Setpoints °F	Cooling-Occupied Space : 78°F (1am-9am, 4pm-0am) , 80°F (8am-3pm) Cooling- Unoccupied Service Spaces (Mech, Electrical, Stairs): 85°F	Cooling-Occupied Space : 78°F (1am-9am, 4pm-0am) , 80°F (8am-3pm) Cooling- Unoccupied Service Spaces (Mech, Electrical, Stairs): 85°F
	Heating-Occupied Space : 70°F (1am-7am, 11pm-0am) , 72°F (7am-11pm) Heating- Unoccupied Spaces (Mech, Electrical, Stairs): 60°F	Heating-Occupied Space : 70°F (1am-7am, 11pm-0am) , 72°F (7am-11pm) Heating- Unoccupied Spaces (Mech, Electrical, Stairs): 60°F
Weather File	Boston-Logan Intl AP 725090 (TMY3)	Boston-Logan Intl AP 725090 (TMY3)
HDD65	5641	5641
CDD50	2897	2897
Building envelope	Baseline Model (Per Appendix G Requirement)	Proposed Design Model
Wall	U-0.064 (Steel-Framed)	Above Grade: Brick Exterior Wall: Brick + 1-1/2" Air Space + 3" Rigid Insulation + Air/Vapor Barrier + 5/8" Exterior Sheathing + 3" min. Spray Foam Insulation in Cavity Metal Exterior Wall: Metal Panel + 1" Air Space + 3" Rigid Insulation + Air/Vapor Barrier + 5/8" Exterior Sheathing + 3" min. Spray Foam Insulation in Cavity Below Grade: Concrete Shear Walls
Floor	U-0.038 (Steel-Joint)	3" Light Weight Concrete over 2" Epicore Composite Floor System
Slab	F-0.054 (R-10 for 24 in. Unheated Slab)	3" Light Weight Concrete over 2" Epicore Composite Floor System
Roof	U-0.048 (R-20 c.i. Insulated Entirely above Deck)	Typical Roof: Air film + Roof Membrane + Protection Board + 4" Tapered Insulation+ 5-1/2" Concrete on Epicore Deck
Window to Wall Ratio	Per Design Drawing	Per Design Drawing
Window type and U-factor	Metal U-0.55 Metal (Curtain Wall/Storefront) U-0.45	Per Design Drawing
Window SHGC	Metal SHGC-0.4	Per Design Drawing
Doors	U-0.5	Per Design Drawing
Lighting & Appliances (per ENERGY STAR MFHR Modeling Guideline)	Baseline Model	Proposed Design Model
Residential lighting power density	1.11 W/SF	Per Design Drawing
Corridor lighting power density	0.66 W/SF	Per Design Drawing
Common space lighting power density	Lobby - 0.9 W/SF Mechanical - 0.95 W/SF Office(enclosed) - 1.11 W/SF Restroom - 0.98 W/SF Stairs - 0.69 W/SF Storage - 0.63 W/SF Lounge - 0.73 W/SF Meeting/Multipurpose - 1.23 W/SF Lounge/Recreation - 0.73 W/SF GYM - 0.72 W/SF Parking - 0.19 W/SF Laundry - 0.6 W/SF	Per Design Drawing
Exterior lighting	Lighting Allowance per ASHRAE 90.1-2010 Table 9.4.3A & B	Per Design Drawing
Lighting controls	N/A	Occupancy Sensors
HVAC System Air-side	Baseline Model	Proposed Design Model
Primary HVAC system	1. Residential and conditioned common spaces - PTAC (ASHRAE Baseline System 1) 2. Heating only spaces - Heating and Ventilation (ASHRAE Baseline System 9&10)	1. Residential spaces -Vertical ducted split system fan coil unit (FCU) with DX cooling and an integral hot water coil + ERV 2. Conditioned common spaces - Air handling units of heating hot water an DX Cooling Coil + demand control ventilation 3. Heating common spaces - Baseboard and/or cabinet unit heaters
Cooling Capacity	Auto sized by eQUEST, 15% oversized	1.5 ton fan coil -Type A, B, B' units 2.0 ton fan coil - Type F, G units 2.5 ton fan coil - Type C, C', D units 7.5 ton air handling units for common spaces
Heating Capacity	Auto sized by eQUEST, 25% oversized	in Unit boilers: 1 Bathroom Unit -Navien NCB-180- 75 MBH 2 Bathroom Unit -Navien NCB-240 -112 MBH
Unitary Efficiency	PTAC EER various per ASHRAE 90.1-2010 Table 6.8.1D equation Cooling EER = 13.8 - (0.300*Capacity/1000)	Rooftop condensing units SEER -20 Heating AFUE - 95%
Fan System Operation	Constant Volume	Two Speed
Indoor Unit Supply CFM	Auto sized by eQUEST	Per Design Drawing
Fan Power	0.0003 kW/CFM	0.0001988 kW/CFM
Outdoor Air	Per Design Drawing	Same as Baseline

APPENDIX B

Ventilation System	Exhaust Fan, 0.0003 kW/CFM (with ERV if the design condition meets ASHRAE 90.1-2010 Table 6.5.6.1 requirement)	Each residential unit is mechanically ventilated by an ERV - Fantech Fit 120H Sensible Recovery Efficiency - 63% Sensible Effectiveness - 78% Latent Effectiveness - 48% (@32°F, 95 cfm) Parking Garage exhaust fans, total 45,000 CFM
Apartment Bathroom Local Exhaust Ventilation	Constant	Constant
Apartment Kitchen Local Exhaust Ventilation	Intermittent	Intermittent
HVAC System Water-side	Baseline Model	Proposed Design Model
Number of Boilers	2	Individual boiler in residential units 2 centralized gas fired condensing hot water boiler
Boiler Capacity	2 equally sized boilers	Per Design Drawing
Boiler Efficiency	84%	Residential Boiler: AFUE-95% Common Boiler: thermal efficiency -95%
Boiler Water Loop Supply Temperature	150-180F	Per Design Drawing
Hot Water Loop Delta T	10F	Per Design Drawing
HW Loop Reset Parameters	150F @ 68F OA, 180F @ 15F OA	Per Design Drawing
Number of HW Pumps	1	Per Design Drawing
HW Loop Pump Power	19 W/GPM	Per Design Drawing
Domestic Hot Water System	Baseline Model	Proposed Design Model
DHW Equipment Type	Residential Spaces: 1 Bathroom Unit -Navien NCB-180 Gas fired combination boiler and hot water heater 2 Bathroom Unit -Navien NCB-240 Gas fired combination boiler and hot water heater Common Spaces: Condensing Gas Water Heater	Residential Spaces: 1 Bathroom Unit -Navien NCB-180 Gas fired combination boiler and hot water heater 2 Bathroom Unit -Navien NCB-240 Gas fired combination boiler and hot water heater Common Spaces: Condensing Gas Water Heater
Equipment efficiency	80%	Residential Boiler: AFUE-95% Common Boiler: Thermal Efficiency -95%
Process Flow (GPM)	Calculate based on design drawing	Calculate based on design drawing
Input BTU	1 Bathroom Unit -Navien NCB-180- 150,000 btu/h 2 Bathroom Unit -Navien NCB-240 -199,90 btu/h	Residential Spaces: 1 Bathroom Unit -Navien NCB-180- 150,000 btu/h 2 Bathroom Unit -Navien NCB-240 -199,90 btu/h
Design HW Temp (°F)	110	110
Storage Capacity (Gallons)	Common Area: 75	Common Area: 75
Miscellaneous (referencing ENERGY STAR MFHR Modeling Guideline)	Baseline Model	Proposed Design Model
In-Unit Misc.	0.5 W/SF	0.5 W/SF
Corridor, Restroom & Stairs	0.2 W/SF	0.2 W/SF
Elevator	Per Design Drawing	Per Design Drawing
Office	1.5 W/SF	1.5 W/SF
Other Public and Common Area	0.5 W/SF	0.5W/SF
In Unit Washer	Per Design Drawing (non energy star)	Per Design Drawing (energy star)
In Unit Dryer	Per Design Drawing (non energy star)	Per Design Drawing (energy star)
Refrigerate	Per Design Drawing (non energy star)	Per Design Drawing (energy star)
Stove	Per Design Drawing (non energy star)	Per Design Drawing (energy star)
Dishwasher	Per Design Drawing (non energy star)	Per Design Drawing (energy star)
Utility Cost (referencing EIA price data)	Baseline Model	Proposed Design Model
Electricity (\$/KWH)	0.155	0.155
Gas (\$/THERM)	0.92	0.92



50 Rogers Street

Introduction

The City of Cambridge continues to lead the way to an efficient and low carbon future by setting aggressive goals and guidelines. Understanding that close to 80% of its greenhouse gas emissions result from building operations, in June 2015, Cambridge unanimously adopted the Net Zero 25-year Action Plan. The plan clearly outlines proposed policy goals for new construction by sector type; by 2022, Cambridge, in cooperation with the local industry and stakeholders, will have developed new zoning requirements for residential new construction sector.

50 Rogers Street development will not be a net zero building; however, significant thought and planning has been dedicated by the development team to align the project with the City’s goals. As outlined below, cost effective and practical steps will be taken to make the building efficient and ready for on-site solar photovoltaic generation. To aid the City in its path to net zero emissions in residential new construction, technically viable options are presented below. While, these may not be financially feasible at this moment, they do outline a path for future policies to carbon neutral residential construction.

Pathway to Net Zero Emissions

Building Size	136 apartments Above Grade: Approx. 141,690 GSF Below Grade: Approx. 201,440 GSF
Building Height	6 levels + 2 level of parking (below grade)

Net Zero Emissions Pathway

The pathway to net zero emissions for 50 Rogers Street development is to improve envelope performance, replace gas-fired equipment with high efficiency electric alternatives, maximize the electricity generated on site, and then purchase green energy or carbon offsets to offset the emissions from the remaining electric load.

Envelope	Planned: The structure will be very well insulated using continuous 3” rigid insulation on the exterior and minimum of 3” spray foam insulation in the cavity. Glazing will be aluminum clad wood windows with a U-value < 0.27, which is equivalent or better than Energy Star. Roof
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PROJECT DESCRIPTION FOR DESIGN REVIEW PER PUD / SPECIAL PERMIT #243

50 ROGERS STREET

ALEXANDRIA CENTER AT KENDALL SQUARE

insulation will be continuous above the deck with an R value minimum of 49.

Pathway to Net Zero: While it is rarely practical to increase the performance of a building's envelope post construction, it is important to note that the planned envelope is scheduled to be high performance. Wall, roof, slab, and floor (between garage and living space) insulation significantly reduces the structure's heating and cooling loads as compared to base code requirements and therefore energy consumption. Additional measures may include increased exterior insulation, increased cavity insulation, triple pane glazing, and increased full slab insulation.

HVAC System

Planned: Each apartment shall be heated and cooled individually using a vertical ducted split system fan coil unit with DX cooling and an integral hot water heating coil. Hot water will be supplied by a 95% AFUE efficient, wall mounted combination boiler/hot water heater. Cooling will be provided by a 20 SEER rated, high efficiency condenser unit mounted on the roof. Boiler will operate in condensing mode under all conditions. This is a very efficient system.

Pathway to Net Zero Alternative: Convert the planned unit HVAC systems to solely refrigerant based air source heat pumps (ASHP) to provide heating and cooling. Conversion will require the installation of a refrigerant only based air handler in each unit instead of the planned hot water coil supplied by a gas fired unit. Since the new units will provide cooling and heating for each residential unit, outdoor condensing units will require conversion to equipment that will have the capacity to heat and cool.

Centralized systems, including ventilation, will have to be converted to ASHPs. Options such as ground source heat pumps (GSHP) for the centralized systems can be considered as it is unlikely to be practical to use GSHP for all apartments. There is limited space for GSHP wells and a retrofit will be difficult due to site constraints. Wells can be located below parking; however, since parking is below grade it drilling would have to occur during construction.

Replace DHW System

Planned: Each apartment shall be equipped with a wall mounted combination boiler/hot water heater that will generate domestic hot water (DHW). This is one the most efficient gas operated, water heater appliance types available on the market. Its efficiency, at 95% AFUE, is rated at the highest end of the spectrum, but just as importantly, this system does not include storage. Storing DHW at a minimum of 120F (often higher) results in significant standby losses, that can reduce an overall efficiency of a system to 60% or less.

Pathway to Net Zero Alternative #1: Convert DHW system to all-electric high efficiency storage tanks such as hybrid heat pump (HP) options by

PROJECT DESCRIPTION FOR DESIGN REVIEW PER PUD / SPECIAL PERMIT #243

50 ROGERS STREET

ALEXANDRIA CENTER AT KENDALL SQUARE

GE or other manufacturers. Conversion will require removal of the gas fired appliance and, since the DHW system is directly connected with the heating system, a conversion will have to occur concurrently with HVAC conversion. It is a less practical option since the hybrid HP option requires a 40 or 60-gallon storage tank (due to slow recovery rate) *and* a mechanical closet that will allow for sufficient ventilation for a HP system to operate.

Pathway to Net Zero Alternative #2: Install a central storage, electric based system in combination with exploring roof space for central solar thermal DHW system. Conversion will require changing the proposed design from unit based DHW to a central system by deleting the planned natural gas-fired boilers water heaters, upgrading any necessary electrical circuits for the new electric storage tanks, and adding centrally located tanks. The addition of solar thermal will require installing the appropriate supports and connections on the roof, installing collector panels, piping supply and return lines from solar storage tanks in the mechanical room to the roof, connecting the new solar storage tanks to the electric storage tanks, and adding system controls and monitoring equipment.

Lighting

Planned: Each apartment, all common spaces, and all outdoor lighting will be high efficacy LED fixtures. All common areas will be operated using occupancy sensors, and outdoor lighting shall be photocell operated. The planned lighting system is very efficient.

Pathway to Net Zero Alternative: Install daylight harvesting and adaptive lighting controls in all common spaces and residential apartments. Educate occupants on lighting controls.

On-Site Renewables

Planned: Roof will be designed to structurally accommodate future solar thermal or solar PV systems. Conduits for electrical conductors shall be installed between roof and main electrical room and space shall be designated in the electrical room for future inverters.

Pathway to Net Zero Alternative: Install a canopy photovoltaic (PV) system above the entire span of the roof.

Off-Site Renewables/RECs

Purchase green power (RECs) or carbon offsets to cover remainder of building common meter load emissions not covered by on-site solar PV array; engage residents in a group purchase of green power or carbon offsets to cover apartment meter load emissions. In cases where it may not be practical to abandon gas fired equipment, purchase RECs to offset the equivalent electrical source energy.



Mr. Frank Valdes
 DiMella Shaffer
 281 Summer Street
 Boston, MA 02210

Email: fvaldes@dimellashaffer.com
 Phone: 617-778-0162

Subject 50 Rogers Street, Cambridge, MA
 Environmental Noise Review
 Acentech Project 629040

Dear Frank,

We have completed a review of sound produced by rooftop mechanical systems at the mixed-use development proposed for 50 Rogers Street, Cambridge, MA. We find that the current design complies with the requirements of the City of Cambridge with respect to noise. This finding is detailed below.

OVERVIEW

Location and Zoning

The project is located near the intersection of Rogers Street and First Street in the City of Cambridge, MA. The project is sited on a parcel zoned IA-1 (Industry A-1); this parcel is also part of the PUD-4C (Planned Unit Development 4C) zone, which allows for mixed office, retail and residential development.

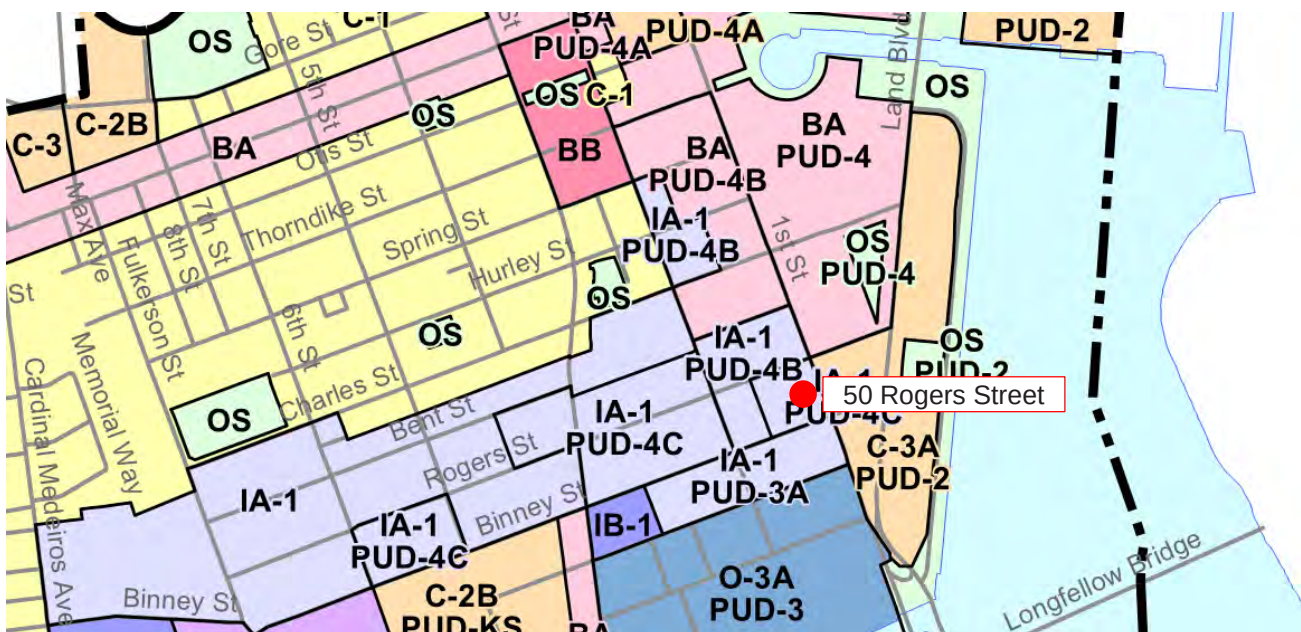


FIGURE 1. Excerpt from Cambridge Zoning Map

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City of Cambridge, MA Noise Ordinance

The Code of Ordinances of Cambridge, MA includes specific limits on sound produced by building mechanical systems (Chapter 8.16, henceforth “the Cambridge code”). The limits are given in the form of both broadband and octave-band sound levels, and vary depending on receptor land use. TABLE I is drawn from Chapter 8.16 and presents the sound level limits of the Cambridge code.

TABLE I. City of Cambridge Sound Level Limits (dB) ¹

Octave Band Center Freq. (Hz)	Residential Area		Residential in Industrial		Commercial Area	Industry Area
	Daytime	Other Times	Daytime	Other Times	Anytime	Anytime
31.5	76	68	79	72	79	83
63	75	67	78	71	78	82
125	69	61	73	65	73	77
250	62	52	68	57	68	73
500	56	46	62	51	62	67
1,000	50	40	56	45	56	61
2,000	45	33	51	39	51	57
4,000	40	28	47	34	47	53
8,000	38	26	44	32	44	50
LA	60	50	65	55	65	70

Given the residential land uses allowed within the PUD-4B zone, we recommend that building mechanical systems be designed to achieve the limits of the “Residential” area, which are 60 dBA during daytime hours and 50 dBA during nighttime hours. However, there is some ambiguity in the Cambridge code that implies the limits of “Residential in Industrial” areas may be applicable to the site. Irrespective, we have used the lower limits of “Residential” areas in our analysis.

ESTIMATED EQUIPMENT SOUND LEVELS

Modeling Methodology

We have developed a computer model of sound produced by facility mechanical equipment and transmitted to nearby receptors using Cadna/A (version 2017, build 157.4702). Cadna/A is an industry-standard software package which implements the algorithms and methods of ISO 9613 “Acoustics – Attenuation of sound during propagation outdoors”².

In order to estimate sound levels at receptor locations, the following data inputs have been included in the model:

- Source sound power level and directivity, L_w (in octave bands)
- Geometrical divergence, A_{div} (i.e. spreading)
- Atmospheric absorption, A_{atm} (based on 50 °F, 70% relative humidity)
- Ground effect, A_{gr} (based on $G = 0.25$)
- Screening by obstacles, A_{bar} (standard inputs)
- Reflection from surfaces (2 orders)

¹ https://www.municode.com/library/ma/cambridge/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.16NOCO&searchText=

² <https://www.iso.org/standard/20649.html>

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The computer model has been developed on the basis of project documents and sound level data provided by the design team, and aerial orthoimagery obtained from MassGIS. Equipment items included in the computer model at the time of this writing include:

- (136) condensing units (Lennox XC25)
- (26) fresh air supply fans (Greenheck AS-12-420-A4)
- (26) kitchen exhaust fans (Greenheck G-095-VG)
- (26) bath exhaust fans (Greenheck G-095-VG)
- (1) emergency generator (Kohler 100ERESD)

Model Results

FIGURES 2 and 3 present the results of computer modeling of building mechanical systems and the emergency generator, respectively. The values appearing in color along the perimeter of neighboring buildings are the greatest A-weighted sound level estimated at that portion of the façade; the values appearing in the white circle near the center of each building are the greatest A-weighted sound level at any point along the façade of the building.



FIGURE 2. A-weighted sound levels produced by building mechanical systems

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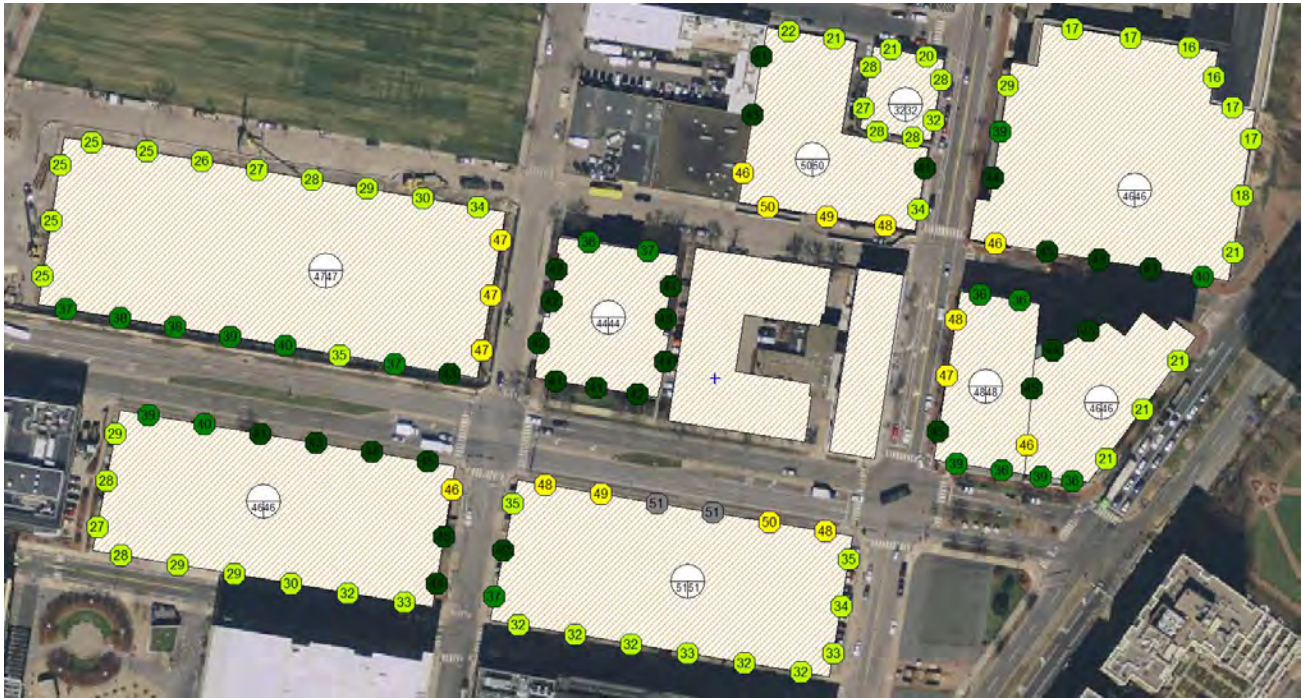


FIGURE 3. A-weighted sound levels produced by emergency generator

As shown in FIGURES 2 and 3, all estimated sound levels are below the limits listed in the Cambridge code. No further noise controls are required for this project.

* * * * *

I trust this letter provides the information you need at this time. Please contact me with questions at 617-499-8025 or acarballeira@acentech.com.

Sincerely,

Andy Carballeira
Senior Consultant

CC: Jonah Sacks (Acentech)