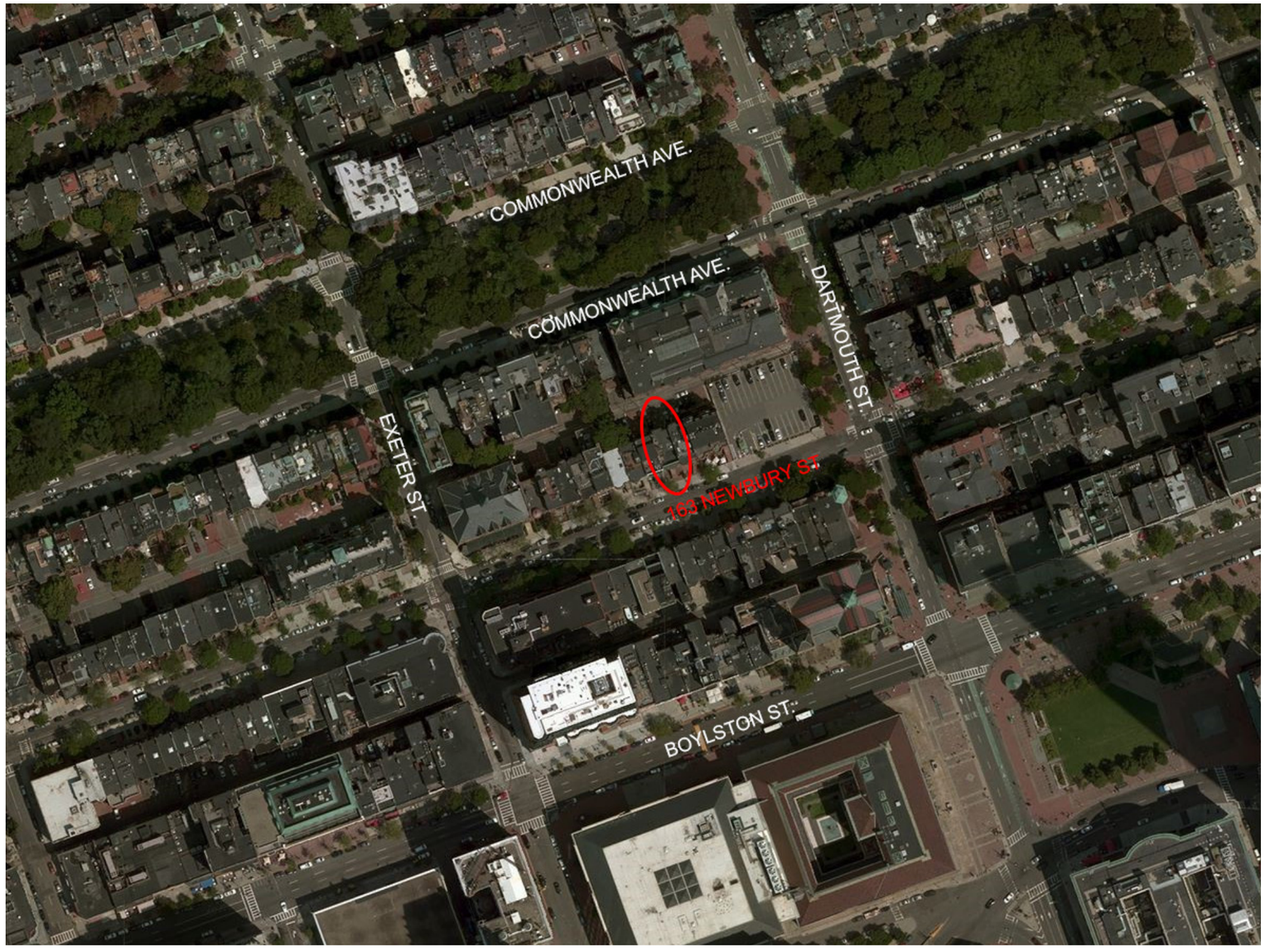


Neighborhood Context

Summary Of Proposed Work:

This Work Amends Previously Approved Equipment Locations:
- Install (4x) Air Source Heat Pumps on 4th Floor Patio

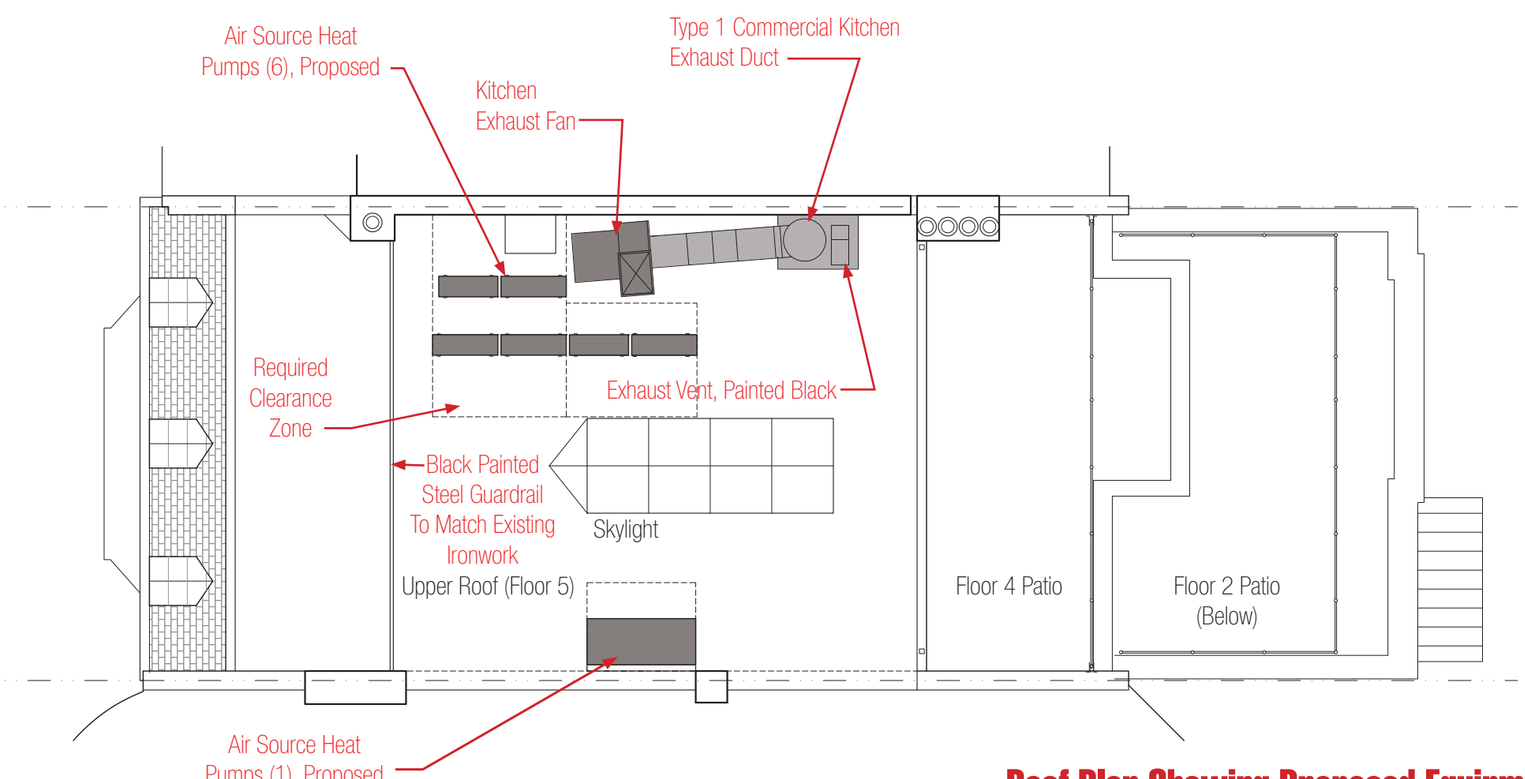
Proposed Equipment On Ultimate Roof:
- Install (1x) New Kitchen Exhaust Fan And Type 1 Grease Duct.
- Install (7x) Air Source Heat Pumps.
- Install New Black Painted Steel Guardrail to Match Existing Ironwork.

Notes On Visibility From Public Way:
- All Proposed Equipment Will Not Be Visible From The Public Way (See Diagram on Page 3).

Design Changes in Response to NABB Architecture Committee Comments

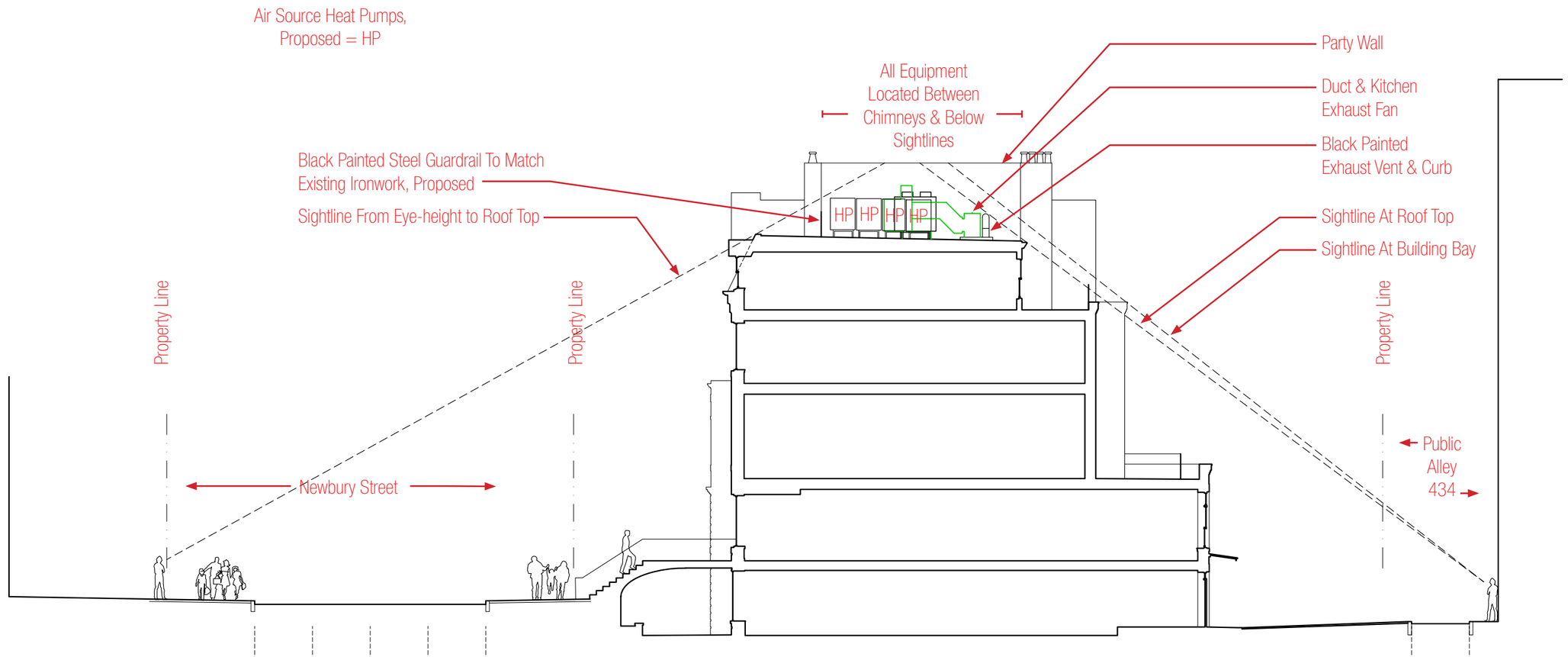
Changes Made After NABB Meeting February 5, 2019
- Removed Rooftop Exhaust Fan And Relocated To Interior.
- Re-Routed Supply Duct Intake To Hidden Location, Eliminating Metal Transition Box Visible From Alley.
- Changed Specification Of Kitchen Exhaust Fan To Quieter Model.
- Commissioned Acoustical Study Of Sound Levels Of Rooftop Equipment.

Changes Made After NABB Meeting March 5, 2019
- Relocated Kitchen Exhaust Duct Penetration Through Roof So It Will Not Be Visible From The Alley.
- Relocated Heat Pumps # 5 And 6 To West Side Of Roof
- Adjusted Location Of Heat Pumps #1-4 Closer To The Party Wall.

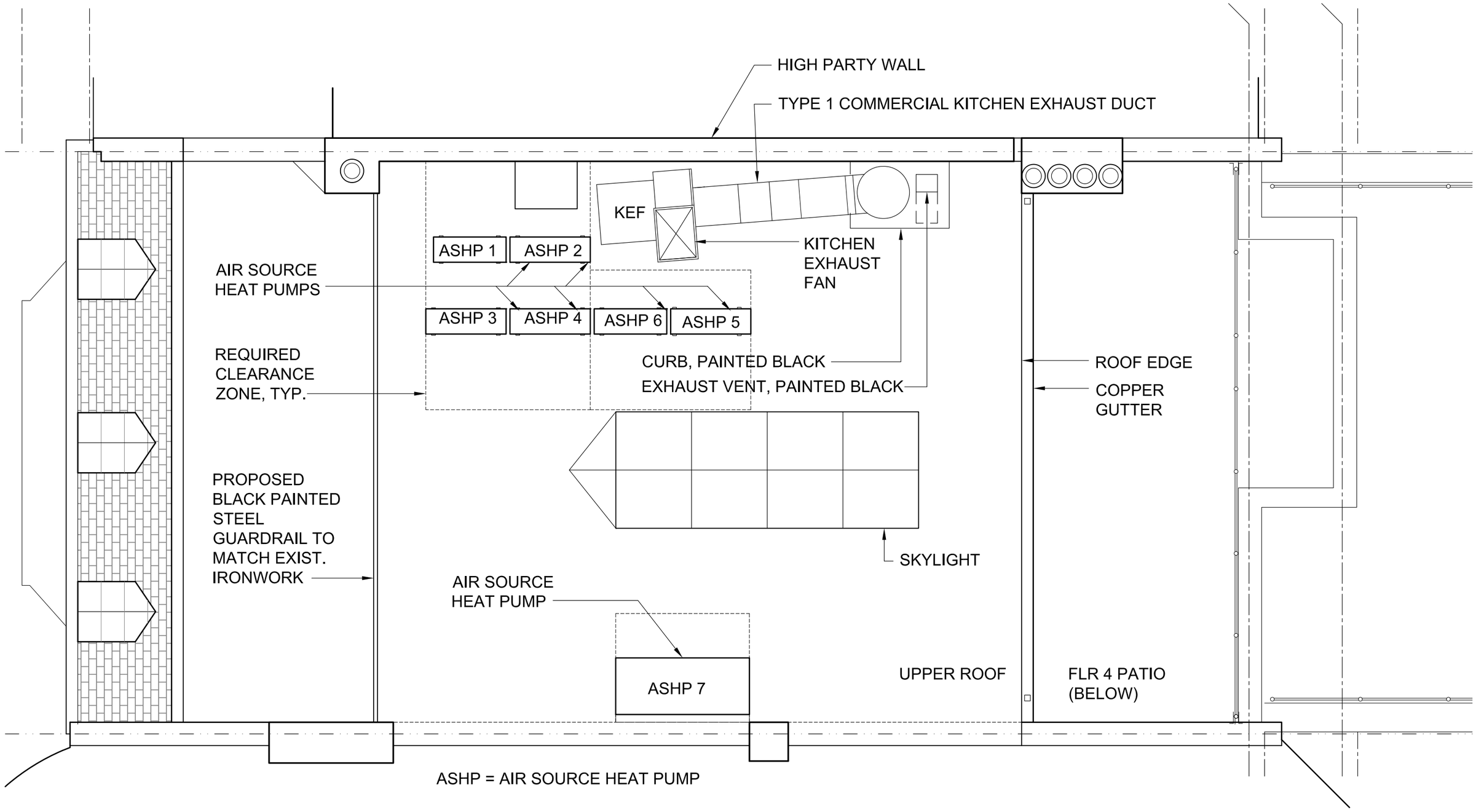


Roof Plan Showing Proposed Equipment Locations

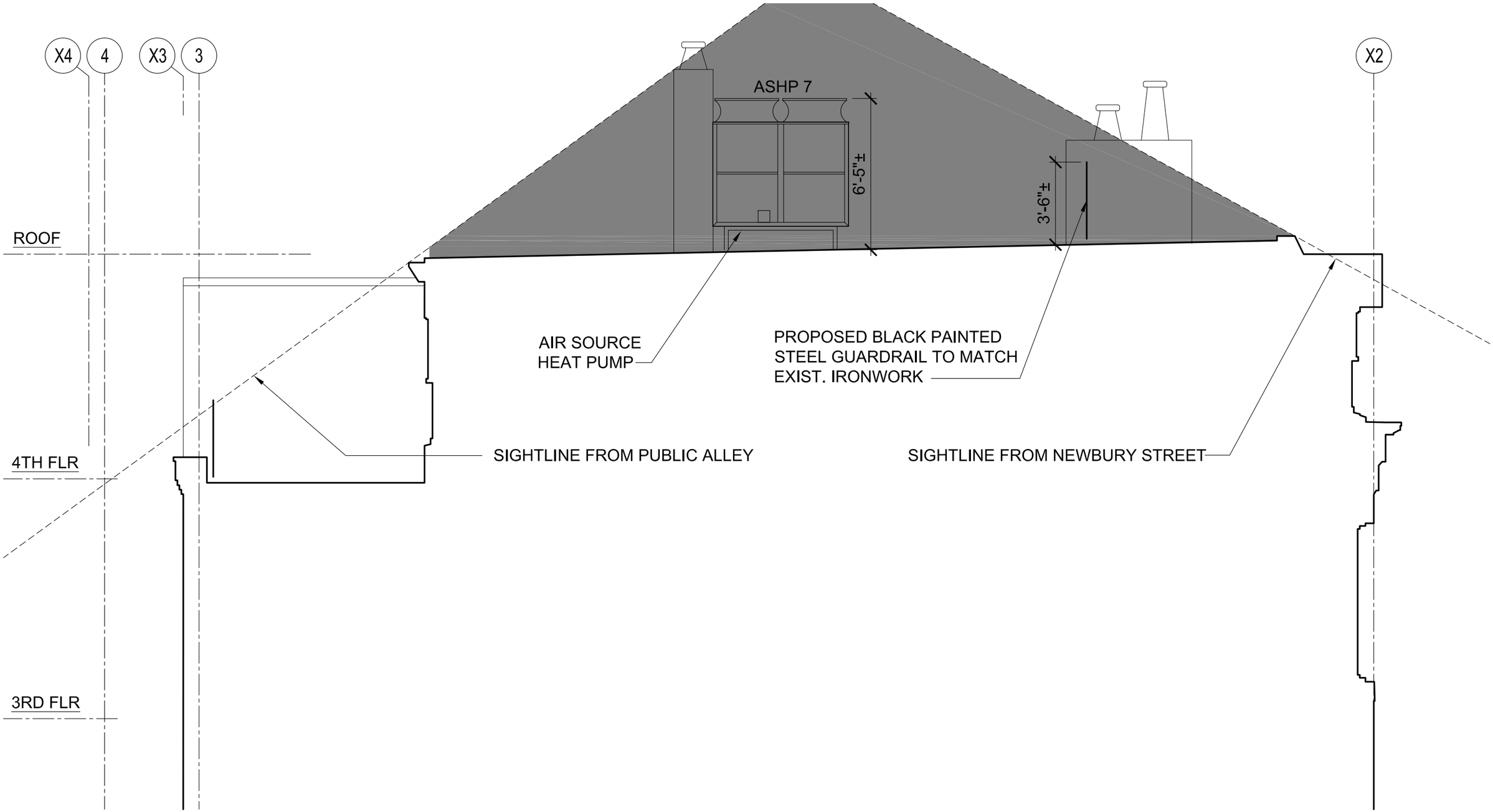
163 Newbury Street | Section Through Building Showing Sightlines Of Proposed HVAC



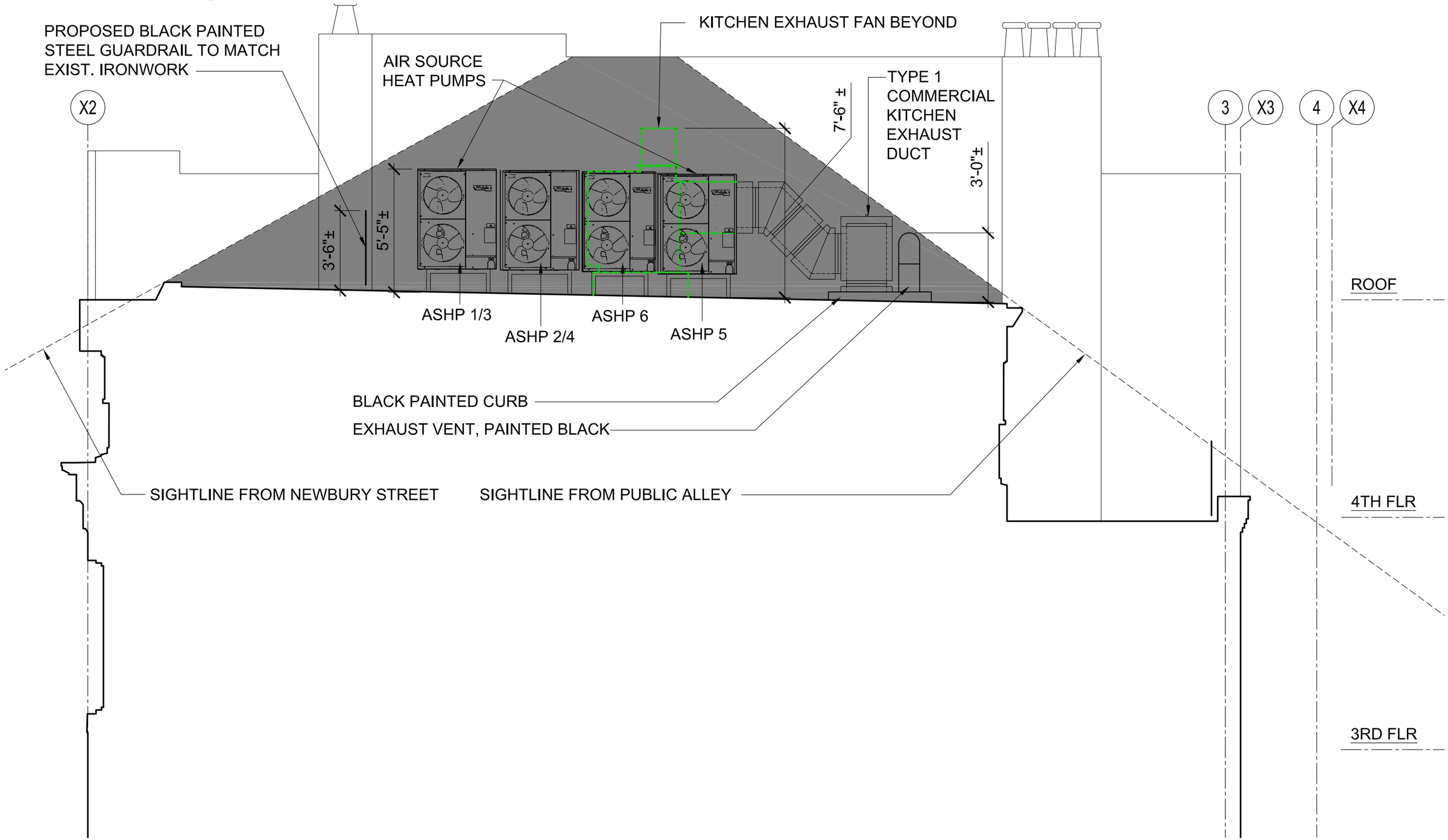
163 Newbury Street | Roof Plan



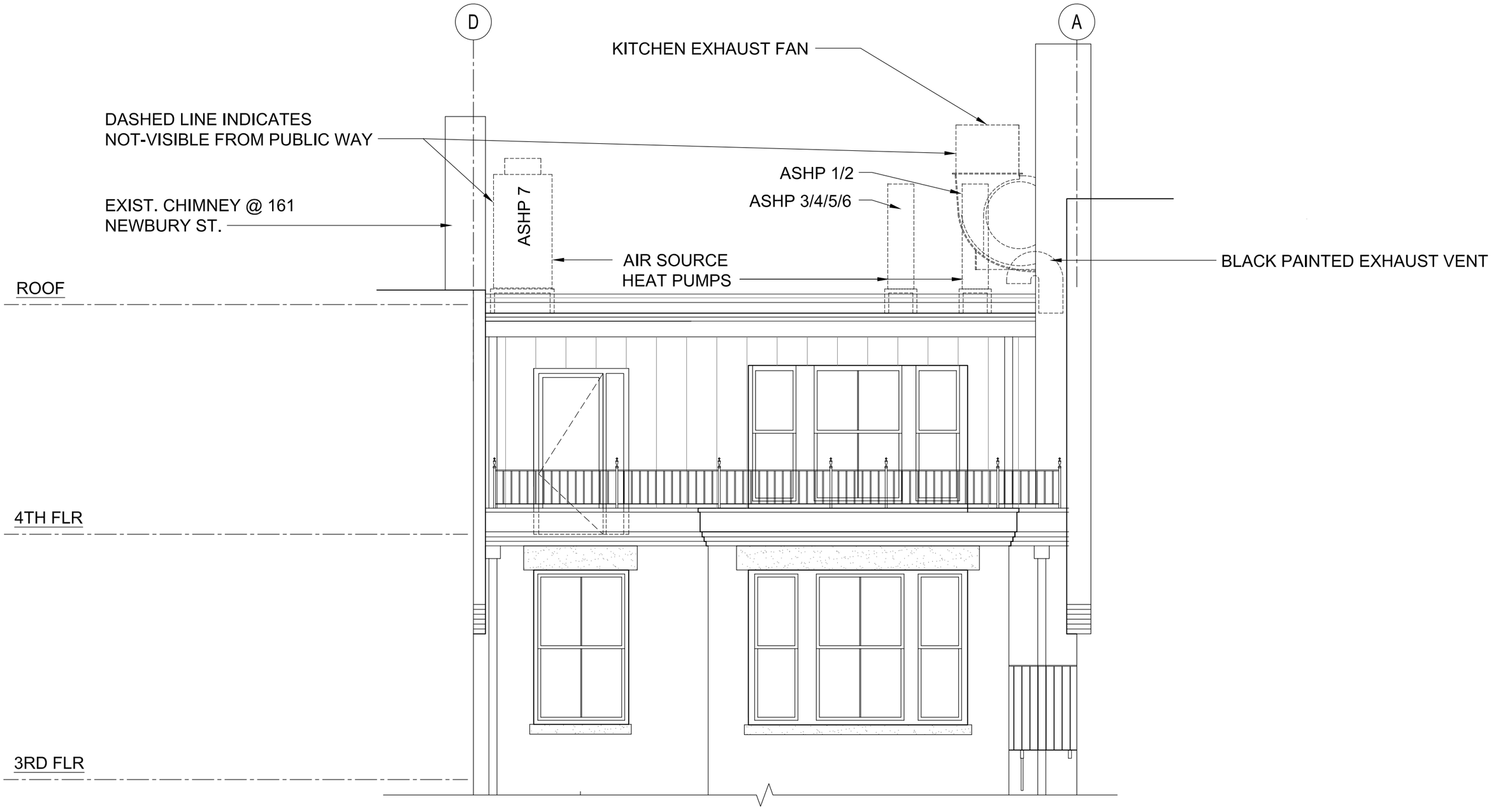
163 Newbury Street | Roof Elevation Looking East



163 Newbury Street | Roof Elevation Looking West



163 Newbury Street | Alley Elevation At Roof



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Boston Office: **50 Summer Street**
Boston, MA 02110
Phone: 857.523.6576

Intertek Project No. J4087.01

February 26, 2019

Mr. Carl Solander, AIA, CPHC, LEED AP
Reverse Architecture
561 Windsor St., Suite A304
Somerville, MA 02143

RE: **HVAC Sound Emissions**
163 Newbury Street
Boston, Massachusetts

Dear Carl:

We reviewed the plans and equipment selection for the rooftop HVAC systems planned for 163 Newbury Street in Boston. We have the following feedback and results from our analysis of the sound emissions of this equipment to the community.

Project Understanding

This project includes new HVAC systems that will be placed on the rooftop of the project. This HVAC equipment will serve the residences and the two retail spaces in the lower floors of the building. The neighbors have expressed concern for the sound from this equipment to the neighborhood. The report studies that issue.

Acoustical Criteria

The project must meet the following City of Boston noise limits.

CITY OF BOSTON NOISE CONTROL REGULATION

The City of Boston Noise Regulation limits noise emissions that would be considered Noise Pollution. Sound level limits have been established by the Air Pollution Control Commission. Regulation 2 identifies the specific quantitative Noise Restrictions according to Zoning Districts.

This site is considered a General Business zoning designation, though residential is allowed. The properties to the north (across Public Alley 434) are zoned Residential.

Based on these conditions, the following noise level limits in Table 1 for Residential or Business Zoning Districts apply to the equipment of the project:

Table 1: City of Boston Air Pollution Control Commission Sound Level Limits										
	Octave Band Center Frequency (Hz)									
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	dBA
Residential Daytime 7AM to 6PM	76	75	69	62	56	50	45	40	38	60
Residential Nighttime 6PM to 7AM & Sundays	68	67	61	52	46	40	33	28	26	50
Business Anytime	79	78	73	68	62	56	51	47	44	65

We will compare the sound emissions from the 163 Newbury Street equipment to the Residential Nighttime and Sunday sound levels to confirm the equipment complies with the noise level limits for any time of the day, night or week.

Rooftop Equipment

For our analysis of the rooftop equipment sound emissions, we included the following equipment in our calculations.

Equipment	Model	Operating Days & Hours
Kitchen Exhaust Fan (KEF-1)	CaptiveAire model	Sunday-Saturday 11am to midnight
Retail Heat Pumps HP-1 thru 4	Mitsubishi City Multi PUMY-P48NHMU (1) & PUZ-HA42NKA (3)	Sunday -Saturday 24 Hours
Retail Heat Pump 10 Ton	Mitsubishi City Multi PURY-P120TLMU-A	Sunday-Saturday 24 Hours
Residential Heat Pumps (2)	Mitsubishi M-Series MXZ-8C48NAHZ	Sunday-Saturday 24 Hours

We obtained sound level data from the manufacturers for all of the equipment to use in our sound emissions calculations.

Sound Propagation Study

Our calculations of the sound emissions were performed using an acoustic modeling software called iNoise (version 2019). The software uses internationally accepted sound propagation algorithms. We entered the building geometries, equipment locations, and equipment sound levels to represent the conditions for this project. We checked the output of the software with hand calculations of the sound levels at a location in the middle of the rooftop to verify that the calculations were consistent with our expectations.

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February 26, 2019

Results

The sound emission predictions indicate that the sound levels at the nearest residential properties will be less than 40 dBA. This is due to the equipment being very low noise models, which minimize the sound emissions from the rooftop.

This prediction assumes that all of the equipment is operating at 100% capacity, which is not anticipated to happen except for very hot and humid daytime periods. During nighttime operation, the sound levels are expected to be even lower than 40 dBA at the neighboring residences.

This prediction also does not account for the ambient sound levels that would be present. The ambient sound levels would be additive to this prediction. Given that the predicted sound levels from the 163 Newbury rooftop equipment are less than 40 dBA, these sound levels would not be additive to an ambient level that would exceed 50 dBA.

The results of the model indicate that the sound levels from the equipment running at full capacity will be below the City of Boston noise limits for Residential Nighttime and Sunday designation (50 dBA).

We trust this provides the information that you need at this time, please feel free to contact us by email (Jeffrey.Fullerton@intertek.com or Alexander.Maurer@Intertek.com) or phone (857-523-6576 or 603-560-4614) should you have any questions or require further information.

Sincerely,

Architectural Testing, Inc., an Intertek company

Digitally signed by Jeffrey L. Fullerton
Date: 2019.02.26 16:37:44-05'00'

Jeffrey L. Fullerton, INCE Bd. Cert., LEED AP_{BD+C}
Acoustics Department Manager
Building Science Solutions

Digitally signed by Alexander Maurer
Date: 2019.02.26 17:06:32-05'00'

Alex Maurer
Acoustical Consultant
Building Science Solutions

JLF:kag

Example of Kitchen Exhaust Fan

Photograph of Typical Heat Pump Units (Not In Proposed Location)