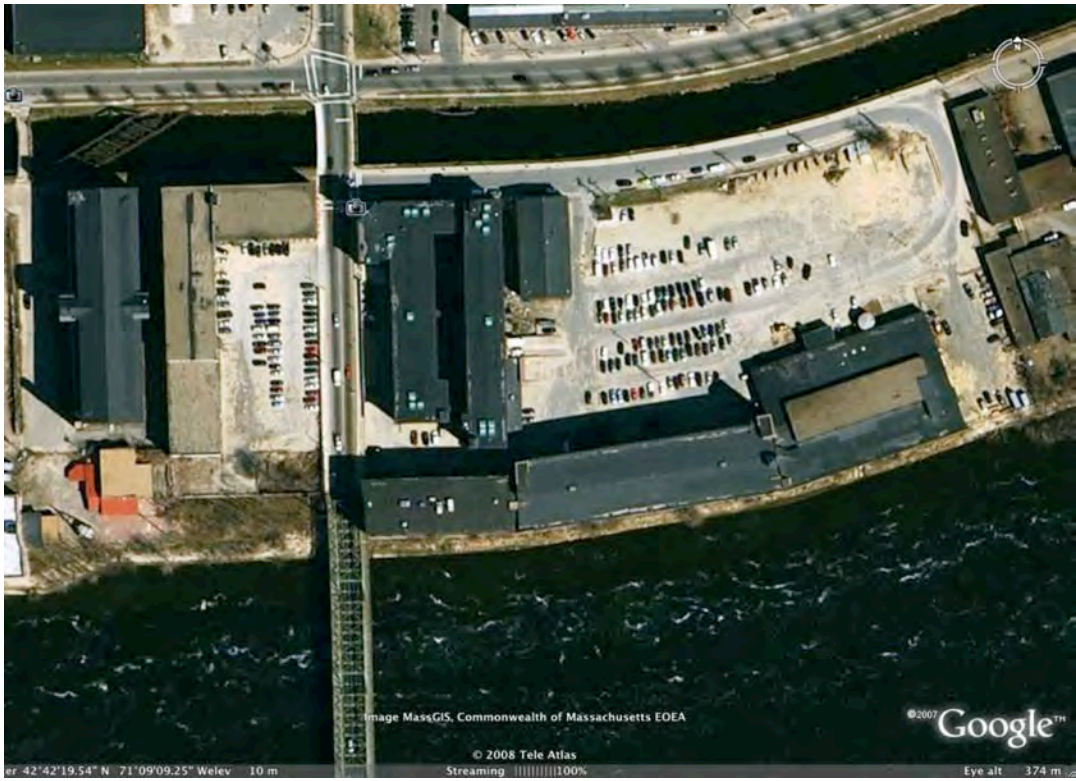
Lawrence Community Works

union crossing

Client - Lawrence Community Works

Coldham&Hartman Architects



Context Plan

Existing Site

Site Plan

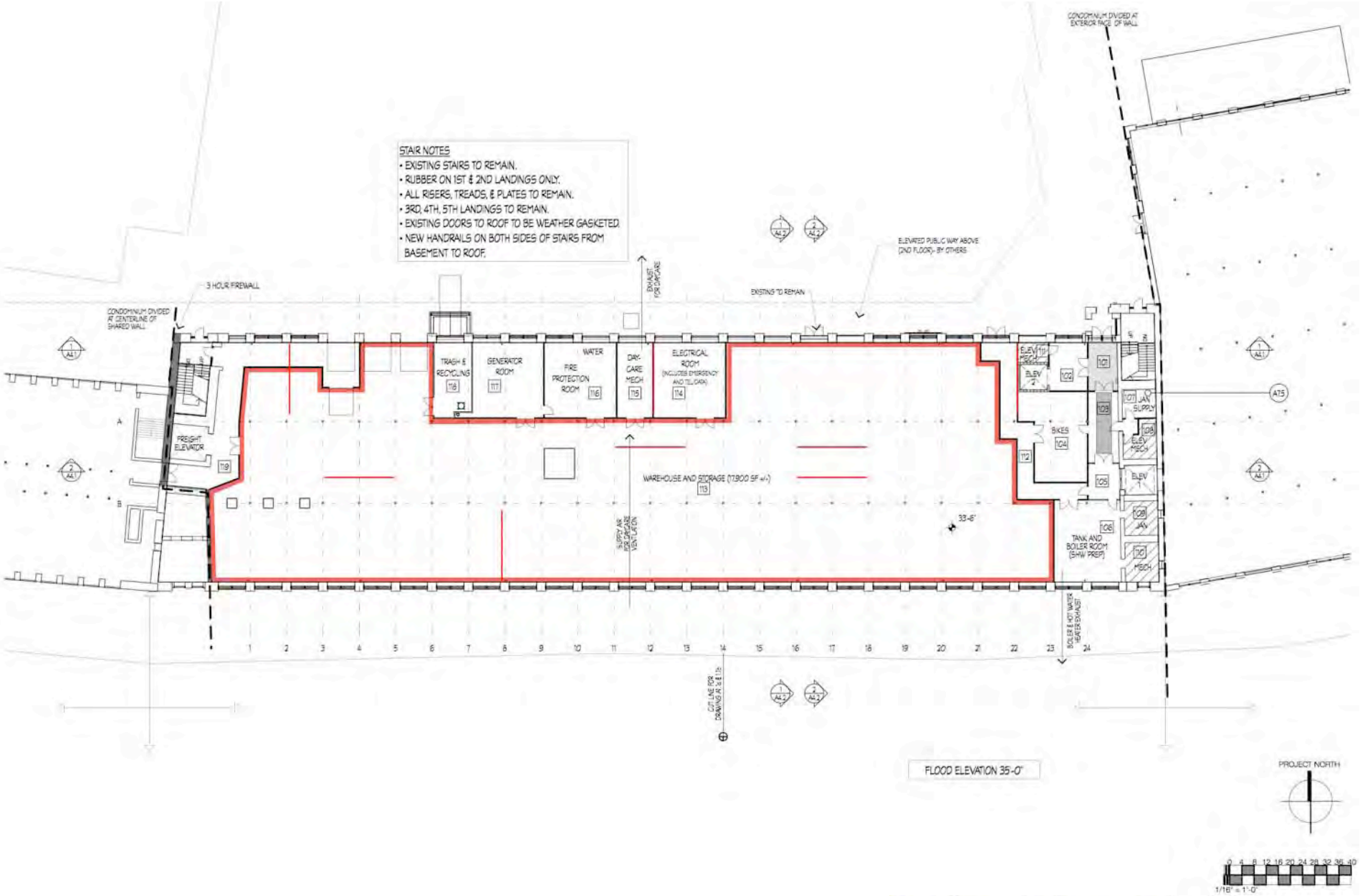
Coldham&Hartman Architects

Rendering – From rooftop looking North

Coldham&Hartman Architects

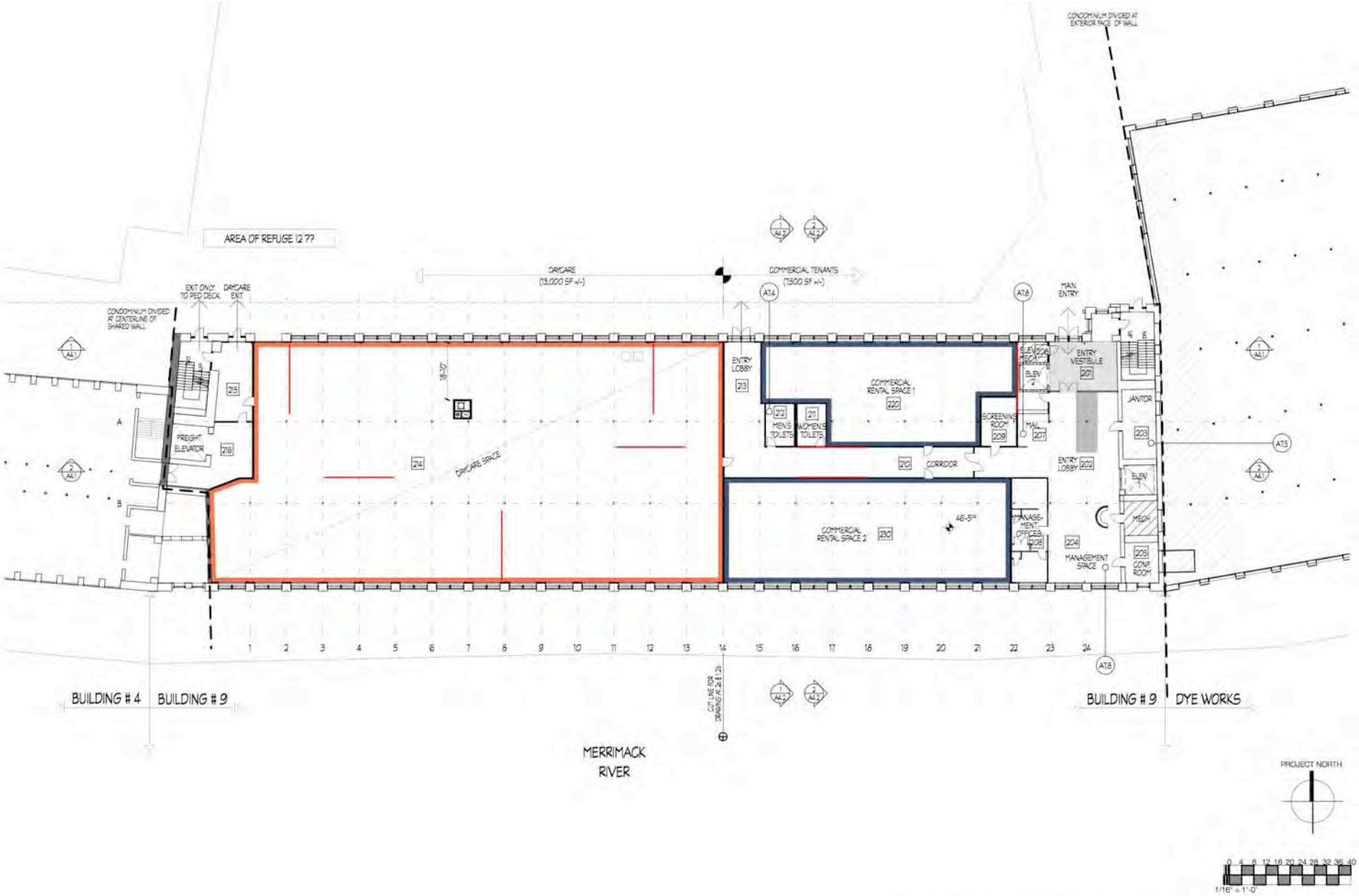
Rendering - Pedestrian Bridge from Island Street

Coldham&Hartman Architects



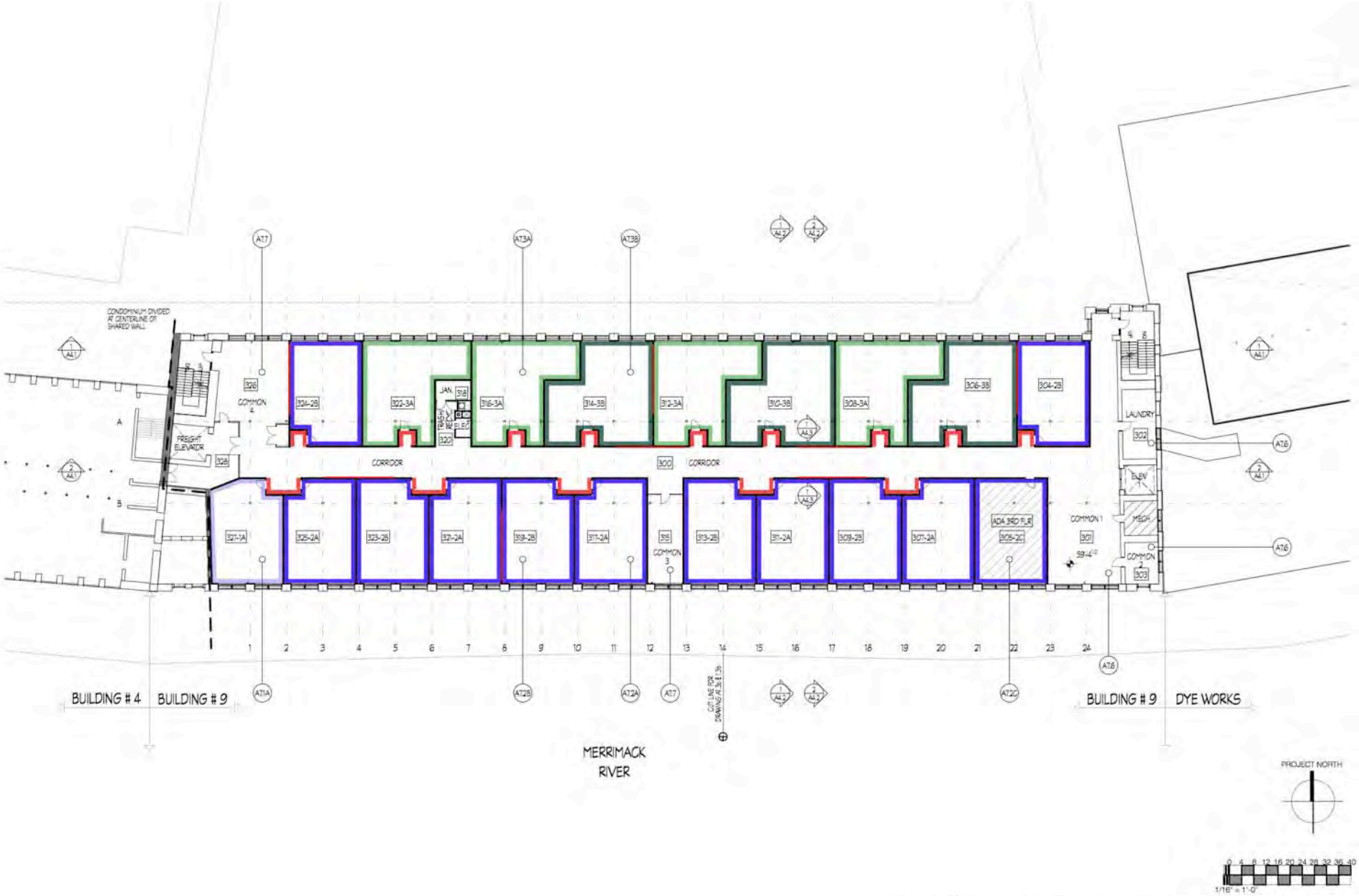
First Floor Plan

Coldham&Hartman Architects



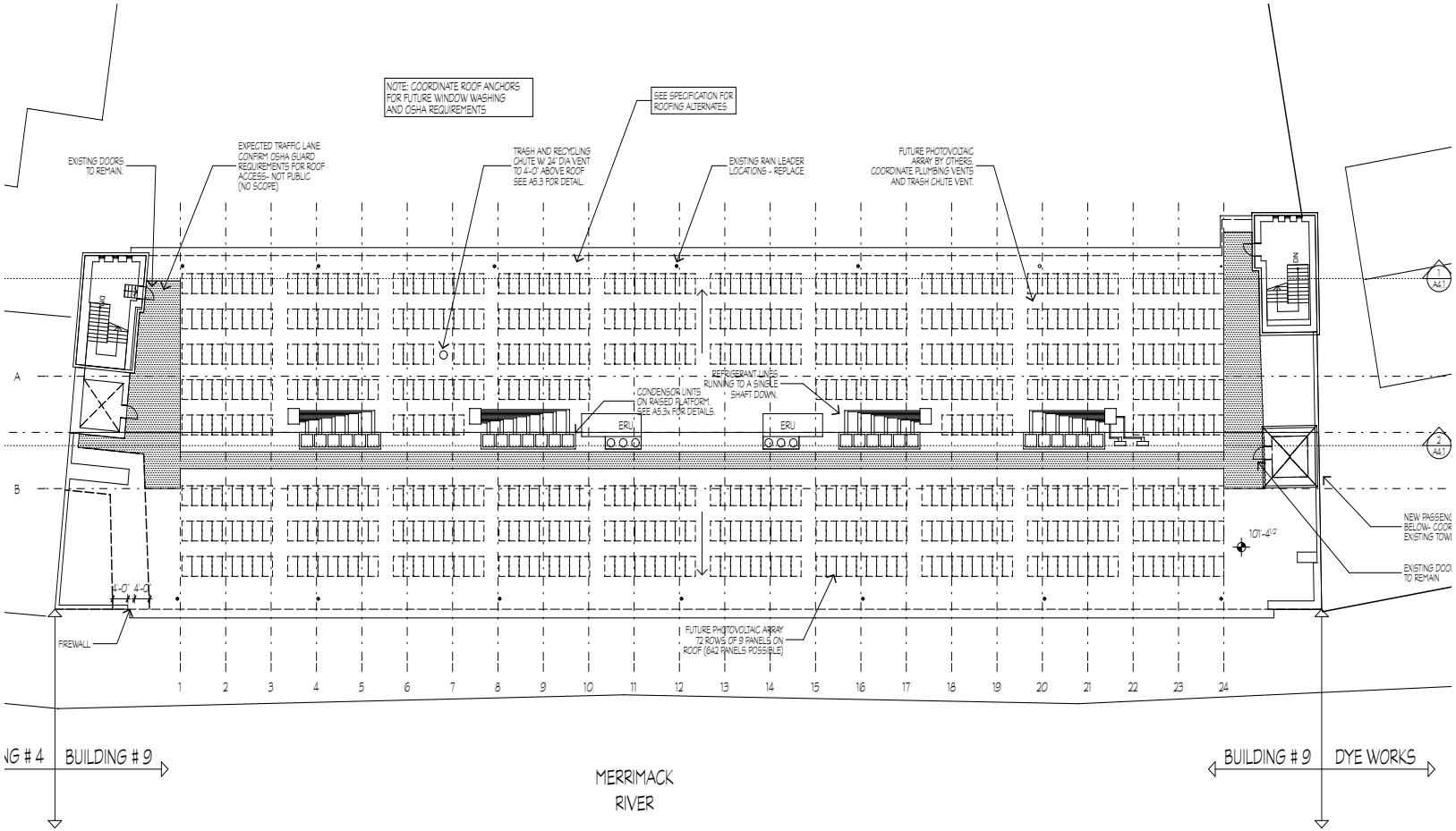
Second Floor Plan

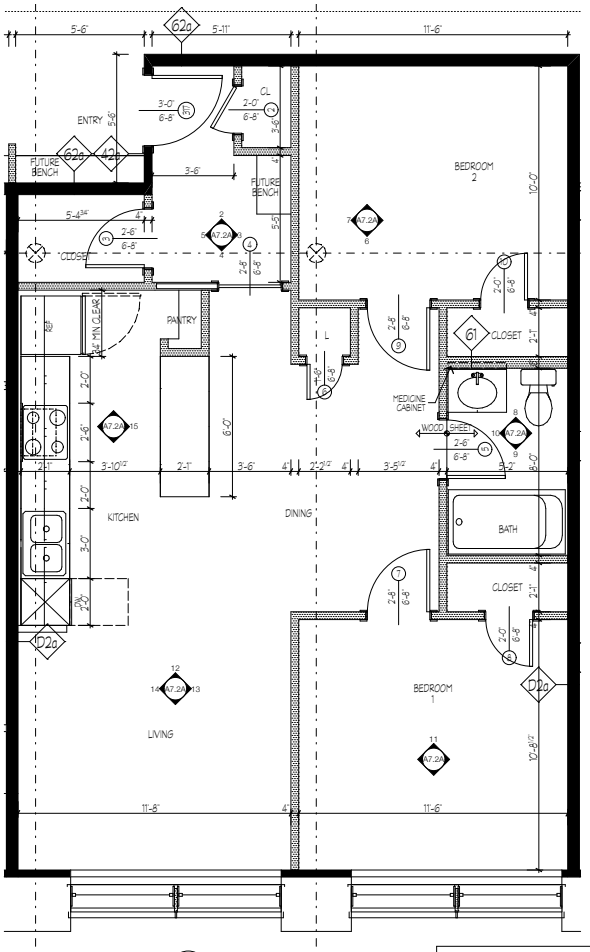
Coldham&Hartman Architects



Third Floor Plan

Coldham&Hartman Architects

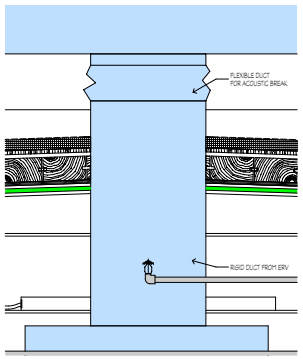

NOTE: COORDINATE ROOF ANCHORS FOR FUTURE WINDOW WASHING AND OSHA REQUIREMENTS
SEE SPECIFICATION FOR ROOFING ALTERNATES
EXISTING DOORS TO REMAIN.
EXPECTED TRAFFIC LANE CONFIRM OSHA GUARD REQUIREMENTS FOR ROOF ACCESS- NOT PUBLIC (NO SCOPE)
TRASH AND RECYCLING CHUTE W/ 24" DIA VENT TO 4'-0" ABOVE ROOF SEE A5.3 FOR DETAIL.
EXISTING RAIN LEADER LOCATIONS - REPLACE
FUTURE PHOTOVOLTAIC ARRAY BY OTHERS. COORDINATE PLUMBING VENTS AND TRASH CHUTE VENT.
REFRIGERANT LINES RUNNING TO A SINGLE SHAFT DOWN.
CONDENSOR UNITS ON RAISED PLATFORM. SEE A5.3x FOR DETAILS.
ERU
ERU
FUTURE PHOTOVOLTAIC ARRAY 72 ROWS OF 9 PANELS ON ROOF (642 PANELS POSSIBLE)
FIREWALL
4'-0"
4'-0"
101'-4 1/2"
A
B
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
BUILDING # 9
BUILDING # 9
DYE WORKS
MERRIMACK RIVER



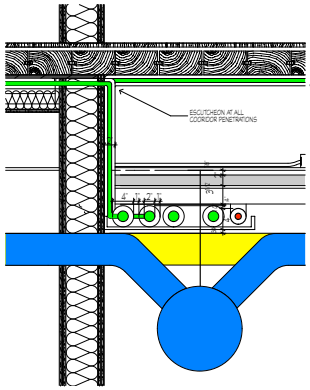
1A PLAN
3/8" = 1'-0"

862 SF

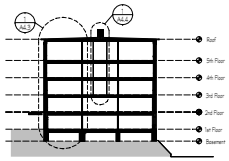
NOTE: ALL WALLS WITHIN UNITS ARE TYPE 41 UNLESS OTHERWISE NOTED

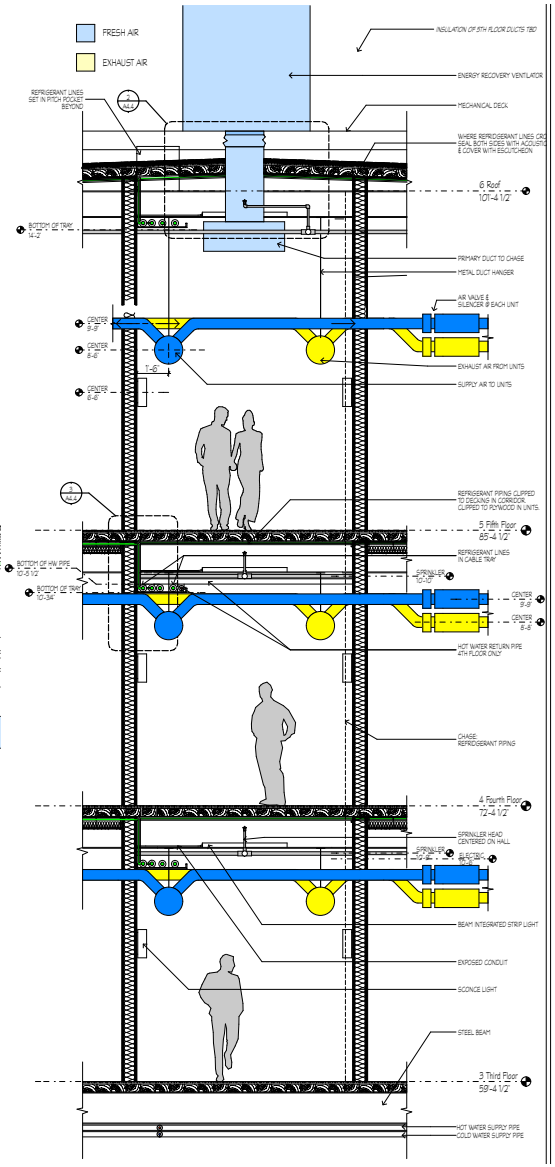


2 DETAIL SECTION - ROOF MECH PENETRATION
1 1/2" = 1'-0"



3 DETAIL SECTION - UNIT WALL MECH PENETRATION
1 1/2" = 1'-0"



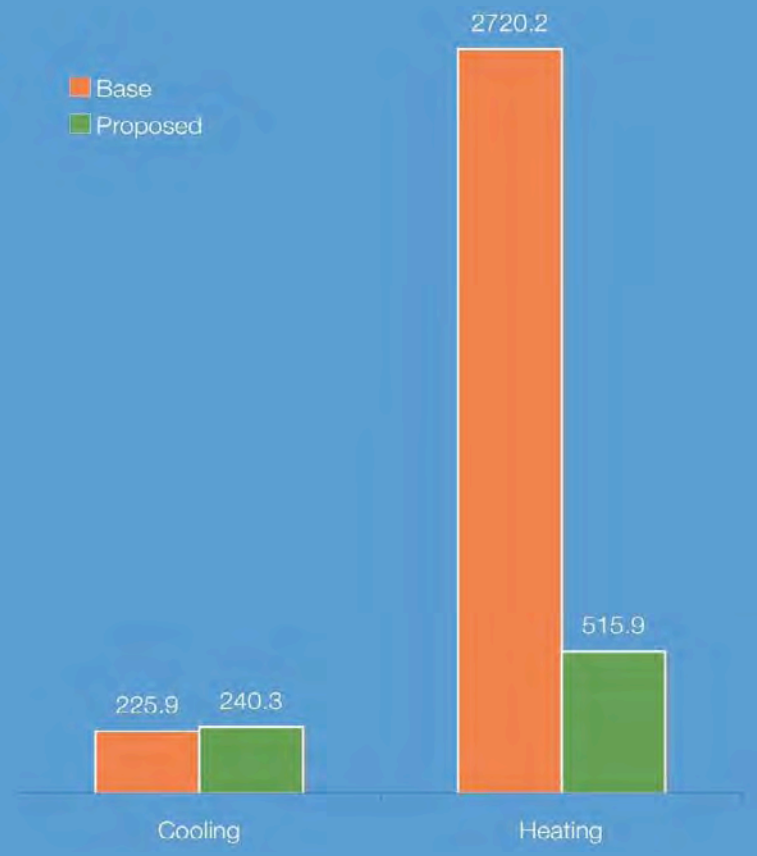


Union Crossing- Building 9 Thermal Envelope summary

Component	*Base*	*Design*
Exterior Walls	R4.3 (based on R0.2/inch x 18") Uninsulated 18" deep brick infill with 36" piers averaging 28" deep	R22 3 1/2" closed cell foam at R6.2 per inch on top of brick base value
Windows	U value 0.6, shgc 0.45 Aluminum w/ basic glass	Existing to remain- use base (Also Upgraded to U of 0.33 and shgc of 0.26)
Roof	R10 Leave existing roof in place as is- assumed to be 1 layer of tapered polyiso with epdm membrane over 4" decking	R30 On underside of decking- existing roof to remain – add 3 1/2" closed cell foam at R6.2 per inch under deck
Floors	R6 typically with R8 above warehouse	Same as base
Air infiltration	Estimated total cfm 4340 0.5 cfm50/sf of shell 0.0419 cfm natural per sf of shell LIKELY MUCH MORE	Goal of Total cfm 2170 0.25 cfm50/sf of shell 0.021 cfm natural per sf of shell (weak spot is exist windows)

	Base	Proposed
Exterior Wall	As Is: Brick - R4.3	Insulated - R15
Window	U-value .5	U-value .33
Roof	As Is: R14	Re-roof: R30
Garage Ceiling	R-10	R-20
Air Leakage	.5cfm50 / sf of shell	.1cfm50 / sf of shell

Consumption (MMBtu/year)

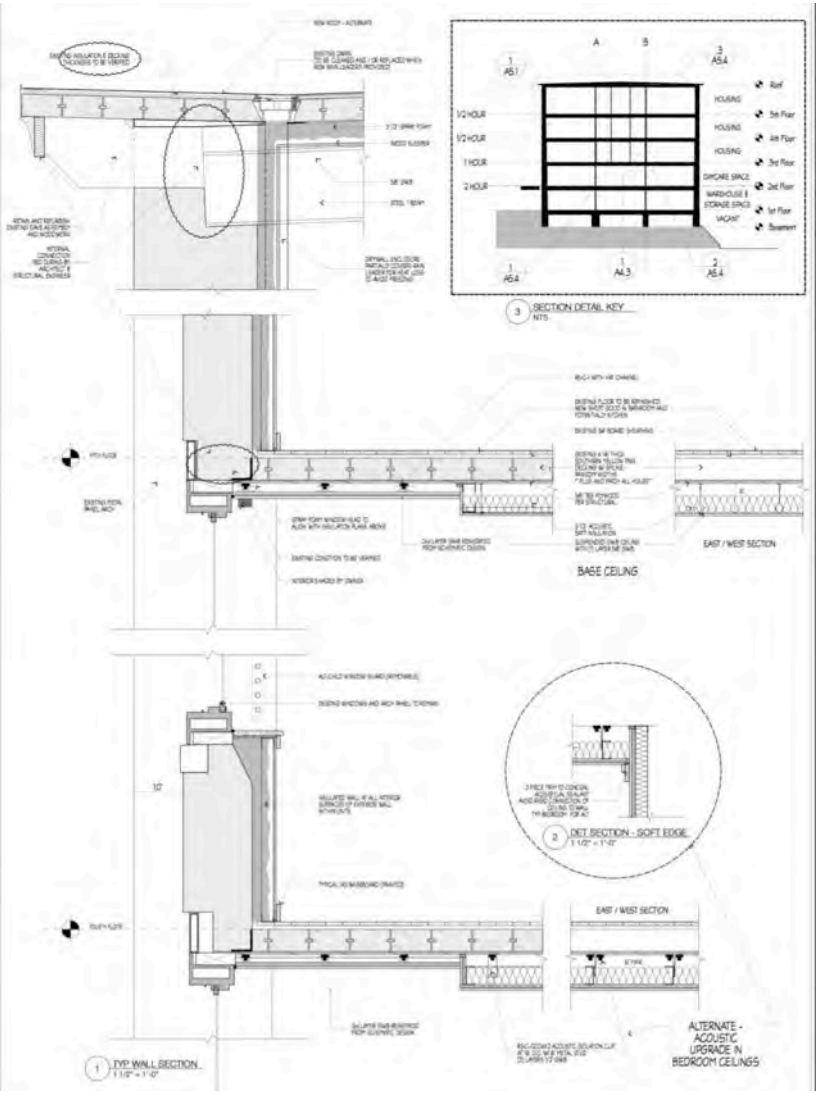


Proposed Savings : 81%

Coldham&Hartman Architects

It's The Envelope,

Building 9 Union Crossing


SECTION DETAIL KEY
BASE CEILING
EAST / WEST SECTION
DET SECTION - SOFT EDGE
EAST / WEST SECTION
ALTERNATE - ACOUSTIC UPGRADE IN BEDROOM CEILINGS
TYP WALL SECTION

National Grid 2009 Custom Screening Tool - v 1.0	Report Version - 1.0	10/20/2009 12:03:24 PM
Customer Name:	Union Crossing	
Project Description:	ECM-C -- Improved Envelope	
Existing Case	Existing Brick Walls Infiltration estimated at 0.50 ACH	
Proposed Case	3.5 in. of closed-cell foam on interior of brick walls 6 in. of closed-cell foam on interior of roof deck Infiltration estimated at 0.25 ACH	

Utility Contact:		**Phone Number:**	
Program:	D2	**App Number:**	
State:	MA	**Funding Type:**	Standard

Time Period	Energy (kWh) Reduction Per Period	Hours Per Period	Average Demand Reduction Per Period
Winter			
December 5pm-7pm M-F	7434	42	177
January 5pm-7pm M-F	4326	42	103
February	0	0	0
Summer			
June 1pm-5pm M-F	0	84	0
July 1pm-5pm M-F	0	84	0
August 1pm-5pm M-F	0	92	0
September	0	0	0

Measure Code:	BSHL
Measure Description:	Building Shell
Measure Life:	20
Base Costs	$68,200
Proposed Costs	$161,746
Est Incremental Costs	$93,546
Est Incr Equip Costs	$0
Est Incr Labor Costs	$0

Total Est Annual kWh Savings	131,757
Average Cost Per kWh	0.1406
Est Annual Energy Cost Savings	$18,525
% On Peak Energy Savings	25
Proposed Incentive	$65,482

70% of Incremental $

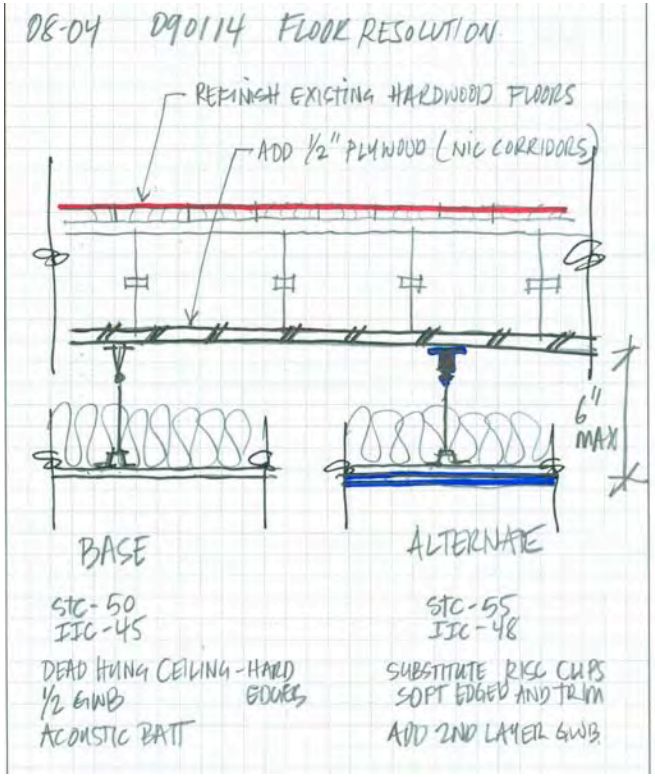
Results	
Oil (Gallons)	0
Gas Heating (Therms)	0
Gas NonHeating (Therms)	0
Water (Gallons)	0
WasteWater (Gallons)	0
Other ($)	$0.0
Total NEB $ Savings	$0.0
Pk Win kW Rd	140.0
Pk Sum kW Rd	0.0
kW Years	0
Lifetime MWH	2635.1
Payback Without Incentive	5.0
Payback With Proposed Incentive	1.5

Customer Cost : $28,064

08-04 Air Sealing Sheet

1 ACH= VOLUME/60MIN
(CFM50*(60M/H))/Volume cu.ft. = ACH
ACH50= ACH Nat x 17
ENERGY STAR IS 5.0 ACH 50

Date	Name	Final Cost	Heated Floor Area s.f.	Cost per sf (nic land)	Volume c.f.	Shell Area s.f.	ELA in2	ELA/100 in2	CFM50	**CFM50/sf shell**	VOLUME of 1ACH, in **CFM**	ACH50 %	ACH Nat %
091104	Acoustical Mockup AS Test 1 all windows unsealed		243	$0	2,534	1,175			490	**0.42**		11.60	0.68
	upper sashes sealed		243	$0	2,534	1,175			352	**0.30**		8.34	0.49
	upper & lower sashes sealed		243	$0	2,534	1,175			215	**0.18**		5.08	0.30



Acoustical Mockup Test - Air Sealing Test

Figure 1. Airborne Sound Transmission - Standard Floor-Ceiling

Date of measurement: 11/4/2009
Consultant: JS/CS
Acentech Project: 619804

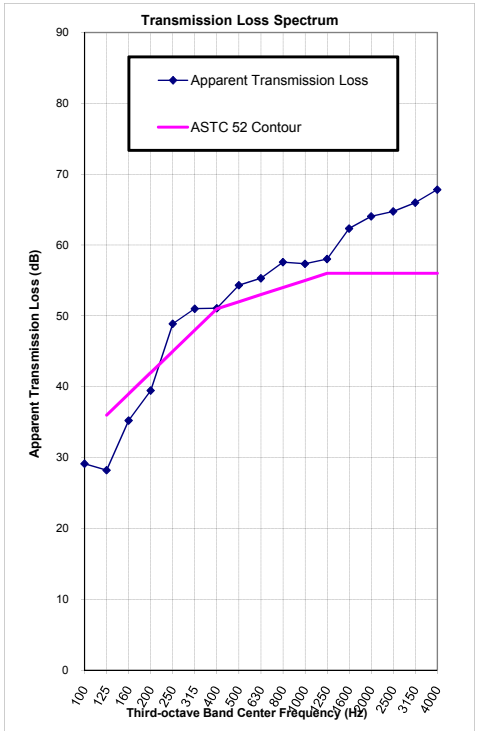
Description of construction:
Existing wood floor and structure throughout. Ceiling in most of the room is one layer of gypsum board suspended on wire, 18-inch airspace, insulation in cavity. Ceiling at window is one layer of gypsum board attached to wood deck using RSIC-1 clips, insulation in small cavity.

Third-Octave Band Center Frequency (Hz)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
Average Source Room Sound Pressure Levels	96.6	98.7	97.1	93.9	97.4	97.9	98.1	97.2	96.1	95.0	94.5	92.9	89.5	88.7	89.3	90.1	90.4
Average Receiving Room Sound Pressure Levels	70.8	72.6	65.9	57.6	52.2	50.8	49.8	46.3	43.6	40.3	39.8	37.6	30.0	26.9	26.4	26.1	24.4
Ambient Sound Level	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Absorption Effects	-3.3	-2.1	-4.0	-3.2	-3.7	-3.9	-2.8	-3.4	-2.8	-2.9	-2.7	-2.7	-2.8	-2.2	-1.8	-2.0	-1.8
Apparent Transmission Loss	**29**	**28**	**35**	**39**	**49**	**51**	**51**	**54**	**55**	**58**	**57**	**58**	**62**	**64**	**65**	**66**	**68**

Apparent Sound Transmission Class (ASTC):	**52**

Description of Source Room:
Lower mockup bedroom.

Description of Receiver Room:
Upper mockup bedroom.



Impact Insulation Measurement Report

Figure 5. Impact Sound At Window (Room A)

Date of measurement: 11/4/2009
Consultant: JS/CS
Acentech Project: 619804

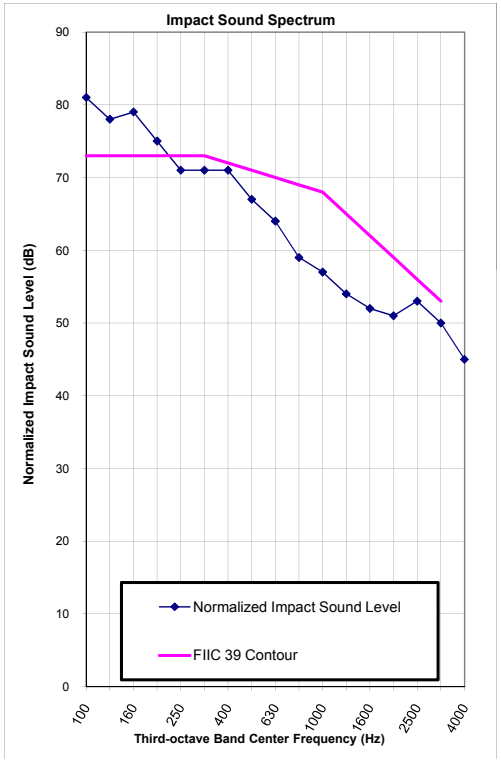
Description of construction:
Existing wood floor and structure, ceiling at window is two layers of gypsum board attached to wood deck using RSIC-1 clips, insulation in small cavity.

Third-Octave Band Center Frequency (Hz)	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
Average Impact Sound Levels	79.1	74.3	77.3	72.3	69.6	69.8	68.5	65.1	61.3	56.6	53.8	51.0	49.4	47.5	49.4	46.6	41.5
Ambient Sound Levels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Absorption Effects	2.1	3.3	1.4	2.3	1.8	1.6	2.7	2.0	2.7	2.6	2.8	2.7	2.6	3.2	3.6	3.5	3.7
Normalized Impact Sound Levels	**81**	**78**	**79**	**75**	**71**	**71**	**71**	**67**	**64**	**59**	**57**	**54**	**52**	**51**	**53**	**50**	**45**

Field Impact Insulation Class (FIIC):	**39**

Description of Source Room:
Upper bedroom mockup.

Description of Receiver Room:
Lower bedroom mockup.



6/3/09

08-04 SOLAR HOT WATER.xls

Union Crossing - SOLAR HOT WATER
Project: 08-04
Bld 9

Last Revised
29-May-09

	Quantity	# people	subtotal
1 bedrooms	3	1.5	4.5
2 bedrooms	36	2.5	90
3 bedrooms	21	4	84

TOTAL PEOPLE	179
Gallons per person per day	15
gallons per day	2,678
gallons per year	977,288
btu input per gallon	686
Total btu required output	670,419,225
Boiler / system efficiency	85%
Gas input	788,728,500
Therms	7,887
Solar fraction GOAL	60%
Avoided therms	4,732

52 degree average water temp
8.33 lbs per gallon x delta t
120 delivery temp
delivered water temp can range over year

Water Heater can be 90%, but then standby l

Produced btu per sf of panel
160,000

% solar
60%

402,251,535

sf required	# panels at 40 sf each
2514.07	62.9

cost per sf
$125

installed system cost
$314,259

BuildingGreen's Top 10 Products for 2012

Innovative solutions for energy efficiency, reduced toxicity, and retrofits

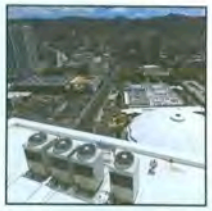
By Alex Wilson

Ductless heat pumps and VRF systems with tenant submetering

Mitsubishi Electric

What makes it green?

- *Conserves energy and manages loads*
- *Alternatives to ozone-depleting substances*



These split-ductless and VRF (variable refrigerant flow) air-source heat pump systems supply efficient heating and cooling for residential and commercial applications. They comprise outdoor condensers, controllers, and interior air-handling units supplied by lines carrying ozone-safe R-410a refrigerant. In recent years, Mitsubishi Electric has been at the leading edge of the air-source heat pump revolution. Their efficient systems significantly outperform older unitary heat pumps, especially at low outdoor temperatures in which air-source heat pumps have not been practical. The residential M-series models are available with SEER ratings as high as 26. Some are available with wireless controls and Mitsubishi's Hyper-Heating Inverter (H2i) technology, allowing operation at outside temperatures as low as -13°F (-25°C). For multifamily application, the company's VRF systems can be configured with "tenant billing." A single outside unit can serve up to 50 individual zones, with total electricity consumption apportioned for separate billing to tenants according to the heated or chilled air delivered by the indoor units.

www.mitsubishielectric.com

Carpet tiles with non-PFC carpet fibers

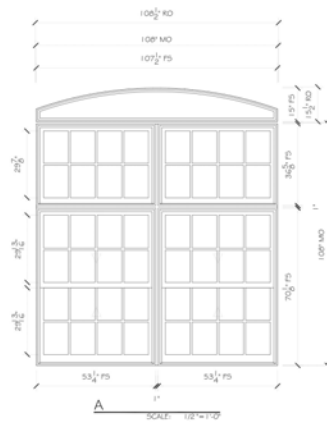
InterfaceFLOR

What makes it green?

- *Post-consumer recycled content*
- *Pre-consumer recycled content*
- *Releases minimal pollutants*
- *Reduces pollution or waste from operations*

Evaluation Criterion 1:

Mitsubishi City-Multi ceiling unit



Park Service -compliant window submittal

Competition propels further savings

1. Technical Merit and Innovation

1.4 Quality / availability of equipment

All of the technologies and equipment being proposed are high-quality off-the-shelf products, currently available.

Closed cell spray foam, Energy Recovery Ventilators, and high-performing wood windows are prevalent throughout the Commonwealth.

Building Energy Dashboards are rapidly becoming more widespread, especially on college campuses in the state. Boston College, for instance, has networked 25 residences for display on a single dashboard and initiated a campus-wide competition to reduce electric consumption, resulting in an estimated 15000 kwh saved over the course of their "NRG Games".

1.5 Risks

The risks involved in Air Sourced Heat Pumps are ones of half-measures.

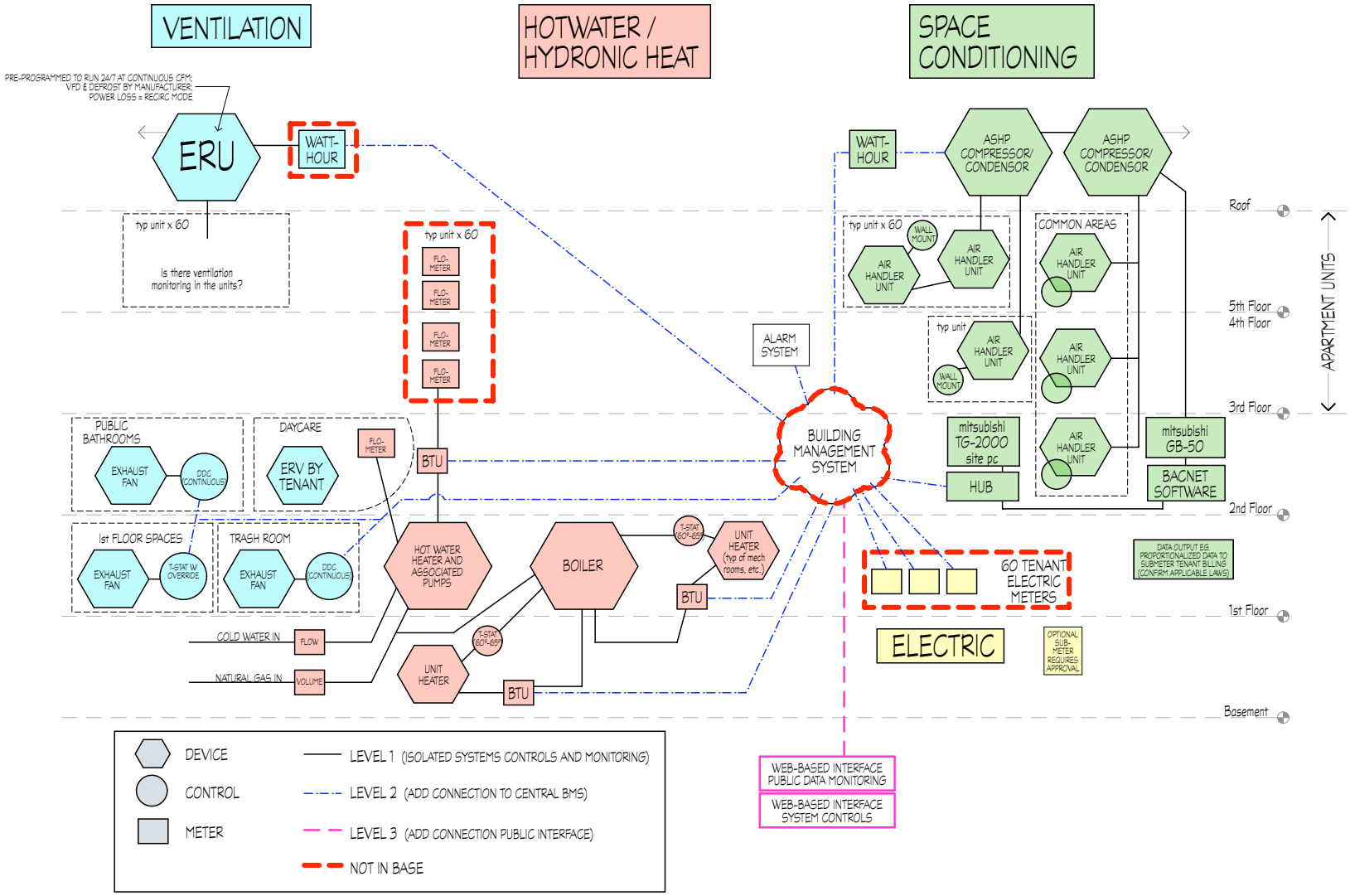
The Mitsubishi City-Multi Air Sourced Heat Pumps have excellent Coefficients of Power, from 2.2 to 3.9, but the reliance on electrically-driven heating - without significant load reductions -will not by itself decrease reduce primary (source) energy consumption, reliance on the fossil-driven electric grid, or the carbon output of Union Crossing.

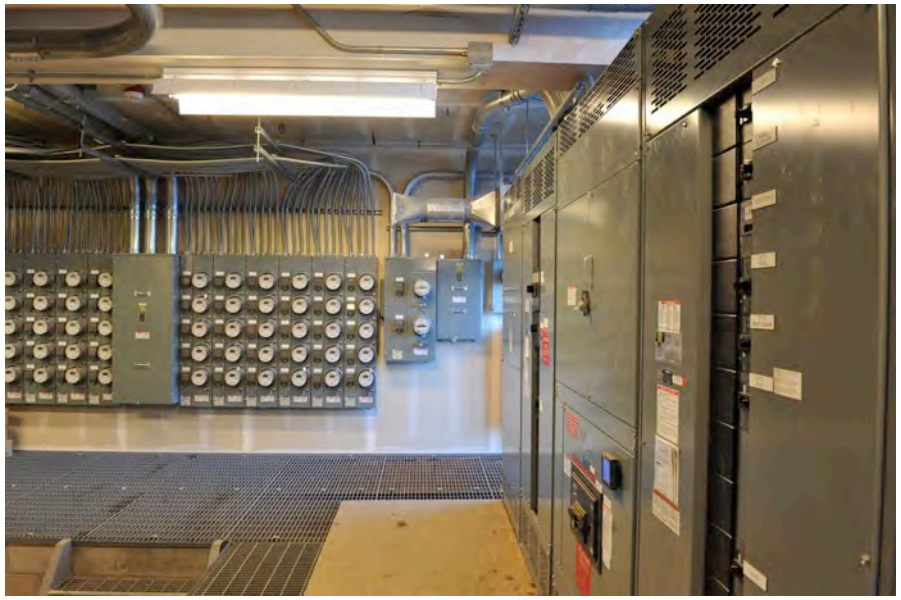
In combination with air sourced heat pumps, envelope-based load reductions can reduce both site and source energy required, resulting in lowered energy consumption, lower cost, and lower carbon outputs.

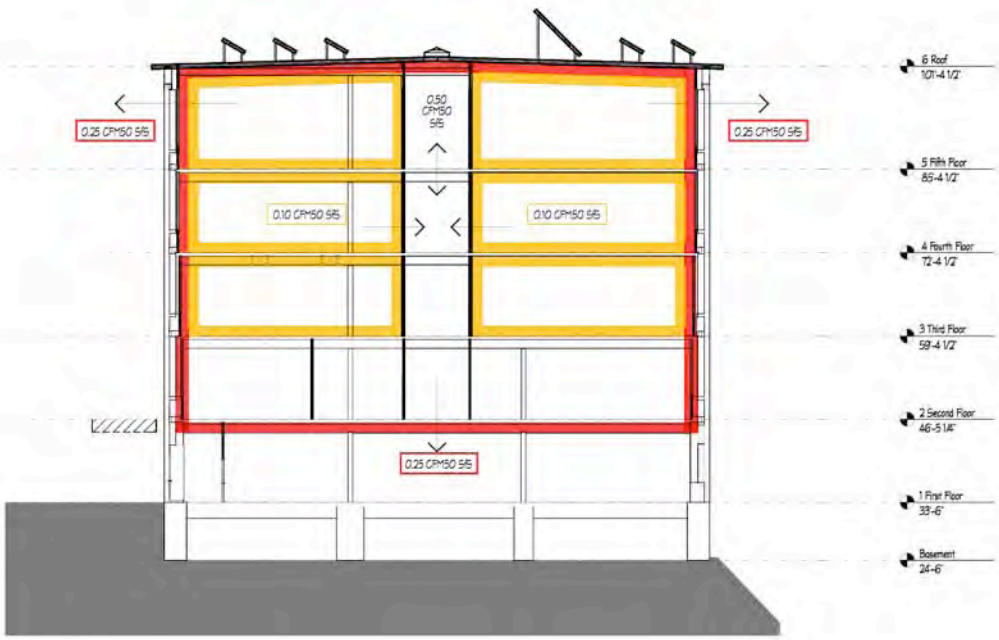
Without these significant reductions, electrically-driven heating of aging mill buildings may also drive large peak demands. In general, eQuest modeling of this project has shown that the upgrade package proposed increases demand during some "shoulder" months, while decreasing demand at other times - during summer. This "smoothing" of the demand curve will be of benefit to the grid at large.
Union Crossing will tread more lightly on the electric grid than its standard practice contemporaries.

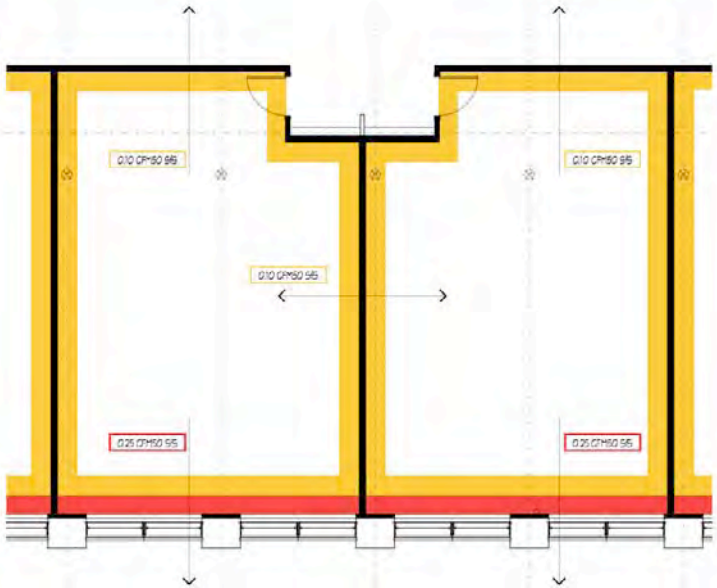
The risk of monitoring is that its messages will go unheard. Installation of even the most advanced measuring systems requires diligent follow-up and on-going behavior modification to be of real value.

Lawrence CommunityWorks and the tenants at Union Crossing will engage in active education literacy campaigns to pursue continuous energy reductions, based on feedback from the monitoring systems to be installed. Success in similar education programs indicates good reason to expect success in this field.


VENTILATION
HOTWATER / HYDRONIC HEAT
SPACE CONDITIONING
PRE-PROGRAMMED TO RUN 24/7 AT CONTINUOUS CFM; VFD & DEFROST BY MANUFACTURER POWER LOSS = RECIRC MODE
ERU
WATT-HOUR
typ unit x 60
Is there ventilation monitoring in the units?
typ unit x 60
FLO-METER
FLO-METER
FLO-METER
FLO-METER
PUBLIC BATHROOMS
EXHAUST FAN
DDC CONTINUOUS
DAYCARE
ERV BY TENANT
FLO-METER
BTU
1st FLOOR SPACES
EXHAUST FAN
T-STAT W OVERRIDE
TRASH ROOM
EXHAUST FAN
DDC CONTINUOUS
HOT WATER HEATER AND ASSOCIATED PUMPS
BOILER
T-STAT 60°-65°
UNIT HEATER (typ of mech rooms, etc.)
BTU
COLD WATER IN
FLOW
NATURAL GAS IN
VOLUME
T-STAT 60°-65°
UNIT HEATER
BTU
ALARM SYSTEM
BUILDING MANAGEMENT SYSTEM
WATT-HOUR
ASHP COMPRESSOR/ CONDENSOR
ASHP COMPRESSOR/ CONDENSOR
typ unit x 60
WALL MOUNT
AIR HANDLER UNIT
AIR HANDLER UNIT
COMMON AREAS
AIR HANDLER UNIT
typ unit
AIR HANDLER UNIT
WALL MOUNT
AIR HANDLER UNIT
AIR HANDLER UNIT
AIR HANDLER UNIT
mitsubishi TG-2000 site pc
HUB
mitsubishi GB-50
BACNET SOFTWARE
60 TENANT ELECTRIC METERS
ELECTRIC
DATA OUTPUT EG. PROPORTIONALIZED DATA TO SUBMETER TENANT BILLING (CONFIRM APPLICABLE LAWS)
OPTIONAL SUB-METER REQUIRES APPROVAL
Roof
5th Floor
4th Floor
3rd Floor
2nd Floor
1st Floor
Basement
APARTMENT UNITS
DEVICE
CONTROL
METER
LEVEL 1 (ISOLATED SYSTEMS CONTROLS AND MONITORING)
LEVEL 2 (ADD CONNECTION TO CENTRAL BMS)
LEVEL 3 (ADD CONNECTION PUBLIC INTERFACE)
NOT IN BASE
WEB-BASED INTERFACE PUBLIC DATA MONITORING
WEB-BASED INTERFACE SYSTEM CONTROLS

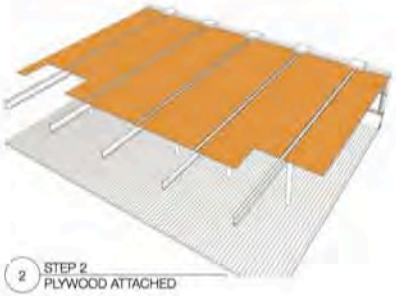




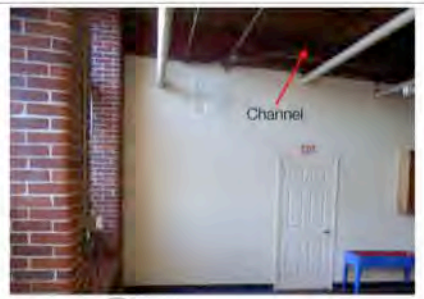


Air Sealing - Section & Plan

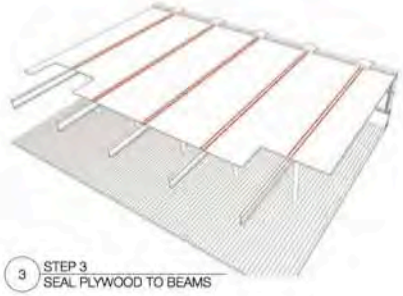
1 STEP 1
SEAL CHANNELS



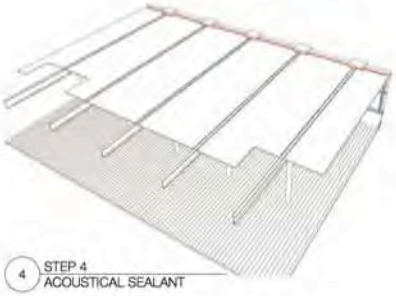
2 STEP 2
PLYWOOD ATTACHED



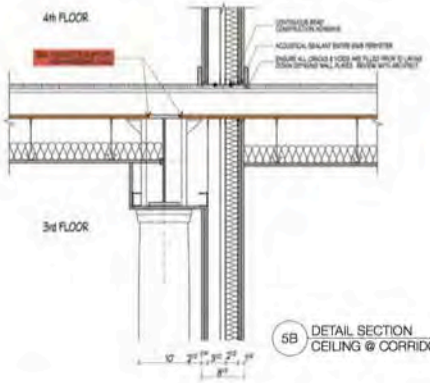
1A PHOTO
EXISTING CHANNEL



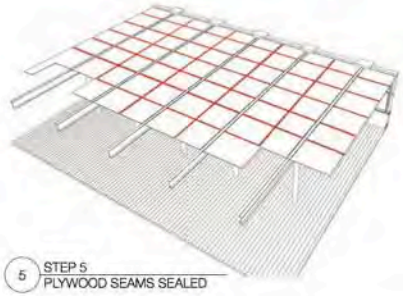
3 STEP 3
SEAL PLYWOOD TO BEAMS



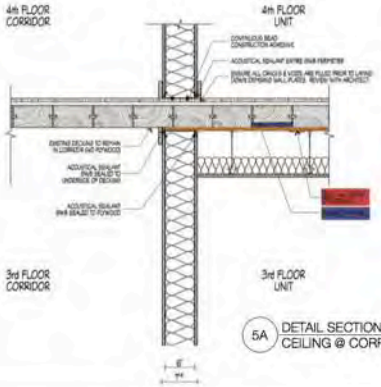
4 STEP 4
ACOUSTICAL SEALANT



5B DETAIL SECTION
CEILING @ CORRIDOR WALL



5 STEP 5
PLYWOOD SEAMS SEALED



5A DETAIL SECTION
CEILING @ CORRIDOR WALL

AIR SEALING SEQUENCE

1. Seal existing channels in the underside of decking (see image above) with single component high-expansion poly foam. Seal the channel so that the foam extends 2' +/- on either side of the beams only. Ensure that the foam is flush with the decking so plywood can be applied (see 1A for existing channel).
2. Plywood attached to underside of existing wood decking. Plywood does not extend into the corridor. Edge of plywood will align with corridor demising wall below (corridor side of GWB to be applied to decking, not plywood - see detail 9A).
3. Seal plywood to beams with acoustical sealant.
4. Acoustical sealant at all connections to exterior brick wall.
5. All seams of plywood are sealed with non-hardening caulk.

For steps 1-5 see detail section 5A & 5B.

Architect's Consultants

Energy & Equipment
Energysmiths
Marblehead, MA

Fire Protection
Agricola Corp
Chicopee, MA

Structural Engineering
Structures North
Salem, MA

Mechanical Engineering
Van Zelm, Heywood & Shadford, Inc.
Farmington, CT

Acoustics
Acentech Inc
Cambridge, MA

Building Envelope
Steven Winter Associates
Maynard, MA

Geotechnical Engineering
Harold Cutler, PE
Sudbury, MA

Lighting Design
Naomi Miller
Troy, NY

Owner's Consultants

Construction Management
Eckman Construction Company, Inc.
Bedford, NH

Landscape Architecture
Planners Collaborative
Boston, MA

Civil Engineering
TEC, Inc.
Lawrence, MA

Green Energy Consultant
Stephen Burrington
Brookline, MA

Coldham&Hartman Architects

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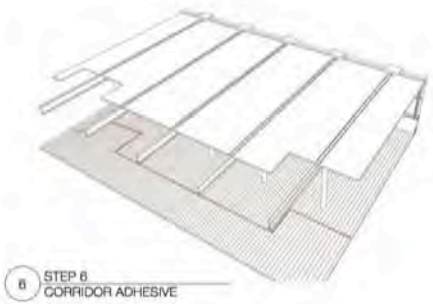
Lawrence COMMUNITY WORKS

LAWRENCE
Massachusetts

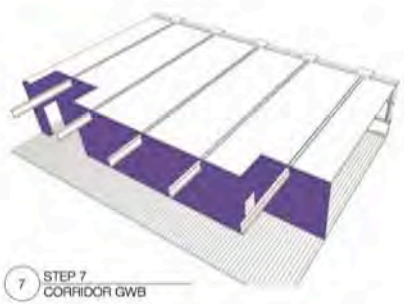
AIR SEALING SEQUENCE

Date: see above
Project No. 08-04
Scale: NOT TO SCALE
Drawn by: CJP
Checked by: —

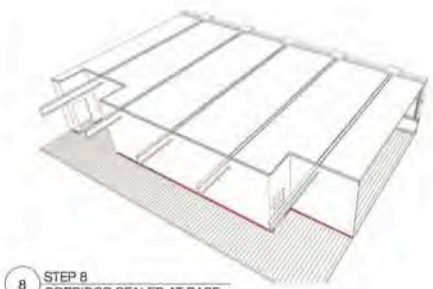
AS-2



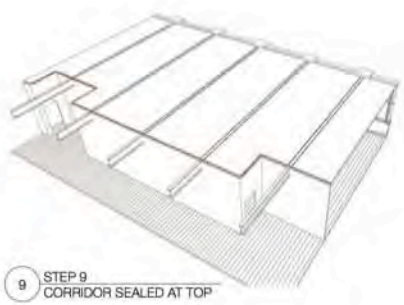
6 STEP 6
CORRIDOR ADHESIVE



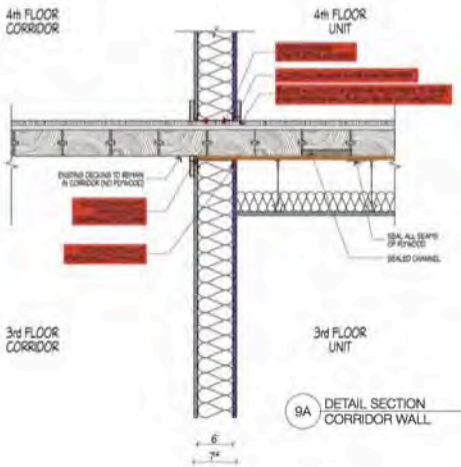
7 STEP 7
CORRIDOR GWB



8 STEP 8
CORRIDOR SEALED AT BASE



9 STEP 9
CORRIDOR SEALED AT TOP



9A DETAIL SECTION
CORRIDOR WALL

AIR SEALING SEQUENCE

6. (2) Continuous beads of construction adhesive placed at location of corridor demising walls. Ensure all cracks and voids are filled prior to laying down demising wall plates. Review with architect.
7. (1) layer GWB installed (interior/unit side only) as air barrier of corridor demising wall.
8. Acoustical sealant around entire base of GWB perimeter.
9. Acoustical sealant at top of corridor GWB (sealed to plywood).

For steps 6-9 see detail section 9A.

Architect's Consultants

Energy & Equipment
Energysmiths
Marblehead, MA

Project Manager
Agricola Corp
Chicopee, MA

Structural Engineering
Structures North
Salem, MA

Mechanical Engineering
Van Zelm, Heywood & Shadford, Inc.
Farmington, CT

Insulation
Acentech Inc
Cambridge, MA

Lighting Consultant
Steven Winter Associates
Maynard, MA

Code Consultant for Renovation
Harold Cutler, PE
Burlington, MA

Lighting Designer
Naomi Miller
Troy, NY

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Bedford, NH

Landscape Architecture
Planners Collaborative
Boston, MA

Civil Engineering
TEC, Inc.
Lawrence, MA

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AIR SEALING SEQUENCE

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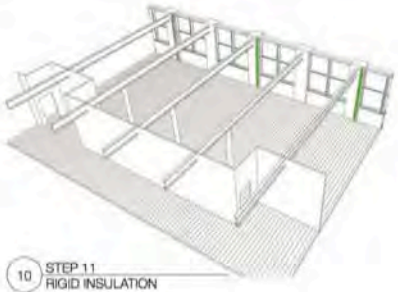
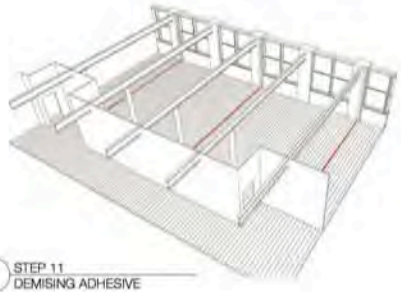
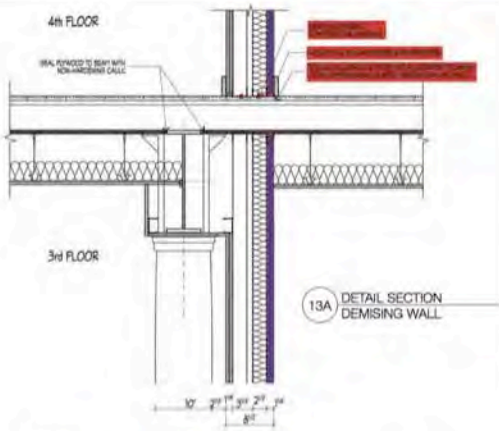
AS-3



10 STEP 11
RIGID INSULATION

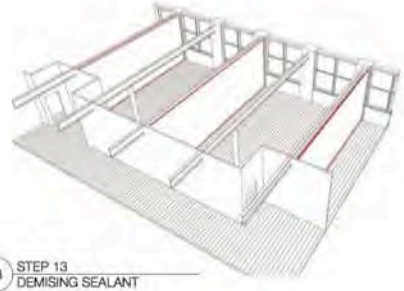


11 STEP 11
DEMISING ADHESIVE

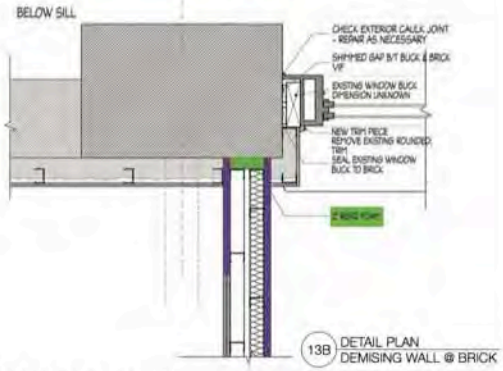


13A DETAIL SECTION
DEMISING WALL

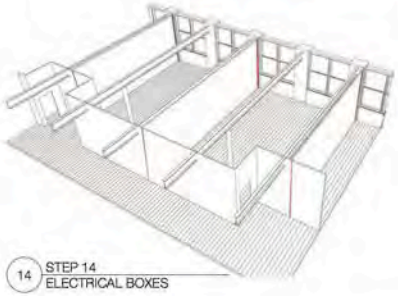
12 STEP 12
DEMISING GWB



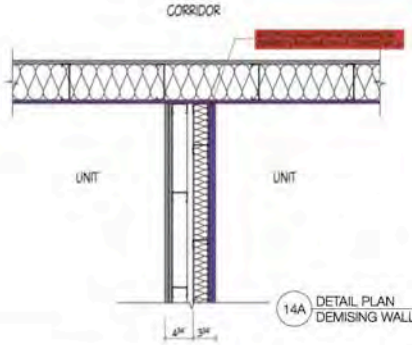
13 STEP 13
DEMISING SEALANT



13B DETAIL PLAN
DEMISING WALL @ BRICK



14 STEP 14
ELECTRICAL BOXES



14A DETAIL PLAN
DEMISING WALL @ CORRIDOR

AIR SEALING SEQUENCE

10. Install 2" thick rigid insulation directly to brick wall prior to wall framing.
11. (2) Continuous Bead of Construction Adhesive placed at location of unit demising walls.
12. GWB installed as air barrier of unit demising wall on one side of demising wall only.
13. (1) Course of GWB installed (2nd side of demising wall) at exterior (brick) wall. Leave remaining 2nd side of wall open for testing.
14. Acoustical sealant around entire top and bottom of GWB perimeter.
15. Acoustical sealant around GWB perimeter at exterior (brick) wall and at corridor wall (see detail 14A for corridor wall).

For steps 10-14 see demising wall details 13A & 13B.

Architect's Consultants
Energysmiths, Marblehead, MA
Agricola Corp, Chicopee, MA
Structures North, Salem, MA
Van Zelm, Heywood & Shadford, Inc., Farmington, CT
Acentech Inc, Cambridge, MA
Steven Winter Associates, Maynard, MA
Harold Cutler, PE, Sudbury, MA
Naomi Miller, Troy, NY

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Eckman Construction Company, Inc., Bedford, NH
Planners Collaborative, Boston, MA
TEC, Inc., Lawrence, MA
Stephen Burrington, Brookline, MA

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AIR SEALING SEQUENCE

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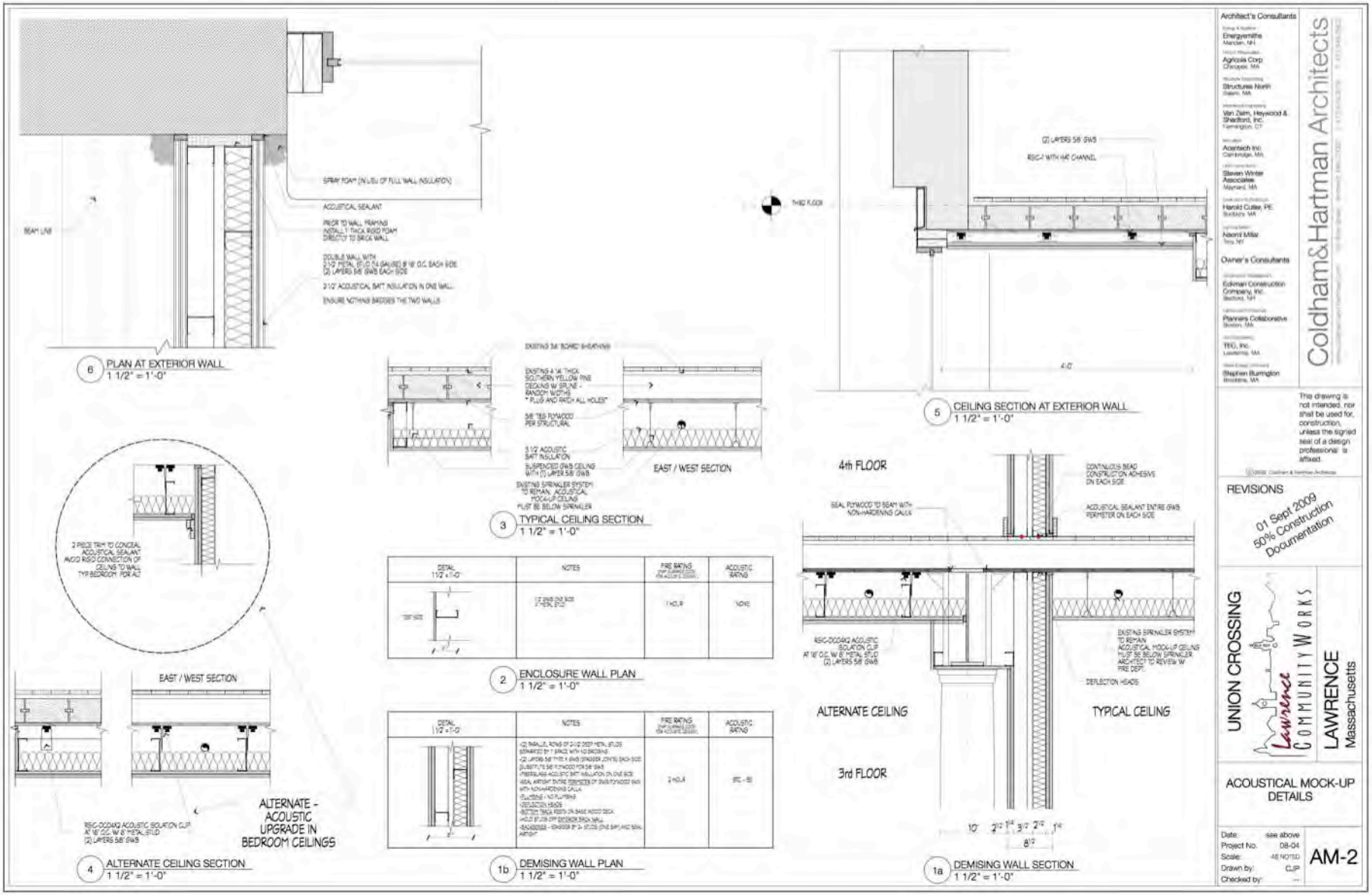
AS-4


6 PLAN AT EXTERIOR WALL
1 1/2" = 1'-0"
3 TYPICAL CEILING SECTION
1 1/2" = 1'-0"
EAST / WEST SECTION
2 ENCLOSURE WALL PLAN
1 1/2" = 1'-0"
4 ALTERNATE CEILING SECTION
1 1/2" = 1'-0"
ALTERNATE - ACOUSTIC UPGRADE IN BEDROOM CEILINGS
1b DEMISING WALL PLAN
1 1/2" = 1'-0"
5 CEILING SECTION AT EXTERIOR WALL
1 1/2" = 1'-0"
4th FLOOR
3rd FLOOR
ALTERNATE CEILING
TYPICAL CEILING
1a DEMISING WALL SECTION
1 1/2" = 1'-0"
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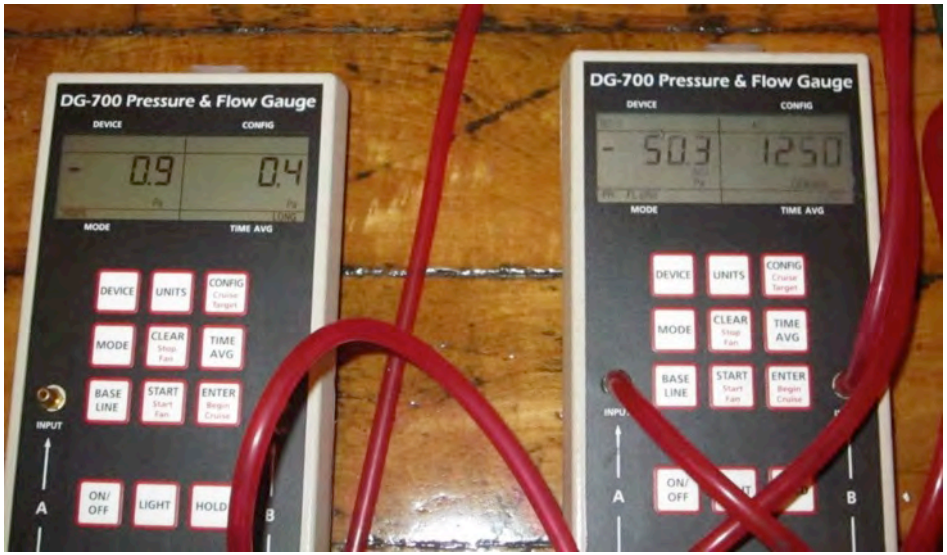
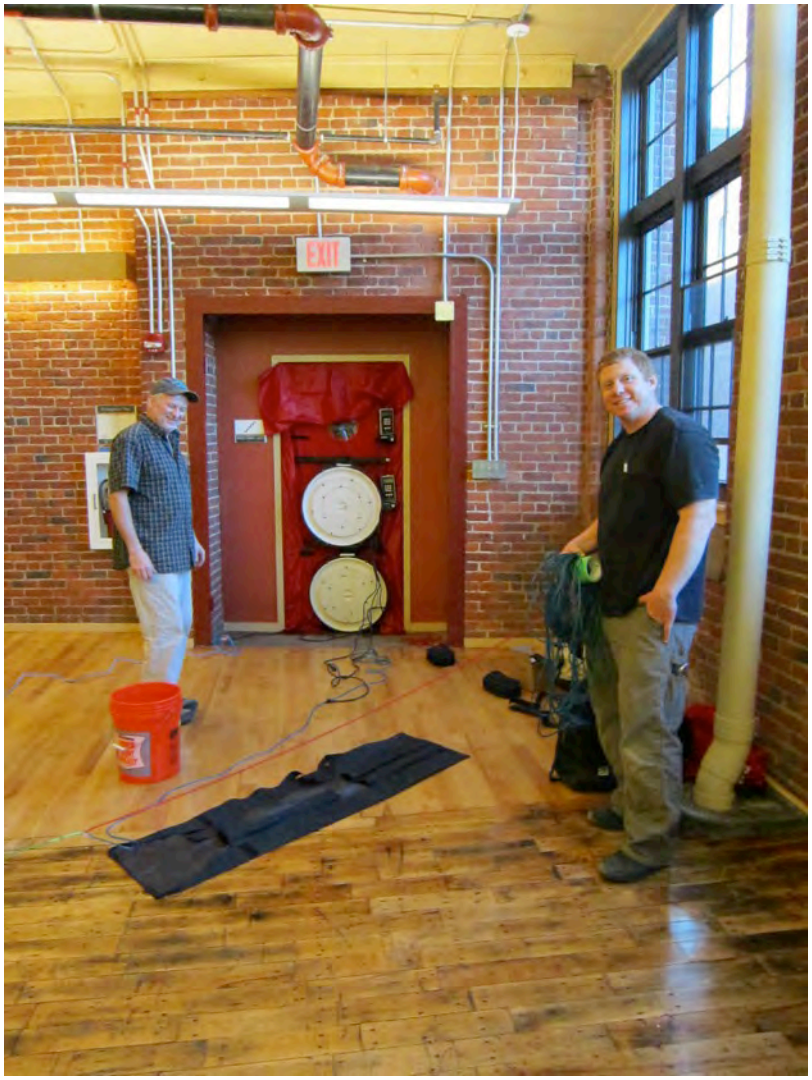
ACOUSTICAL MOCK-UP DETAILS
AM-2





Air sealing results

4th floor isolated with mechanical running-
368,000 cubic foot volume-
3.7 ACH50 or 0.34 cfm50/sf/shell

Isolated unit was at 7 ACH 50,
but with nearly perfect air barrier vertically
Side to side via the “triscut” and corridor wall

Blower door