DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND

BUILDING PERMIT

This is to certify that Danforth on High LP

Located At 81 DANFORTH ST

Job ID: 2012-07-4399-NEWCOM

CBL: 040- A-016-001

has permission to Build 30 units elderly housing, 4 story/garage und

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.	A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

Fire Prevention Officer

Code Enforcement Officer / Plan Reviewer

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY

PENALTY FOR REMOVING THIS CARD

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

Footings/Setbacks prior to pouring concrete

Foundation/Rebar

Foundation/Backfill

Close In Elec/Plmb/Frame prior to insulate or gyp

Certificate of Occupancy Inspection

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.

PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • *www.portlandmaine.gov*

Director of Planning and Urban Development
Jeff Levine

Job ID: 2012-07-4399-NEWCOM **Located At:** 81 DANFORTH ST **CBL:** 040- A-016-001

Conditions of Approval:

Zoning

1. Separate permits shall be required for any new signage.
2. This permit is being approved on the basis of plans submitted. Any deviations shall require a separate approval before starting that work.
3. As discussed during the review process, the property must be clearly identified prior to pouring concrete and compliance with the required setbacks must be established. Due to the proximity of the setbacks of the proposed addition, it may be required to be located by a surveyor.

Building

1. Application approval based upon information provided by the applicant or design professional, including revisions as dated received. Any deviation from approved plans requires separate review and approval prior to work.
2. A final special inspection report shall be submitted prior to issuance of a certificate of occupancy. This report must demonstrate any deficiencies and corrective measures that were taken.
3. Per the 8/7/12 email from Barry Y. at Archetype, the spray applied fire resistant rating will be inspected by S.W. Cole. The report shall be submitted prior to the CO inspection.
4. Separate permits are required for any electrical, plumbing, sprinkler, fire alarm, HVAC systems, heating appliances, including pellet/wood stoves, commercial hood exhaust systems and fuel tanks. Separate plans may need to be submitted for approval as a part of this process.

Fire

1. All construction shall comply with City Code Chapter 10.
2. The building meets the definition of *special hazard dwelling units* and shall also comply with City Code 10-4.
3. Signage shall be provided in accordance with the City of Portland Fire Department Rules and Regulations.
4. This permit is being approved on the basis of the plans submitted. Any deviation from the plans would require amendments and approval.
5. Application requires State Fire Marshal approval.
6. Street addresses shall be marked on the structure and shall be as approved by the City E-911 Addressing Officer. Contact Michelle Sweeney at 874-8682 for further information.
7. Special inspection reports shall be provided for the elevator hoistway pressurization and the emergency generator.
8. The emergency generator shall be Type 10, Class 2, Level 1.

9. Stair, suite and room designation shall comply with the City of Portland Fire Department Rules and Regulations. The primary stair shall be "Stair A" and the secondary stair shall be "Stair B". Floors shall be numbered starting with Floor 1 at the parking level. Room numbers shall be renumbered to correspond.
10. Stair re-entry shall be provided in accordance with NFPA 101:7.2.1.5.7.
11. Central Station monitoring for addressable fire alarm systems shall be by point.
12. Any Fire alarm or Sprinkler systems shall be reviewed by a licensed contractor(s) for code compliance. Compliance letters are required.
13. A separate Fire Alarm Permit is required. This review does not include approval of fire alarm system design or installation.
14. Fire Alarm system shall be maintained. If system is to be off line over 4 hours a fire watch shall be in place. Dispatch notification required 874-8576.
15. The fire alarm system shall comply with the City of Portland Fire Department Rules and Regulations. All fire alarm installation and servicing companies shall have a Certificate of Fitness from the Fire Department.
16. All fire alarm records required by NFPA 72 should be stored in an approved cabinet located at the FACP labeled "FIRE ALARM RECORDS".
17. Records cabinet, FACP, annunciator(s), and pull stations shall be keyed alike.
18. Fire alarm system requires a wireless master box connection per city ordinance. Master box design and installation shall in conformance with Fire Department Regulations and approved by Fire Department Electrical Division.
19. All smoke detectors and smoke alarms shall be photoelectric.
20. Carbon Monoxide is detection required in accordance with NFPA 720, Standard for Installation of Carbon Monoxide (CO) Detection and Warning Equipment, 2009 edition. System CO detectors shall be centrally located on every habitable level and in each HVAC zone of the building; and on the ceiling of rooms containing fuel-fired appliances. System CO detectors shall sound local alarm using temporal-4 in the notification zone it originates from and report to remote or central station. CO detectors shall not trip the master box. CO alarms shall be installed and located in accordance with NFPA 720:9.
21. Compliance with NFPA 1, Fire Code, Annex O for In-building Public Safety Radio Enhancement Systems shall be verified by an RF Engineer.
22. The sprinkler system shall be installed in accordance with NFPA 13 and the City of Portland Fire Department Rules and Regulations.
23. A separate Suppression System Permit is required. This review does not include approval of sprinkler system design or installation.
24. Sprinkler supervision shall be provided in accordance with NFPA 101, Life Safety Code, and NFPA 72, National Fire Alarm and Signaling Code.
25. Sprinkler protection shall be maintained. Where the system is to be shut down for maintenance or repair, the system shall be checked at the end of each day to insure the system has been placed back in service.
26. Fire department connections shall be 2 ½". The Fire Department will require Knox locking caps on all Fire Department Connections on the exterior of the building.
27. System acceptance and commissioning must be coordinated with alarm and suppression system contractors and the Fire Department. Call 874-8703 to schedule.
28. Knox Box(es) are required. The building should be master keyed. A Knox key switch model 3502 shall be provided for the garage entrance door.
29. A firefighter Building Marking Sign is required.
30. The manual wet standpipe system shall be installed in accordance with NFPA 14 the City of Portland Fire Department Rules and Regulations. A signed compliance letter will be required.
31. Fire extinguishers are required per NFPA 1.
32. New elevators are required to be ADA compliant and fit an 80" x 24" stretcher. This elevator shall comply with NFPA 101:7.2.12.2.4 including smokeproof enclosure.
33. Two-way communications for the area of refuge shall be provided in accordance with NFPA 101:7.2.12.1.1.
34. Emergency lights and exit signs are required. Compliance with NFPA 101:7.9 and specifically 101:7.9.2.3 shall be verified. Emergency lights and exit signs are required to be labeled in relation to the panel and circuit and on the same circuit as the lighting for the area they serve.
35. Any cutting and welding done will require a Hot Work Permit from Fire Department.

36. Walls in structure are to be labeled according to fire resistance rating. IE; 1 hr. / 2 hr. / smoke proof.
37. A single source supplier should be used for all through penetrations.
38. HVAC shall comply with NFPA 90A and NFPA 90B. Separate HVAC permits are required.

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No:	Date Applied:	CBL:	
2012-07-4399-NEWCOM	7/3/2012	040- A-016-001	
Location of Construction: 81 DANFORTH ST	**Owner Name:** DANFORTH ON HIGH LP	**Owner Address:** 309 CUMBERLAND AVE – STE #203 PORTLAND, ME 04102	**Phone:** 879-0347
Business Name:	**Contractor Name:** TBD	**Contractor Address:**	**Phone:**
Lessee/Buyer's Name:	**Phone:**	**Permit Type:** BLDG NEW CONST.	**Zone:** C-49
Past Use: Vacant Land	**Proposed Use:** To construct 30 residential apartments for senior 55+ under affordable housing 4 Story, garage under	**Cost of Work:** $3,997,000.00	**CEO District:**
		Fire Dept: 8/28/12 ✓ Approved w/ conditions ___ Denied ___ N/A Signature: [signature] (58)	**Inspection:** Use Group: R-2/S-2 Type: 5A IBC-2009 Signature: [signature] 8/22/12
Proposed Project Description: Construct 30 units elderly housing		**Pedestrian Activities District (P.A.D.)**	

Permit Taken By: Brad

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
___ Shoreland N/A	___ Variance	✓ Not in Dist or Landmark
___ Wetlands	___ Miscellaneous	___ Does not Require Review
___ Flood Zone Panel 13 Zone C	___ Conditional Use	___ Requires Review
X Subdivision	___ Interpretation	___ Approved
X Site Plan PB Approved #2011-405 5/22/12	___ Approved	___ Approved w/Conditions
X Maj ___ Min ___ MM	___ Denied	___ Denied
Date: OK with Conditions [signature] 7/3/12	Date:	Date: [signature]

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building Permits do not include plumbing, septic or electrial work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the appication is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT ADDRESS DATE PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE DATE PHONE

C-49 Extend 7/3/12

General Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

2012-07-4399 Newconm

Location/Address of Construction: 81-85 Danforth Street		
Total Square Footage of Proposed Structure/Area 28,501	Square Footage of Lot 7655.9	
Tax Assessor's Chart, Block & Lot Chart# 40 Block# A Lot# 16	Applicant *must be owner, Lessee or Buyer* Name Danforth on High LP Address 309 Cumberland Ave, Suite 203 City, State & Zip Portland, ME 04101	Telephone: (207) 879-0347
Lessee/DBA (If Applicable)	Owner (if different from Applicant) Name Danforth on High LP Address 309 Cumberland Ave, Suite 203 City, State & Zip Portland, ME 04101	Cost Of Work: $ 3,997,000 3,996,300 C of O Fee: $ 75.00 $ 40,065 Total Fee: ~~$ 40,058~~ 4101.00

Current legal use (i.e. single family) Vacant Lot

If vacant, what was the previous use? _____

Proposed Specific use: Residential

Is property part of a subdivision? No If yes, please name _____

Project description: Thirty units elderly housing

RECEIVED
JUL 03 2012
Dept. of Building Inspections
City of Portland Maine

Contractor's name: Not chosen at this time

Address: _____

City, State & Zip _____ Telephone: 720-0181

Who should we contact when the permit is ready: Erin Copperider Telephone: 879-0347

Mailing address: _____ For Quotes

Please submit all of the information outlined on the applicable Checklist. Failure to do so will result in the automatic denial of your permit.

In order to be sure the City fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information or to download copies of this form and other applications visit the Inspections Division on-line at www.portlandmaine.gov, or stop by the Inspections Division office, room 315 City Hall or call 874-8703.

I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

Signature: _____ Date: 7/3/12

This is not a permit; you may not commence ANY work until the permit is issue

CHOM
Community Housing of Maine

July 3, 2012

Tammy Munson, Division Director
Inspection Services Program
City of Portland
389 Congress Street
Portland ME 04101

Subject: Danforth on High – Building Permit Fee

Dear Ms. Munson:

Community Housing of Maine (CHOM) has recently received City Council and Planning Board approval for the construction of 30 units of affordable senior housing at the corner of Danforth and High Streets in Portland's Downtown. This project is using federal Low-Income Housing Tax Credits and Maine State Housing Authority funds as well as local bank funds to build this important development.

I am requesting that CHOM be allowed to defer payment of the building permit fee, Certificate of Occupancy Fee and Inspections Fee for the project until the time of construction loan closing. We plan to submit the application for the building permit this week. We are targeting an August 1, 2012 closing with construction starting immediately thereafter.

The total fees are as follows
Permit Fee $39,983.00
Certificate of Occupancy Fee $75.00
2% Public Improvements Inspection Fee 854.54
Total 40,912.54

In order for the lenders to allow a closing on the construction loan we will need a conditional approval of the building permit with the only condition being payment of the fee to the City out of the closing proceeds. Please provide this approval at your earliest convenience.

Thank you very much for your consideration of this request.

Regards,

Jay Waterman
Development Officer
Community Housing of Maine

309 Cumberland Avenue, Suite 203 · Portland, ME 04101 · phone 207.879.0347 · fax 207.879.0348
www.chomhousing.org

Brad Saucier - Fwd: Danforth on High - Permit Fee Request

From: Tammy Munson
To: Saucier, Brad
Date: 7/3/2012 1:19 PM
Subject: Fwd: Danforth on High - Permit Fee Request
Attachments: Danforth on High - Permit Fee Letter.pdf

>>> Jay Waterman <jay@chomhousing.org> 7/3/2012 9:54 AM >>>
Hello Tammy,

Per your request, attached please find the letter requesting that the building permit fee be deferred until our construction loan closing.

I did not add in the tree and park fund required by the planning board in this letter, because that payment is not needed until sometime prior to issuance of the C of O. We will make that payment during construction.

Archetype should be submitting the permit application today. Sue Geffers will call you to confirm, as you requested. Please let me know if you have questions. We look forward to receiving the conditional approval.

Regards,

Jay

Jay Waterman, Development Officer
Community Housing of Maine
jay@chomhousing.org
207-272-2562

Brad Saucier - Re: Permit fees

From: Brad Saucier
To: Tammy Munson; jay@chomhousing.org
Date: 7/3/2012 1:33 PM
Subject: Re: Permit fees

And because the property is in the historic district, there's an additional $50 fee for that, which puts the total to ***$40,115***.

Brad Saucier
Administrative Assistant
Inspections Division
City of Portland
(207) 874-8703

>>> Brad Saucier 7/3/2012 1:27 PM >>>
Hi, I just wanted to let you know the permit fees on the application was wrong...a little.

The fees are a total of ***$40,065***, which includes the Cost of work/application fee of $3,997.00 and $75 for the C of O.

Brad Saucier
Administrative Assistant
Inspections Division
City of Portland
(207) 874-8703

Certificate of Design Application

From Designer: Archetype, P.A.

Date: 7/3/12

Job Name: Danforth on High

Address of Construction: 81-85 Danforth Street

2003 International Building Code

Construction project was designed to the building code criteria listed below:

Building Code & Year IBC 2009 Use Group Classification (s) R-2 Residential, S-2 Storage

Type of Construction 5A

Will the Structure have a Fire suppression system in Accordance with Section 903.3.1 of the 2003 IRC Yes

Is the Structure mixed use? Yes If yes, separated or non separated or non separated (section 302.3) Non-Separated

Supervisory alarm System? Yes Geotechnical/Soils report required? (See Section 1802.2) Yes

Structural Design Calculations

N/A Submitted for all structural members (106.1 – 106.11)

Design Loads on Construction Documents (1603)

Uniformly distributed floor live loads (7603.11, 1807)

Floor Area Use	Loads Shown
Residential Units	40 psf
Public Places	100 psf

Wind loads (1603.1.4, 1609)

1609.6 Design option utilized (1609.1.1, 1609.6)

100 MPH Basic wind speed (1809.3)

CAT II I=1.0 Building category and wind importance Factor, I_w table 1604.5, 1609.5)

B Wind exposure category (1609.4)

+/- 0.18 Internal pressure coefficient (ASCE 7)

+18 psf-24 psf Component and cladding pressures (1609.1.1, 1609.6.2.2)

15.2-17.6 psf Main force wind pressures (7603.1.1, 1609.6.2.1)

Earth design data (1603.1.5, 1614-1623)

ASCE 7-02 Design option utilized (1614.1)

B Seismic use group ("Category")

S ds= 0.30 Sd1=0.11 Spectral response coefficients, S_{Ds} & S_{D1} (1615.1)

C Site class (1615.1.5)

ASCE 7-02 Live load reduction

Roof *live* loads (1603.1.2, 1607.11)

46 psf Roof snow loads (1603.7.3, 1608)

60 psf Ground snow load, P_g (1608.2)

42 psf If P_g > 10 psf, flat-roof snow load P_f

1.0 If P_g > 10 psf, snow exposure factor, C_e

1.0 If P_g > 10 psf, snow load importance factor, I_s

1.0 Roof thermal factor, C_t (1608.4)

N/A Sloped roof snowload, P_s (1608.4)

B Seismic design category (1616.3)

1K Basic seismic force resisting system (1617.6.2)

6.0 Response modification coefficient, R_I and

4.0 deflection amplification factor C_d (1617.6.2)

E.L.F Analysis procedure (1616.6, 1617.5)

40.3K Design base shear (1617.4, 16175.5.1)

Flood loads (1803.1.6, 1612)

N/A Flood Hazard area (1612.3)

N/A Elevation of structure

Other loads

N/A Concentrated loads (1607.4)

N/A Partition loads (1607.5)

N/A Misc. loads (Table 1607.8, 1607.6.1, 1607.7, 1607.12, 1607.13, 1610, 1611, 2404

Accessibility Building Code Certificate

Designer: Archetype, P.A.

Address of Project: 81-85 Danforth Street

Nature of Project: 30 units elderly housing

The technical submissions covering the proposed construction work as described above have been designed in compliance with applicable referenced standards found in the Maine Human Rights Law and Federal Americans with Disability Act. Residential Buildings with 4 units or more must conform to the Federal Fair Housing Accessibility Standards. Please provide proof of compliance if applicable.

(SEAL)

LICENSED ARCHITECT
DAVID
LLOYD
NO. 936
STATE OF MAINE

Signature: David Lloyd

Title: Architect

Firm: Archetype, P.A.

Address: 48 Union Wharf
Portland, ME

Phone: (207) 772-6022

For more information or to download this form and other permit applications visit the Inspections Division on our website at www.portlandmaine.gov

Certificate of Design

Date: 7/3/12

From: Archetype, P.A.

These plans and / or specifications covering construction work on:

Danforth on High

81/85 Danforth Street, Portland

Have been designed and drawn up by the undersigned, a Maine registered Architect / Engineer according to the ***2003 International Building Code*** and local amendments.

(SEAL) LICENSED ARCHITECT DAVID LLOYD NO. 936 STATE OF MAINE

Signature: David Lloyd

Title: Architect

Firm: Archetype, P.A.

Address: 48 Union Wharf
Portland, ME

Phone: (207) 772-6022

For more information or to download this form and other permit applications visit the Inspections Division on our website at www.portlandmaine.gov

Statement of Special Inspections

Project: *Danforth on High*

Location: *81-85 Danforth Street, Portland, ME*

Owner: *CHOM Development Corp., 380 Cumberland Ave, Portland, ME*

Design Professional in Responsible Charge: *David J. Tetreault, P.E.*

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection Coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☒ Structural ☐ Mechanical/Electrical/Plumbing
☐ Architectural ☐ Other: _____

The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: *Monthly* or ☐ per attached schedule.

Prepared by:

David J. Tetreault, P.E.
(type or print name)

David Tetreault 07/02/12
Signature Date

Design Professional Seal

Owner's Authorization:

Erin Cooperrider, Dev. Dir. 7-3-12
Signature Date

Building Official's Acceptance:

_____
Signature Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☒ Masonry
- ☒ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☒ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone
1. Special Inspection Coordinator	*Structural Design Consulting, Inc.*	*22 Oakmont Drive* *Old Orchard Beach, ME 04064-4121* *207-934-8038*
2. Inspector	*S.W Cole Engineering, Inc*	*286 Portland Road* *Gray, ME 04039* *207 657-2866*
3 Testing Agency	*S.W Cole Engineering, Inc*	*286 Portland Road* *Gray, ME 04039* *207 657-2866*
4		
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Quality Assurance Plan

Special Inspections for Seismic Resistance

Seismic Design Category	*B*
Special Inspections Required (Y/N)	*N*

The building is in Seismic Design Category B therefore a quality assurance plan for seismic resistance is not required (IBC/2009 Section 1705.3)

Special Inspections for Wind Requirements

Basic Wind Speed (3 second gust)	*100 mph*
Wind Exposure Category	*B*
Special Inspectionslan Required (Y/N)	*N*

The building is in wind exposure Category B with a 3-sec gust basic wind speed less than 120 mph therefore a quality assurance plan for wind is not required (IBC/2009 Section 1705.4)

Statement of Responsibility

Each contractor responsible for the construction or fabrication of a system or component designated above must submit a Statement of Responsibility.

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE	Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE	Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.

International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

Other

_____ _____

Soils and Foundations

Item	Req'd Y/N	Agency # (Qualif.)	Scope
1. Shallow Foundations	*Y*	*2 (P.E.)*	*Inspect soils below footings for adequate bearing capacity and consistency with geotechnical report.* *Inspect removal of unsuitable material and preparation of subgrade prior to placement of controlled fill*
2. Controlled Structural Fill	*Y*	*3 (NICET-ST)*	*Perform sieve tests (ASTM D422 & D1140) and modified Proctor tests (ASTM D1557) of each source of fill material.* *Inspect placement, lift thickness and compaction of controlled fill.*
3. Deep Foundations	*N*		
4. Load Testing			
4. Other:			

Cast-in-Place Concrete

Item	Req'd Y/N	Agency # (Qualif.)	Scope
1. Mix Design	*Y*	*3 (NICET-CT)*	*Review concrete batch tickets and verify compliance with approved mix design. Verify that water added at the site does not exceed that allowed by the mix design.*
2. Material Certification	*N*		
3. Reinforcement Installation	*Y*	*3 (NICET-CT)*	*Inspect size, spacing, cover, positioning and grade of reinforcing steel. Verify that reinforcing bars are free of form oil or other deleterious materials. Inspect bar laps and mechanical splices. Verify that bars are adequately tied and supported on chairs or bolsters*
4. Post-Tensioning Operations	*N*		.
5. Welding of Reinforcing	*N*		.
6. Anchor Rods	*Y*	*3 (NICET-CT)*	*Inspect size, positioning and embedment of anchor rods. Inspect concrete placement and consolidation around anchors.*
7. Concrete Placement	*Y*	*3 (NICET-CT)*	*Inspect placement of concrete. Verify that concrete conveyance and depositing avoids segregation or contamination. Verify that concrete is properly consolidated.*
8. Sampling and Testing of Concrete	*Y*	*3 (NICET-CT)*	*Test concrete compressive strength (ASTM C31 & C39), slump (ASTM C143), air-content (ASTM C231 or C173) and temperature (ASTM C1064).*
9. Curing and Protection	*Y*	*3 (NICET-CT)*	*Inspect curing, cold weather protection and hot weather protection procedures.*
10. Other:			

Masonry

Item	Req'd Y/N	Agency # (Qualif.)	Scope
1. Material Certification			
2. Mixing of Mortar and Grout	*Y*	*3 (ICC-SMSI)*	*Periodically inspect proportioning, mixing and retempering of mortar and grout.*
3. Installation of Masonry	*Y*	*3 (ICC-SMSI)*	*Periodically inspect size, layout, bonding and placement of masonry units.*
4. Mortar Joints	*Y*	*3 (ICC-SMSI)*	*Periodically inspect construction of mortar joints including tooling and filling of head joints.*
5. Reinforcement Installation	*Y*	*3 (ICC-SMSI)*	*Inspect placement, positioning and lapping of reinforcing steel.*
6. Prestressed Masonry	*N*		
7. Grouting Operations	*Y*	*3 (ICC-SMSI)*	*Inspect placement and consolidation of grout.*
7. Weather Protection	*N*		
9. Evaluation of Masonry Strength	*N*		
10. Anchors and Ties	*N*		
11. Other:			

Structural Steel

Item	Req'd Y/N	Agency # (	Scope
1. Fabricator Certification/ Quality Control Procedures ☐ Fabricator Exempt		*1 (P.E.)*	*Review shop fabrication and quality control procedures.*
2. Material Certification	*Y*	*1 (P.E.)*	*Review certified mill test reports and identification markings on wide-flange shapes, high-strength bolts, nuts and welding electrodes*
3. Open Web Steel Joists	*N*		
4. Bolting	*Y*	*3 (AWS/AISC-SSI)*	*Inspect installation and tightening of high-strength bolts. Verify that splines have separated from tension control bolts. Verify proper tightening sequence.*
5. Welding	*Y*	*3 (AWS/AISC-SSI)*	*Visually inspect all field welds. Inspect pre-heat, post-heat and surface preparation between passes. Verify size and length of fillet welds.* *Ultrasonic testing of all full-penetration welds.*
6. Shear Connectors	*N*		
7. Structural Details	*Y*	*1 (P.E.)*	*Inspect steel frame for compliance with structural drawings, including bracing, member configuration and connection details.*
8. Metal Deck	*N*		
9. Other:	*N*		

Wood Construction

Item	Req'd Y/N	Agency # (Qualif.)	Scope
1. Fabricator Certification/ Quality Control Procedures	*N*		
2. Material Grading	*Y*	*1 (P.E.)*	*Verify material grading marks.*
3. Connections	*Y*	*1 (P.E.)*	*Verify that connections and fastenings comply with Contract Documents*
4. Framing and Details	*Y*	*1 (P.E.)*	*Verify conformance with Contract Documents*
5. Diaphragms and Shearwalls	*y*	*1 (P.E.)*	*Inspect size, configuration, and fastening of shearwalls and diaphragms. Verify panel grade and thickness.*
6. Prefabricated Wood Trusses	*y*	*1 (P.E.)*	*Verify that prefabricated wood trusses are installed and braced in accordance with Contract Documents and shop drawings.*

Applicant: Danforth Hyde LP Date: 5/21/12

Address: 81-85 Danforth St C-B-L: 40-A-16

CHECK-LIST AGAINST ZONING ORDINANCE

Date - New Development of The Lot

Zone Location - R-7 Contract Zone (C-49 re-do)

Interior or corner lot -

Proposed Use/Work - to construct max of 30 (30 shown) rental apts for Seniors 55+ rent restrictive/Affordable housing

Sewage Disposal - City

Lot Street Frontage - N/A

Front Yard - None req

Rear Yard - 4' min req — 4'+ scaled
Rear min between bldgs 20' — 21' scaled

Side Yard on st. 0' req (Hyde St) — ≈1.5' scaled
other side: - 4' min — 4.7' scaled at closest
Projections:
min side between bldgs: 12' — 15.5' at closest

Width of Lot - N/A

Height - 50' max (req R-7 req) — 47'2½" of 47.03125' given

Lot Area - 7,656# given

Lot Coverage/ Impervious Surface - 100% of lot

Area per Family - 250#/DU = 250 x 30 = 7,500# min

Off-street Parking - 13 vehicles min - 13 shown
2 scooters min - 2 shown
27 Bicycles min - 27 shown

Loading Bays N/A

Site Plan - 2011-406 - conditional contract rez.
2011-405 - Level III Site plan with Subdivision

Shoreland Zoning/ Stream Protection - N/A

Flood Plains - panel 13. Zone C

of 2 community spaces & laundry req

1st floor - 8 DU - 1 lounge 1 office
2nd floor - 8 DU - 1 community spc
3rd floor - 8 DU & Laundry
4th floor - 6 DU & 1 Lounge

NOT Available for Comments (still grey)

1/4/12

City of Portland
Development Review Application
Planning Division Transmittal form

Application Number: 2011-405 **Application Date:** 12/27/2011 12:00:00 AM
CBL: ~~40-A-16~~
Project Name: Danforth on High
Address: 81-85 Danforth Street

Project Description: 30 Unit Elderly Housing with Underground Parking
Zoning: R-6
Other Reviews Required: Subdivision
Review Type: Level III Site Plan with Subdivision

Distribution List:

☐ Planner		☐ Parking	John Peverada
☑ Zoning	Marge Schmuckal	☐ Design Review	Alex Jaegerman
☐ Traffic Engineer	Tom Errico	☐ Corporation Counsel	Danielle West-Chuhta
☐ Civil Engineer	David Senus	☐ Sanitary Sewer	John Emerson
☐ Fire Department	Chris Pirone	☐ Inspections	Tammy Munson
☐ City Arborist	Jeff Tarling	☐ Historic Preservation	Deb Andrews
☐ Engineering	David Margolis-Pineo	☐ DRC Coordinator	Phil DiPierro
		☐ Outside Agency	

Comments needed by (7 days later):

Marge Schmuckal - 81-85 Danforth

From: Barbara Barhydt
To: Errico, Thomas; Margolis-Pineo, David; Peverada, John; Pirone, Chris;...
Date: 1/13/2012 12:50 PM
Subject: 81-85 Danforth
Attachments: Distib Sheet 81 Danforth Levle III.pdf; Distrib Sheet 81 Danforth- Zoning.pdf

Hi:

I announced that we had an application for this project on Jan 4th, which is an amended conditional rezoning agreement for this site. I They also submitted plans for site plan and subdivision, which is a separate project. I am attaching the distribution form with the project number. We need to review the revised agreement first and then the site plan. With that said, I want to make sure I am aware of any concerns. This will go to the Board for a workshop on January 24th.

All the plans and documents are in e-plan.

John Peverada, if you want to see the parking sections, let me know.

Thanks.

Barbara

Marge Schmuckal - 81-85 Danforth Review

From: Marge Schmuckal
To: Barbara Barhydt
Date: 5/21/2012 12:04 PM
Subject: 81-85 Danforth Review

Hi Barbara,
The site plan review One Solution does not have the appropriate zoning thingie to allow zoning comments, so I am e-mailing it here to you.

81-85 Danforth Street - 40-A-16
Danforth High LP - Conditional/Contract/R-7 Rezoning (C-49)
#2011-406 (c/c/rezone) & 2011-405 (Level III & subdivision)
May 21, 2012

I have reviewed the conditional contract agreement and compared them to the most recent submitted plans.. The proposal is meeting the new contract for setbacks, height parking spaces and bicycle spaces, number of units including, required community spaces and laundry. the height that was given as part of the submission is also meeting the maximum height allowance under the R-7 zone.

The emergency generator shall only be tested during reasonable daytime hours.

Separate permits are required bor construction and any signage.

Marge Schmuckal, Zoning Administrator

81-85 Danforth Street – 40-A-16

Danforth High LP – Conditional/Contract Rezoning

#2011-406 (c/c rezone) & 2011-405 (Level 111 & subdivision)

January 31, 2012

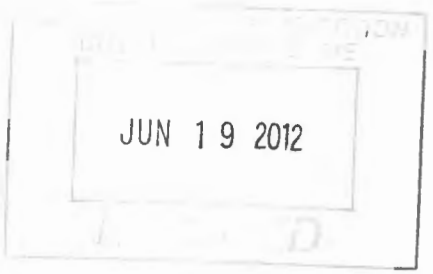
This is a re-do of a conditional contract rezoning that was originally done in 2007-2008. The project is now for 30 rental apartments for seniors 55+ and an affordable housing project.

The proposal is meeting the new contract for setbacks, height, parking spaces and bicycle spaces. It is pointed out that the emergency generator shall meet the same requirements as previously conveyed. It really is only for emergencies and shall not be used on a constant basis. Tests of the emergency generator shall be performed during reasonable hours during the day.

Separate permits are required for construction.

Marge Schmuckal, Zoning Administrator

CITY OF PORTLAND, MAINE
PLANNING BOARD



June 13, 2012

Erin Cooperrider, Development Director
Community Housing of Maine
309 Cumberland Ave., Suite 203
Portland, ME 04101

Jay Waternman, Development Officer
Community Housing of Maine
309 Cumberland Ave., Suite 203
Portland, ME 04101

Project Name:	Danforth On High	Project ID:	2011-405
Address:	81-85 Danforth Street	CBL:	40-A-016
Applicant:	Danforth on High, LP		
Planner:	Barbara Barhydt, Development Review Services Manager		

Dear Erin and Jay:

On May 22, 2012, the Planning Board considered the Danforth on High application for 30 units of age restricted housing at 81-85 Danforth Street. The Planning Board reviewed the proposal for conformance with the standards of the Subdivision Ordinance and Site Plan Ordinance. The Planning Board voted unanimously (5-0, O'Brien and Venne absent) to approve the application with the following waivers and condition(s) as presented below.

WAIVERS
The Planning Board voted unanimously (5-0, O'Brien and Venne absent) to waive each of the following waivers from the Technical Standards:

1) Planning Board waives the Technical Manual 1.14. Standard parking space is 9x 18 feet and compact space is 8x15 feet to allow 8'-6" by 18'-6' and compact spaces of 7'-6" by 18'-6" in the garage.

2) The Planning Board (waives/does not waive) the Technical Manual 1.7.2.3 Minimum driveway width (two-way) of width of 20 feet for two-way ingress and egress, with a preferred width of 24 feet to allow 22 feet at the curb-line and 16 feet at the garage entrance.

3) The Planning Board (waiver/does not waive) the Technical Manual 1.7.2.6 Location and spacing of driveway, which requires a separation of 100 feet on streets with speed limit of 25 mph to allow a a separation of 20 feet between the Danforth Street driveways.

4) The Planning Board (waives/does not waive) the Technical Manual 12.2.6. Luminair types requiring full cut off light fixtures to allow a semi-recessed mounted luminaire with a frosted glass lens and located under the building canopy.

5) The Planning Board (waives/does not waive) the Site Plan Standard14-526 (b)b.(iii) (a) Street Trees: for 25 trees on the site and the applicant shall contribute $5,000 to the City of Portland Tree Fund and which may be used for street trees and landscaping at Pleasant Street Park as required in the conditional zone agreement.

SUBDIVISION REVIEW

The Planning Board voted unanimously (5-0, O'Brien and Venne absent) that the plan is in conformance with the subdivision standards of the Land Use Code, subject to the following condition(s) of approval:

1) That the Subdivision Plat shall be finalized to the satisfaction of the Planning Authority, Corporation Counsel, and Department of Public Services and include the waivers and applicable conditions of approval;

2) The applicant shall adhere to the monitoring provisions contained with the Transportation Demand Management Plan.

3) The community contribution and street tree contribution shall be paid prior to the issuance of a certificate of occupancy.

SITE PLAN REVIEW

The Planning Board voted unanimously (5-0, O'Brien and Venne absent) that the plan is in conformance with the site plan standards of the Land Use Code, subject to the following condition(s) of approval:

1) The amended conditional zone for 81-85 Danforth Street becomes effective 30 days after enactment, so a building permit cannot issued for this project until June 6, 2012.

2) The applicant shall submit the specifications and noise attenuation measures (such as a muffler or other attenuation provisions) for the generator to be reviewed and approved by the Planning Authority. The standard testing of the generator shall be programmed to occur during the week between 9 a.m. and 5 p.m.

3) The applicant shall submit the specifications for the exterior bike racks meeting the City's technical standards for review and approval by the Planning Authority prior to the issuance of a building permit.

4) The community contribution and street tree contribution shall be paid prior to the issuance of a certificate of occupancy.

5) The Transportation Demand Management Plan must be revised to eliminate the condition that restricts residents from participating in the residential sticker program.

6) The applicant shall adhere to the monitoring provisions contained with the Transportation Demand Management Plan.

7) The applicant shall provide details on the current users of the parking lot and whether the displacement of these spaces impacts the site approval for another project prior to the issuance of a building permit.

8) The construction management plan must be revised to maintain sidewalk access via temporary measures, such as use of parking areas, or other strategies without unreasonably impacting pedestrian routings. The Construction Management Plan must be reviewed and approved by the Department of Public Services prior to the issuance of a building permit.

9) The applicant may submit details for the heated sidewalks for review and approval by DPS.

The approval is based on the submitted plans and the findings related to site plan and subdivision review standards as contained in Planning Report #21-21 for application #2011-405 which is attached.

STANDARD CONDITIONS OF APPROVAL
Please note the following standard conditions of approval and requirements for all approved site plans:

1. **Subdivision Recording Plat** A revised recording plat listing all conditions of subdivision approval must be submitted for review and signature prior to the issuance of a performance guarantee.

2. **Subdivision Waivers** Pursuant to 30-A MRSA section 4406(B)(1), any waiver must be specified on the subdivision plan or outlined in a notice and the plan or notice must be recorded in the Cumberland County Registry of Deeds within 90 days of the final subdivision approval).

3. **Develop Site According to Plan** The site shall be developed and maintained as depicted on the site plan and in the written submission of the applicant. Modification of any approved site plan or alteration of a parcel which was the subject of site plan approval after May 20, 1974, shall require the prior approval of a revised site plan by the Planning Board or the Planning Authority pursuant to the terms of Chapter 14, Land Use, of the Portland City Code.

4. **Separate Building Permits Are Required** This approval does not constitute approval of building plans, which must be reviewed and approved by the City of Portland's Inspection Division.

5. **Site Plan Expiration** The site plan approval will be deemed to have expired unless work has commenced within one (1) year of the approval or within a time period up to three (3) years from the approval date as agreed upon in writing by the City and the applicant. Requests to extend approvals must be received before the one (1) year expiration date.

6. **Subdivision Plan Expiration** The subdivision approval is valid for up to three years from the date of Planning Board approval.

7. **Performance Guarantee and Inspection Fees** A performance guarantee covering the site improvements as well as an inspection fee payment of 2.0% of the guarantee amount and seven (7) final sets of plans must be submitted to and approved by the Planning Division and Public Services Department prior to the release of a building permit, street opening permit or certificate of occupancy for site plans. If you need to make any modifications to the approved plans, you must submit a revised site plan application for staff review and approval.

8. **Defect Guarantee** A defect guarantee, consisting of 10% of the performance guarantee, must be posted before the performance guarantee will be released.

9. **Preconstruction Meeting** Prior to the release of a building permit or site construction, a pre-construction meeting shall be held at the project site. This meeting will be held with the contractor, Development Review Coordinator, Public Service's representative and owner to review the construction schedule and critical aspects of the site work. At that time, the Development Review Coordinator will confirm that the contractor is working from the approved site plan. The site/building contractor shall provide three (3) copies of a detailed construction schedule to the attending City representatives. It shall be the contractor's responsibility to arrange a mutually agreeable time for the pre-construction meeting.

10. **Separate Building Permits Are Required** This approval does not constitute approval of building plans, which must be reviewed and approved by the City of Portland's Inspection Division.

11. **Department of Public Services Permits** If work will occur within the public right-of-way such as utilities, curb, sidewalk and driveway construction, a street opening permit(s) is required for your site. Please contact Carol Merritt at 874-8300, ext. 8828. (Only excavators licensed by the City of Portland are eligible.)

12. **As-Built Final Plans** Final sets of as-built plans shall be submitted digitally to the Planning Division, on a CD or DVD, in AutoCAD format (*,dwg), release AutoCAD 2005 or greater.

13. **Mylar Copies** Mylar copies of the as-built drawings for the public streets and other public infrastructure in the subdivision must be submitted to the Public Services Dept. prior to the issuance of a certificate of occupancy.

The Development Review Coordinator must be notified five (5) working days prior to date required for final site inspection. The Development Review Coordinator can be reached at the Planning Division at 874-8632. All site plan requirements must be completed and approved by the Development Review Coordinator prior to issuance of a Certificate of Occupancy. Please schedule any property closing with these requirements in mind.

If there are any questions, please contact Barbara Barhydt, Development Review Services Manager, at 874-8699.

Sincerely,

Carol Morrissette, Chair
Portland Planning Board

Attachments:
1. Planning Board Report and attachments
2. Performance Guarantee Packet

Electronic Distribution:

cc: Greg Mitchell, Interim Director of Planning and Urban Development
Alexander Jaegerman, Planning Division Director
Barbara Barhydt, Development Review Services Manager
Philip DiPierro, Development Review Coordinator, Planning
Marge Schmuckal, Zoning Administrator, Inspections Division
Tammy Munson, Inspection Division Director
Lannie Dobson, Administration, Inspections Division
Gayle Guertin, Administration, Inspections Division
Michael Bobinsky, Public Services Director
Katherine Earley, Engineering Services Manager, Public Services
Bill Clark, Project Engineer, Public Services
David Margolis-Pineo, Deputy City Engineer, Public Services
Doug Roncarati, Stormwater Coordinator, Public Services
Greg Vining, Associate Engineer, Public Services
Michelle Sweeney, Associate Engineer
John Low, Associate Engineer, Public Services
Mike Farmer, Project Engineer, Public Services
Jane Ward, Administration, Public Services
Jeff Tarling, City Arborist, Public Services
Captain Chris Pirone, Fire Department
Thomas Erriso, P.E., TY Lin Associates
David Senus, P.E., Woodard and Curran
Rick Blackburn, Assessor's Department
Approval Letter File

40-A-16 most recent C-49

Order 164-11/12
Given first reading on 4/23/12
Public Hearing and Passage as amended 8-0 (Mavodones gone) 5/7/12

MICHAEL F. BRENNAN (MAYOR)
KEVIN J. DONOGHUE (1)
DAVID A. MARSHALL (2)
EDWARD J. SUSLOVIC (3)
CHERYL A. LEEMAN (4)

CITY OF PORTLAND
IN THE CITY COUNCIL

JOHN R. COYNE (5)
JOHN M. ANTON (A/L)
JILL C. DUSON (A/L)
NICHOLAS M. MAVODONES (A/L)

AMENDMENT TO CITY CODE
SEC. 14-49 (ZONING MAP AMENDMENT)
RE: CONDITIONAL REZONING FOR PROPERTY
IN VICINITY OF 81-85 DANFORTH STREET

ORDERED, that the Zoning Map of the City of Portland, dated December 2000 as amended and on file in the Department of Planning & Development, and incorporated by reference into the Zoning Ordinance by Sec. 14-49 of the Portland City Code, is hereby amended to reflect a conditional rezoning as detailed below:

CONDITIONAL ZONE AGREEMENT
RE: DANFORTH ON HIGH, L.P.

This Agreement made this _____ day of _____, 20__ by **DANFORTH ON HIGH, L.P.** a Maine corporation with an office in Portland, Maine (hereinafter "**DANFORTH ON HIGH**").

WITNESSETH:

WHEREAS, DANFORTH ON HIGH has entered into a contract to purchase a parcel of land from Random Orbit, Inc. consisting of approximately 7,655 square feet located at 81-85 Danforth Street in Portland, being a parcel shown on City of Portland Tax Map 40, Block A, Lot 16, and more particularly described in a deed recorded in Cumberland County Registry of Deeds in Book 3304, Page 289 (collectively the "Property"); and

WHEREAS, DANFORTH ON HIGH proposes to construct upon the Property a maximum of 30 rental apartment units for seniors aged 55 and older in one building, which are designed to contribute innovative, pedestrian oriented and affordable housing to the peninsula housing stock, to enhance alternative transportation options, and to provide a unique residential living experience compatible with the established urban neighborhood; and

WHEREAS, the proposed development is consistent with the purposes of the R-7 Compact Urban Residential Overlay Zone as it is on the peninsula; in a location

characterized by moderate to high density multi-family housing; within walking distance of downtown or other work places, shopping and community facilities; will have access to public transit service; and will provide opportunities for compact in-city living for renters, representing a variety of income levels in small households; and

WHEREAS, in December 2007, the **CITY OF PORTLAND** (hereinafter "**CITY**") granted a conditional rezoning from R-6 to R-7 Compact Urban Residential Overlay Zone for Random Orbit, Inc. recorded in the Cumberland County Registry of Deeds on 20 at Book , Page ; and

WHEREAS, certain easements are in place between Random Orbit and abutters that remain in effect and will be assigned to **DANFORTH ON HIGH** at the time of closing including the easements evidenced by Easement Deeds recorded in the Cumberland County Registry of Deeds as follows: (1) an access easement granted by Random Orbit, Inc. to East Danforth, LLC and recorded in Book 26501, Page 247; (2) an emergency egress easement granted by Mid-Town Properties, LLC to Random Orbit, Inc. and recorded in Book 26501, Page 249; (3) a temporary construction easement granted by Mid-Town Properties, LLC to Random Orbit, Inc. and recorded in Book 26501, Page 251; and (4) an access easement granted by Random Orbit, Inc. to Mid-Town Properties, LLC and recorded in Book 26501, Page 253; and

WHEREAS, DANFORTH ON HIGH has requested an amendment to the December 2007 Conditional Rezoning Agreement; and

WHEREAS, the Planning Board of the **CITY**, pursuant to 30-A M.R.S.A. § 4352(8) and §§ 14-60 to 14-62 and 14-127 of the Code, after notice and hearing and due deliberation thereon, recommended the rezoning of the Property as aforesaid, subject, however, to certain conditions; and

WHEREAS, the **CITY,** by and through its City Council has determined that because the unique and innovative concept and design of the proposed development:

- Contributes a desirable, unique type of housing to the peninsula stock;
- Provides affordable senior rental housing opportunities for traditionally underserved groups;
- Promotes reuse of an underutilized lot to provide new housing development consistent with the compact urban residential development pattern typically found on the peninsula; and
- Encourages pedestrian, public transit, bicycle, and alternative transportation options that are part of a Transportation Demand Management Plan;

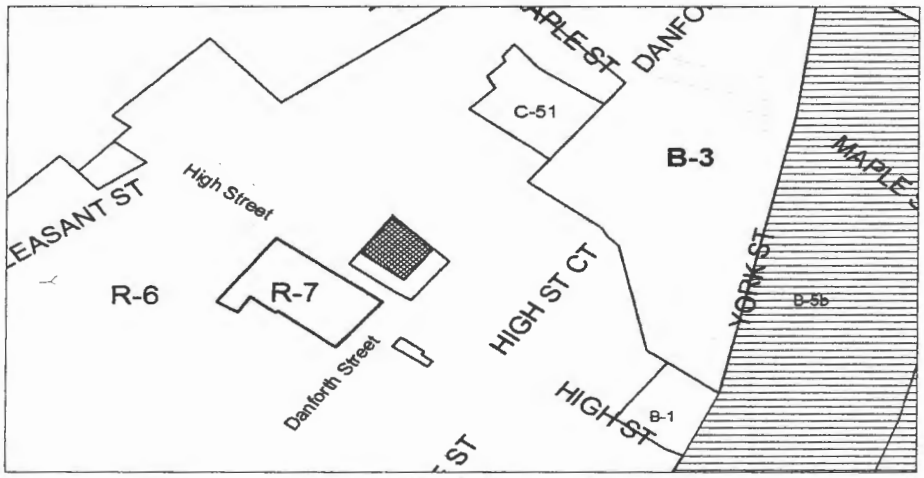
it is necessary and appropriate to impose, by agreement, the conditions and restrictions set forth herein, in order to insure that said rezoning is consistent with the **CITY'S** comprehensive land use plan; and

WHEREAS, the City Council of the **CITY** authorized the execution of this Agreement on _____ by City Council Order No. _____, a true copy of which is attached hereto as Attachment 1; and

WHEREAS, DANFORTH ON HIGH has agreed to enter into this contract, with its concomitant terms and conditions, which shall hereinafter bind **DANFORTH ON HIGH**, its successors or assigns;

NOW, THEREFORE, in consideration of the rezoning of the Property, **DANFORTH ON HIGH** contracts to be bound by the following terms and conditions:

1. The **CITY** hereby amends Section C-49 of the Zoning Map of the City of Portland dated December 2000, as amended from time to time and on file in the Department of Planning and Development, and incorporated by reference into the Zoning Ordinance by Section 14-49 of the Code, by adopting the map change amendment shown below (rezoning to R-7 Compact Urban Residential Overlay Zone with contract zone described herein). If this Agreement is not recorded within thirty (30) days of the City Counsel's approval of said rezoning, then the rezoning shall become null and void and the zoning of the Property shall revert to the pre-existing R-7 zone.



Amended Conditional R-7 Zone
Agreement - C-49
81-85 Danforth and 51 High Street

2. **DANFORTH ON HIGH** is authorized to establish and maintain the following uses on the Property:

a. Residential units: Up to 30 residential units located in one building, which shall be developed and rented as age- and rent-restricted apartments; and

b. Related amenities: to be located within the building, namely, two shared lounges for residents and guests; shared laundry facilities;

bicycle storage areas with a minimum capacity for 27 bicycles and storage areas to be used by individuals or in common.

c. Parking:

1) shall be provided on-site in an amount of not less than a total of 13 vehicle spaces and 2 scooter/motorcycle spaces,

2) **DANFORTH ON HIGH** shall include a Transportation Demand Management ("TDM") Plan with its site plan application, as required by the **CITY'S** Technical Manual. An analysis of the effectiveness and functioning of the TDM Plan shall be provided to the Planning Authority on an annual basis for two (2) years following the issuance of a certificate of occupancy for the project described herein and shall be maintained for inspection upon request thereafter.

3. The Property will be developed substantially in accordance with the Site Plan and Subdivision Plan, elevations and floor plans prepared by Archetype, P.A., Architects on _____, 2012 attached hereto as Exhibits_____, subject to such subsequent modifications as may be required by the Planning Board during site plan and subdivision review and such subsequent modifications as may be required by the Portland Historic Preservation Committee during its review and approval.

4. Dimensional Requirements: The following shall be the dimensional requirements which shall be applied in subsequent review and shall be met by the proposed development:

Rear yard minimum setback:	4 feet
Rear yard minimum distance between buildings:	20 feet
Side minimum setback, not abutting street:	4 feet
Side minimum setback, abutting street:	0 feet
Side minimum distance between buildings:	12 feet
Minimum land area per dwelling unit:	Two hundred fifty (250) square feet

	per dwelling unit
Maximum units allowed:	30
Minimum parking spaces per unit:	0.43 spaces/unit (13 vehicle spaces and 2 scooter/motorcycle spaces for 30 units)

To the extent that the dimensional, density and related standards are not otherwise specified herein to the contrary, the dimensional requirements of the R-7 Compact Urban Residential Overlay Zone shall apply.

5. **DANFORTH ON HIGH** shall enter into a Land Use Regulatory Agreement with Maine State Housing Authority at the time of closing on the financing for the project described herein that shall reflect an obligation of **DANFORTH ON HIGH** to maintain affordability and age restrictions on the Property for a term consistent with the Maine State Housing Authority financing requirements.

6. **DANFORTH ON HIGH** shall maintain the planter along Danforth Street with appropriate seasonal flowers or plants.

7. The Planning Board shall review and approve this development according to the subdivision and site plan provisions of the Portland Land Use Code.

8. Any change in ownership to an owner other than **DANFORTH ON HIGH** shall be brought to the Planning Board for its review and approval, but this requirement shall not apply to the granting of mortgages by **DANFORTH ON HIGH** or any successor in interest, or to the enforcement by the mortgagees of their rights under such mortgages, or to the assignment or conveyance of the ownership to an entity in which **DANFORTH ON HIGH** holds at least a 30% interest.

9. The above stated restrictions, provisions and conditions are an essential part of the rezoning, shall run with the Property, shall bind and benefit **DANFORTH ON HIGH**, its successors and assigns, and any party in possession or occupancy of said Property or any part thereof, and shall inure to the benefit and be enforceable by the **CITY**, by and through its duly authorized representatives.

10. If any of the restrictions, provisions, conditions, or portions thereof set forth herein is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portions shall be deemed as a separate, distinct and independent provision and such determinations shall not affect the validity of the remaining portions thereof.

11. Given the lack of open space on the site and the requested density, the community contribution under this Agreement shall be $19,000. $14,000 of this contribution shall be dedicated to improvements at the Pleasant Street Park as determined

necessary and appropriate by the City's Recreation Division, and the remaining $5,000 of this contribution shall be dedicated to the City's street tree fund as required under the City's subdivision ordinance and may also be applied to the street tree and landscaping needs of Pleasant Street Park as determined necessary and appropriate by the City Arborist. This community contribution is independent of any conditions which the Planning Board may lawfully require under site plan or subdivision review. This community contribution shall also be made prior to the issuance of a certificate of occupancy.

12. This conditional rezoning agreement shall be enforced pursuant to the land use enforcement provisions of state law including, but not limited to, 30-A MRSA § 4452 and the Portland City Code. In addition, in the event of a breach by **DANFORTH ON HIGH** or its successors or assigns of the zoning provisions contained herein (whether the Zoning Administrator, the Zoning Board of Appeals or a court determines such breach), the Planning Board, after notice and hearing, may recommend to the City Council that the Conditional Zone and this Agreement be amended, or be rescinded, such rescission to result in the termination of this Agreement and a reversion of the Property to the existing R-7 zone in place before the execution of this Agreement.

13. In the event that **DANFORTH ON HIGH** does not close upon the purchase of the Property from Random Orbit, LLC pursuant to the Purchase and Sale Agreement by and between the parties, as it may be amended, then the zoning for the Property shall automatically revert to the existing R-7 zone.

14. **DANFORTH ON HIGH** shall file a counterpart original of this Agreement in the Cumberland County Registry of Deeds.

15. Except as expressly modified herein, the development, use and occupancy of the Property shall be governed by and comply with the applicable provisions of the Portland City Code and any applicable amendments thereto or replacements thereof.

WITNESS:

CORPORATION

_____

DANFORTH ON HIGH, L.P.

By: CHOM DEVELOPMENT

Its General Partner

By:_____
Erin Cooperrider
Its Development Director

STATE OF MAINE

CUMBERLAND, SS. _____,
200_

Then personally appeared the above-named Erin Cooperrider, Development Director of CHOM DEVELOPMENT CORPORATION, the General Partner of DANFORTH ON HIGH, L.P., as aforesaid, and acknowledged the foregoing instrument to be her free act and deed in her said capacity and the free act and deed of said CHOM DEVELOPMENT CORPORATION and DANFORTH ON HIGH, L.P.

Before me,

_____
Notary Public/Attorney-at-Law
Printed name:
My Commission Expires:

Strengthening a Remarkable City, Building a Community for Life • www.portlandmaine.gov

Greg Mitchel, acting
~~Penny St. Louis,~~ Director of Planning and Development
Marge Schmuckal, Zoning Administrator

Meeting Information

DATE: 12/8/11 ZONE: C-49 / Historic Zone

LOCATION: 81 Danforth St "Danforth High"

PEOPLE PRESENT: Peter BASS - Jay Waterman - DAVID Lloyd Alex J - Deb ANDREWS ~ BARBARA - MARGE - ERIN

DISCUSSION: Generally show that there are some changes

Chom has an option Agreement with Peter BASS

26 → 30 units

Condos → rental

? parking WAS specifically for Allowing car share

R-7 overlay dimensional

Feb 26, 2008 Subdivision & site plan Approvals - have Expired

site plan → No changes - Needs an emergency generator

Tower going up 1 more story

balconies gone in New rendering

Will be Affordable - Senior housing - Age restricted → 14-332 Allows less than 1 pkg per unit.

Need to redo contract & Subdivision & site plan

Please note: this meeting is not an pre-approval of any ordinances. No project can be approved without going thru the appropriate reviews. This meeting is only to outline the City processes to go through based on the information given at this meeting. Any changes to that information may change the process requirements. Please check ordinances that are on-line for further information at www.portlandmaine.gov.

Start permitting Right Away - Bldg early Spring -

"NO PLASTIC flowers"

Barbara Vestal WAS Their Lawyer

Room 315 – 389 Congress Street – Portland, Maine 04101 (207) 874-8695 – FAX:(207) 874-8716 – TTY:(207) 874-3936

C49. 12/19/07 from Legal

81-85 Danforth St

Order 107-07/08
Given first reading on 12/3/07
Passage: 12-17-07 8-0 (Leeman absent)

EDWARD J. SUSLOVIC (MAYOR)
KEVIN J. DONOGHUE (1)
DAVID A. MARSHALL (2)
DANIEL S. SKOLNIK (3)
CHERYL A. LEEMAN (4)

CITY OF PORTLAND
IN THE CITY COUNCIL

JAMES I. COHEN (5)
JOHN M. ANTON (A/L)
JILL C. DUSON (A/L)
NICHOLAS M. MAVODONES (A/L)

ORDER AUTHORIZING AMENDMENT TO CITY CODE SEC. 14-49 (ZONING MAP AMENDMENT) RE: CONDITIONAL REZONING FOR PROPERTY IN THE VICINITY OF DANFORTH AND HIGH STREET

ORDERED, that the Zoning Map of the City of Portland, dated December 2000 as amended and on file in the Department of Planning & Development, and incorporated by reference into the Zoning Ordinance by Sec. 14-49 of the Portland City Code, is hereby amended to reflect a conditional rezoning as detailed below.

CONDITIONAL ZONE AGREEMENT RANDOM ORBIT, INC.

This Agreement made this _____ day of _____, 200__ by **RANDOM ORBIT, INC.** a Maine corporation with an office in Portland, Maine (hereinafter "**RANDOM ORBIT**").

WITNESSETH:

WHEREAS, RANDOM ORBIT has entered into a contract to purchase a parcel of land from the City of Portland consisting of approximately 7,655 square feet located at 81-85 Danforth Street in Portland, being a parcel shown on City of Portland Tax Map 40, Block A, Lot 16, and more particularly described in a deed recorded in Cumberland County Registry of Deeds in Book 3304, Page 289 (collectively the "Property"); and

WHEREAS, RANDOM ORBIT proposes to construct upon the Property a maximum of 26 condominium units in one building, which are designed to contribute innovative, pedestrian oriented and affordable housing to the peninsula housing stock, to enhance alternative transportation options, and to provide a unique residential living experience compatible with the established urban neighborhood; and

WHEREAS, the proposed development is consistent with the purposes of the R-7 Compact Urban Residential Overlay Zone as it is on the peninsula; in a location characterized by moderate to high density multi-family housing; within walking distance of downtown or other work places, shopping and community facilities; will have access to public transit service; and

will provide opportunities for compact in-city living for owners, and possibly renters, representing a variety of income levels in small households;

WHEREAS, RANDOM ORBIT has requested the rezoning of the site from R-6 to R-7 Compact Urban Residential Overlay Zone with a conditional zone as further outlined below; and

WHEREAS, the Planning Board of the **CITY OF PORTLAND** (hereinafter **"CITY"**), pursuant to 30-A M.R.S.A. § 4352(8) and §§ 14-60 to 14-62 and 14-127 of the Code, after notice and hearing and due deliberation thereon, recommended the rezoning of the Property as aforesaid, subject, however, to certain conditions; and

WHEREAS, the **CITY,** by and through its City Council has determined that because the innovative concept and design of the proposed development:

- Contributes a desirable, unique type of housing to the peninsula stock;
- Provides affordable home ownership opportunities for traditionally underserved groups;
- Promotes reuse of an underutilized lot to provide new housing development consistent with the compact urban residential development pattern typically found on the peninsula; and
- Encourages pedestrian, public transit, bicycle, and alternative private vehicle transportation options;

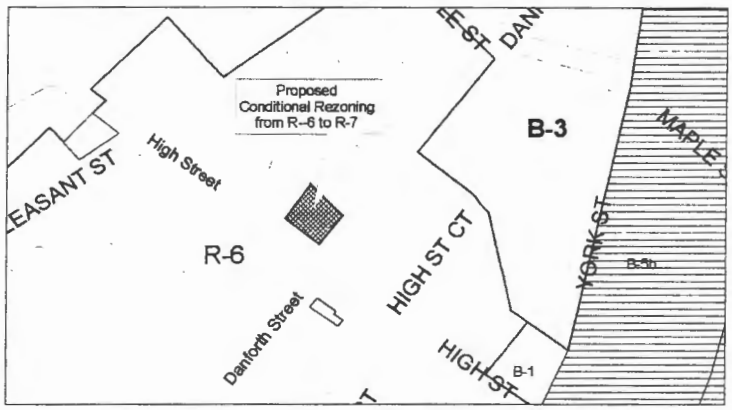
it is necessary and appropriate to impose, by agreement, the conditions and restrictions set forth herein, in order to insure that said rezoning is consistent with the **CITY'S** comprehensive land use plan; and

WHEREAS, the City Council of the **CITY** authorized the execution of this Agreement on _____ by City Council Order No. _____, a true copy of which is attached hereto as Attachment 1; and

WHEREAS, RANDOM ORBIT has agreed to enter into this contract, with its concomitant terms and conditions, which shall hereinafter bind **RANDOM ORBIT**, its successors or assigns;

NOW, THEREFORE, in consideration of the rezoning of the Property, **RANDOM ORBIT** contracts to be bound by the following terms and conditions:

1. The **CITY** hereby amends the Zoning Map of the City of Portland dated December 2000, as amended from time to time and on file in the Department of Planning and Development, and incorporated by reference into the Zoning Ordinance by Section 14-49 of the Code, by adopting the map change amendment shown below (rezoning to R-7 Compact Urban Residential Overlay Zone with contract zone). If this Agreement is not recorded within thirty (30) days of the City Counsel's approval of said rezoning, then the rezoning shall become null and void and the zoning of the Property shall revert to the pre-existing R-6 zone.



Proposed Conditional Rezoning from R-6 to IR-7
81-85 Danforth and 51 High Street
October, 2007
Prepared by Department of Planning and Development based on GIS Workgroup Data

2. **RANDOM ORBIT** is authorized to establish and maintain the following uses on the Property:

a. Residential units: Up to 26 residential units located in one building, which shall be developed and sold and/or rented as condominium units; and

b. Related amenities: to be located within the building, namely, a shared guestroom with private bath; shared lounge for residents and guests; shared laundry facilities; bicycle storage areas with a minimum capacity for 26 bicycles; shared workshop; and storage areas to be used by individuals or in common

c. Parking:

1) shall be provided on-site in an amount of not less than a total of 14 spaces,

2) 2 of said 14 parking spaces shall be used and occupied by two shared vehicles owned or controlled by **RANDOM ORBIT** and/or the condominium association.

3) **RANDOM ORBIT** and/or the condominium association shall be obligated at all times to possess and make available to residents of the 26 units two shared vehicles, subject to rules and regulations governing shared use. No certificate of occupancy shall be issued to any unit unless and until the two commonly shared vehicles have been purchased, are present

on the site, and are available for use by the building occupants.

4) At the time of site plan/ subdivision application, **RANDOM ORBIT** shall provide, for Planning Board review and/or, modification and approval, a shared vehicle management plan for the two commonly shared vehicles, which plan shall include: a.) specific information on the capitalization and ongoing financial plan for the purchase, maintenance and replacement of said shared vehicles, b.) the initial proposed budget for the shared vehicle program, and c.) drafts of the provisions pertaining to the shared vehicle program which will be contained in the initial condominium documents, including the declaration, bylaws and rules and regulations. To provide the necessary incentive to use these shared vehicles and to forego ownership of private cars, as a zoning requirement, the condominium documents shall include the requirement that: a.) on an annual basis at least 20% of the total projected shared vehicle program expenses (including but not limited to operating expenses and reserves for vehicle replacement but specifically excluding gasoline or other fuel expenses which will be paid exclusively by user fees) shall be divided equally between the 26 unit owners; b.) should revenues from user fees and other sources fail to cover the remaining shared vehicle program expenses, any shortfall between expenses and revenues shall be assessed to all 26 unit owners equally; and c.) the condominium owner's association shall submit a shared vehicle program report to the Planning Authority by January 31 of each year reporting total hours of vehicle usage, program revenues, and program expenses for the most recently completed fiscal year, and the projected program budget for the then-current fiscal year.

<u>This provision, 2(c) Parking., shall not foreclose the Planning Board, during site plan or subdivision review, to require a greater contribution from all 26 unit owners to the total projected shared vehicle program expenses.</u>

5) 12 parking spaces may be sold to or otherwise assigned to individual unit owners or occupants; provided, however, that not more than one parking space shall be sold or assigned to any one unit.

6) **RANDOM ORBIT** agrees that it, its successors and assigns shall require purchasers and/or renters of the residential units, or any guests thereof, to accept the restriction that they shall

be prohibited from seeking an on-street residential parking permit from the City of Portland and this covenant and restriction shall be contained in the Condominium Declaration as well as in any deed or lease of the residential units.

3. The Property will be developed substantially in accordance with the Site Plan and Subdivision Plan, elevations and floor plans prepared by Archetype, P.A., Architects on October 23 and November 7, 2007 respectively, attached hereto as Exhibits_____, subject to such subsequent modifications as may be required by the Planning Board during site plan and subdivision review and such subsequent modifications as may be required by the Portland Historic Preservation Committee during its review and approval.

4. Dimensional Requirements: The following shall be the dimensional requirements which shall be applied in subsequent review and shall be met by the proposed development:

Rear yard minimum setback:	4 feet
Rear yard minimum distance between buildings:	20 feet
Side minimum setback, not abutting street:	4 feet
Side minimum setback, abutting street:	0 feet
Side minimum distance between buildings:	12 feet
Minimum land area per dwelling unit:	Two hundred ninety (290) square feet per dwelling unit
Maximum units allowed:	26
Minimum parking spaces per unit:	.53 spaces/unit (14 for 26 units, 2 of which shall be for common or association use)

To the extent that the dimensional, density and related standards are not otherwise specified herein to the contrary, the dimensional requirements of the R-7 Compact Urban Residential Overlay Zone shall apply.

5. The condominium association documents shall reflect an obligation of the association to maintain the planter along Danforth Street with appropriate seasonal flowers, plants or decoration, which shall not include plastic flowers or plants.

6. The Planning Board shall review and approve this development according to the subdivision and site plan provisions of the Portland Land Use Code.

7. Any change in ownership to an owner other than **RANDOM ORBIT** shall be brought to the Planning Board for its review and approval, but this requirement shall not apply to the granting of mortgages by **RANDOM ORBIT** or any successor in interest, or to the enforcement by the mortgagees of their rights under such mortgages, or to the assignment or conveyance of the ownership to an entity in which **RANDOM ORBIT** and/or Peter Bass holds at least a 30% interest, nor shall this requirement apply to the conveyance of individual condominium units or to the granting of mortgages upon individual condominium units.

8. The above stated restrictions, provisions and conditions are an essential part of the rezoning, shall run with the Property, shall bind and benefit **RANDOM ORBIT**, its successors and assigns, and any party in possession or occupancy of said Property or any part thereof, and shall inure to the benefit and be enforceable by the **CITY**, by and through its duly authorized representatives.

8. If any of the restrictions, provisions, conditions, or portions thereof set forth herein is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portions shall be deemed as a separate, distinct and independent provision and such determinations shall not affect the validity of the remaining portions thereof.

9. In the event of a breach by **RANDOM ORBIT** or its successors or assigns of the zoning provisions contained herein (whether the Zoning Administrator, the Zoning Board of Appeals or a court determines such breach), the Planning Board, after notice and hearing, may recommend to the City Council that the Conditional Zone and this Agreement be amended, or be rescinded, such rescission to result in the termination of this Agreement and a reversion of the Property to the R-6 zone in place before the execution of this Agreement.

10. In the event that **RANDOM ORBIT** does not close upon the purchase of the Property from the City pursuant to the Purchase and Sale Agreement, as amended, by December 31, 2008, then the zoning for the Property shall automatically revert to the R-6 zone.

11. **RANDOM ORBIT** shall file a counterpart original of this Agreement in the Cumberland County Registry of Deeds.

12. Except as expressly modified herein, the development, use and occupancy of the Property shall be governed by and comply with the applicable provisions of the Portland City Code and any applicable amendments thereto or replacements thereof.

WITNESS:

RANDOM ORBIT, INC.

_____

By:_____
Peter L. Bass
Its President

STATE OF MAINE
CUMBERLAND, SS. _____, 200_

Then personally appeared the above-named Peter L. Bass, President of RANDOM ORBIT, INC. as aforesaid, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said corporation.

Before me,

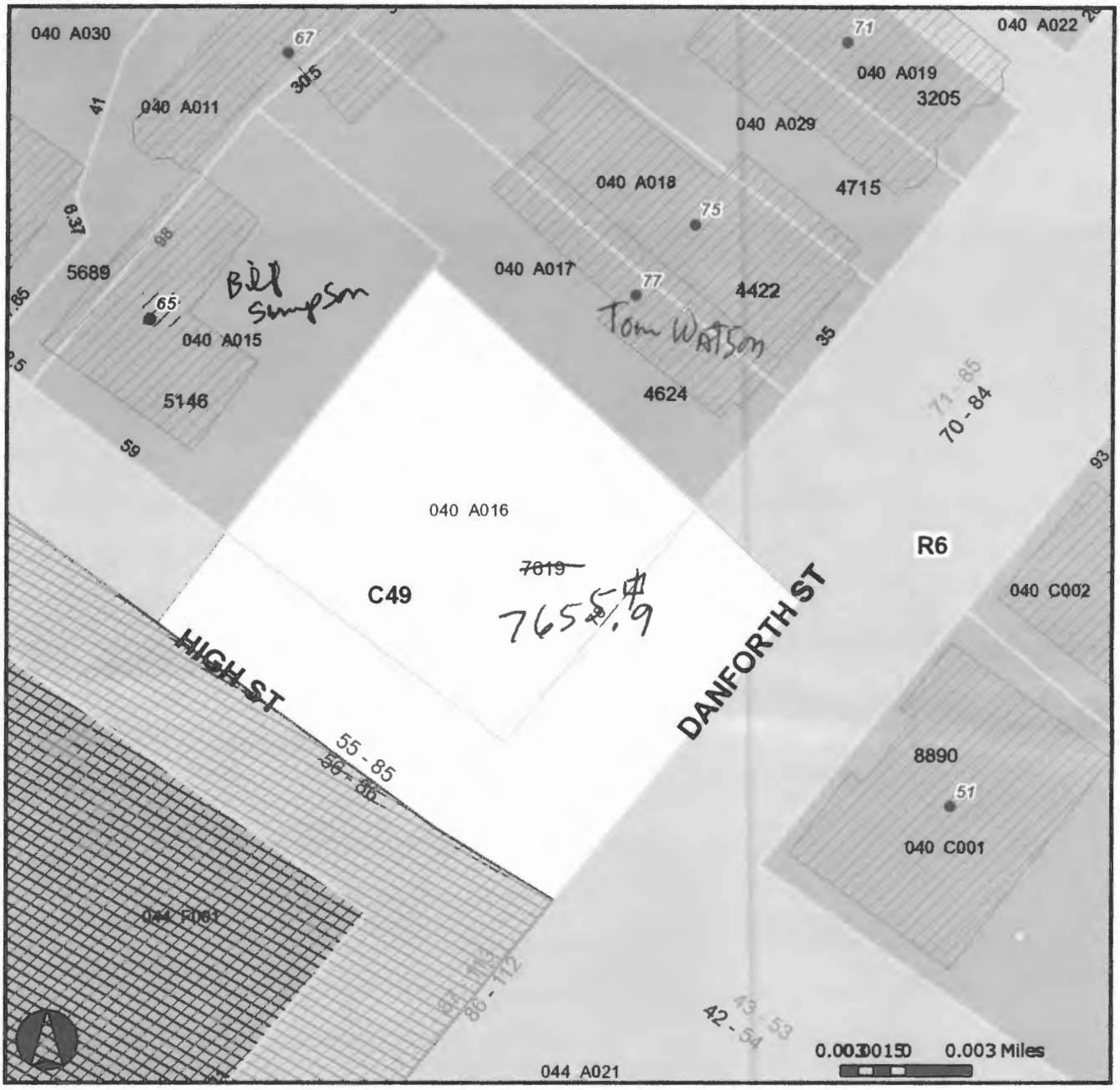
_____
Notary Public/Attorney-at-Law

Printed name: _____

My Commission Expires: _____

O:\OFFICE\PENNY\CONTRACT
\rezone\danforth conditional zone
to council112707.doc

Map



Address Candidates	Stream Overlay Zone	Zoning (continued)	Zoning (continued)
	☒ Stream_protection	☐ R2 Residential	☐ C25
Interstate	Island Zoning	☐ R3 Residential	☐ C26
☐	☐ C43	☐ R4 Residential	☐ C27
Streets	☐ I-B	☐ R5 Residential	☐ C28
	☐ I-TS	☒ R6 Residential	☐ C29
Buildings	☐ I-R1	☐ ROS Recreation Open	☐ C30
☒ Building	☐ I-R2	Space	☐ C31

Marge Schmuckal - Re: Danforth meeting

From: Jay Waterman <jay@chomhousing.org>
To: Alex Jaegerman <AQJ@portlandmaine.gov>, Barbara Barhydt <BAB@portlandmai...
Date: 12/1/2011 1:43 PM
Subject: Re: Danforth meeting
CC: Peter Bass-PelotonLabs <pbass@maine.rr.com>, David Lloyd <lloyd@archetyp...

All,

Let's tentatively shoot for **Thursday Dec 8 from 3:00 - 4:00 PM**. I will confirm soon.

Marge, the project site is at 77 Danforth Street at the corner with High Street.

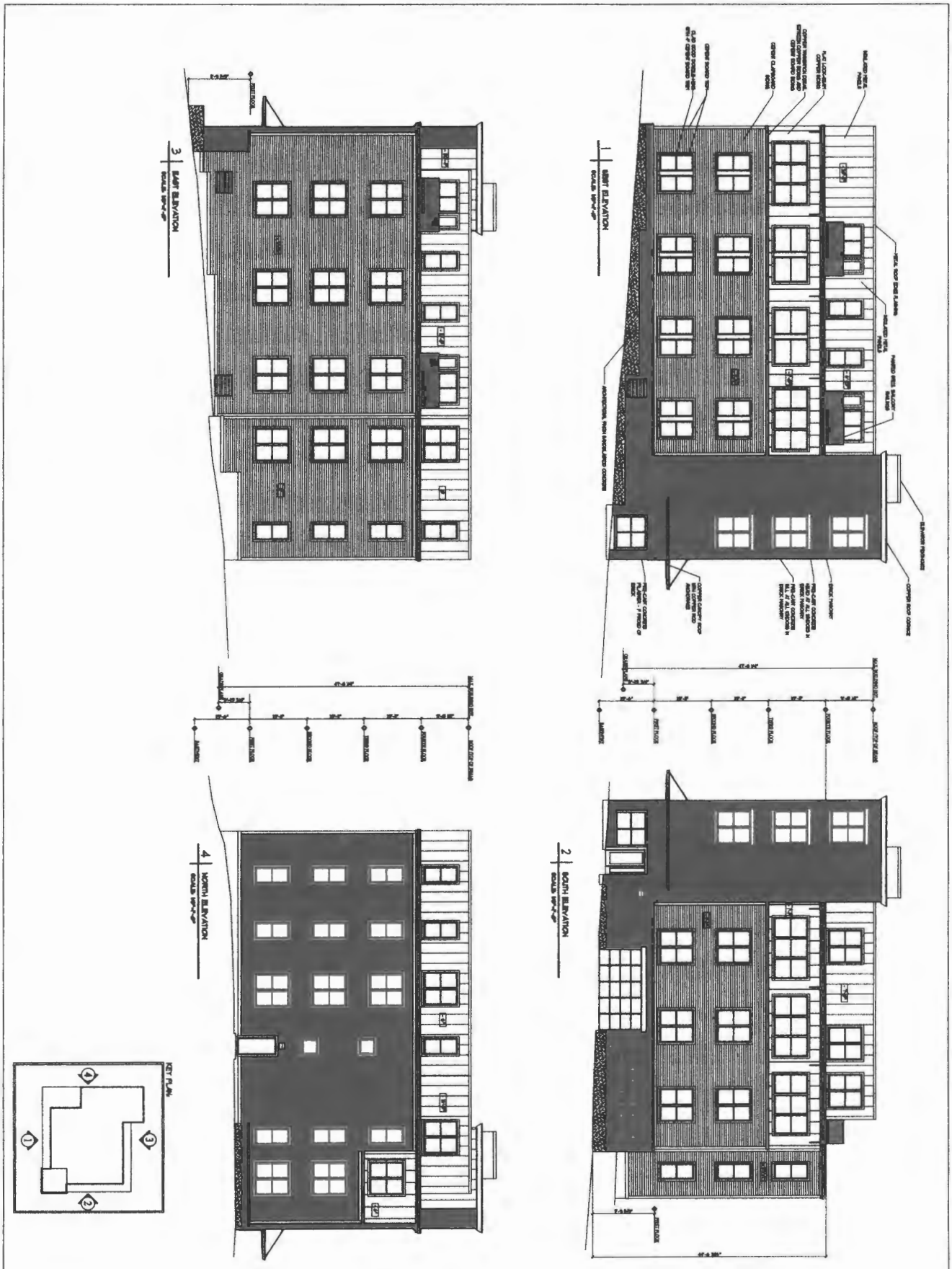
Thanks.

Jay

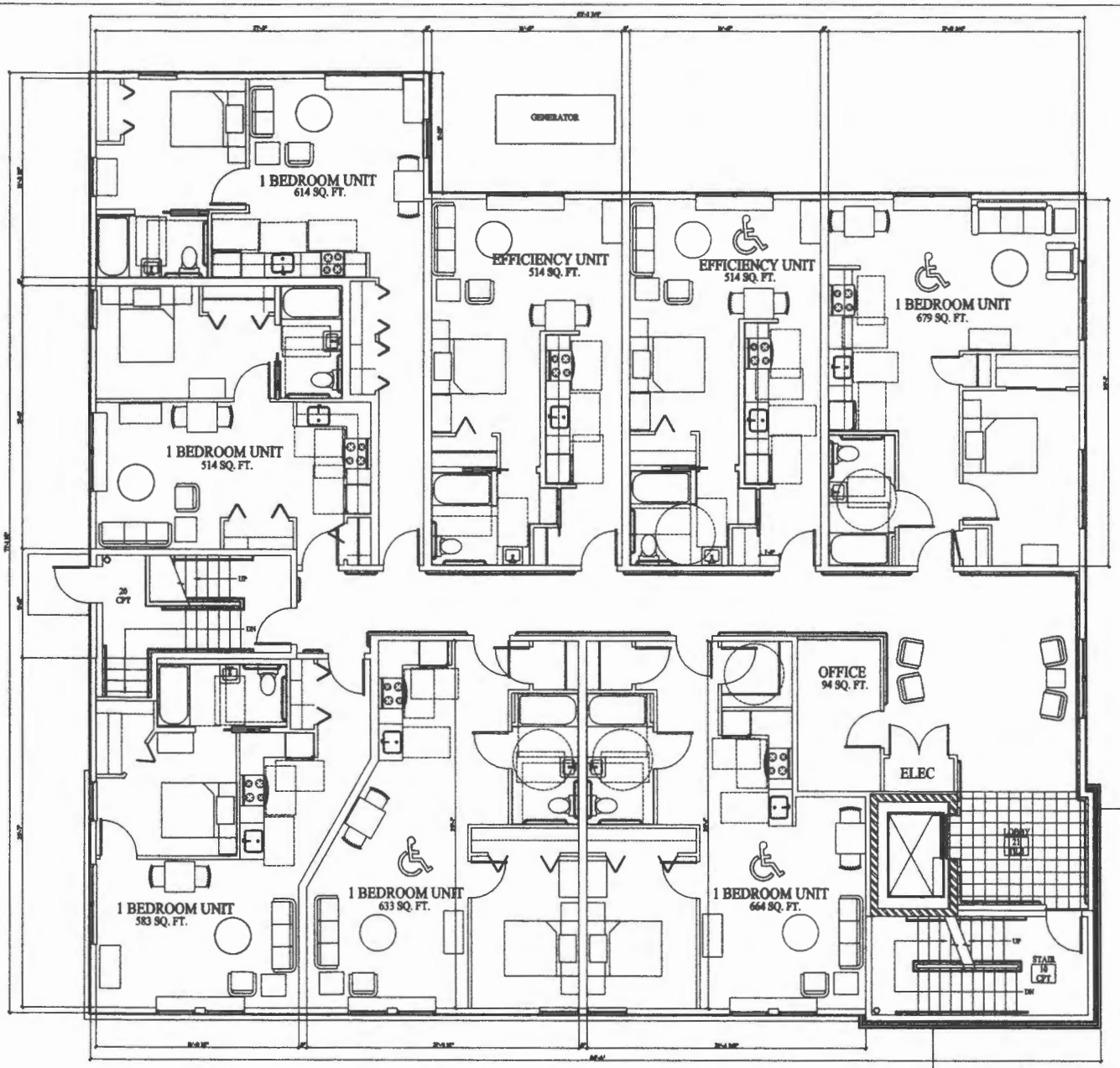
Jay Waterman, LEED AP
Development Officer
Community Housing of Maine
207-272-2562

On Dec 1, 2011, at 11:20 AM, Marge Schmuckal wrote:

> See my availability on your time schedule Please fill me in a little bit more concerning an address on Danforth Street.
> Thank you
> Marge
>
> >>> Peter Bass-PelotonLabs <pbass@maine.rr.com> 12/1/2011 10:41 AM >>>
> Thursday best for me. Friday looks bad after 2:30. Thanks.
>
> Peter
> --
> Peter Bass
> PelotonLabs, LLC
> Random Orbit, INC
>
> 795 Congress St.
> Portland, Maine 04102
>
> 207-772-6005
>
> <Mail Attachment.jpeg>
> http://www.pelotonlabsportland.com
> <Mail Attachment.jpeg>



A2.01	Date: 23 November 2011	Scale: 1/8" = 1'-0"	Revisions:	Project: DANFORTH ON HIGH CONDOMINIUMS	ARCHETYPE, P.A. ARCHITECTS	OWNER: RANDOM ORBIT, INC
	BUILDING ELEVATIONS			81 DANFORTH STREET PORTLAND, MAINE	48 Union Wharf Portland, Maine 04101 (207) 772-6022 Fax (207) 772-4056	17 CHESTNUT STREET PORTLAND, ME 04101



AREA
FIRST FLOOR GROSS AREA
= 5,960 SQ. FT.

TOTAL UNIT COUNT
1 BEDROOM UNITS = 24
EFFICIENCY UNITS = 6
TOTAL UNITS = 30

ACCESSIBLE UNIT COUNT *
1 BEDROOM ACC. UNITS = 9
EFFICIENCY ACC. UNITS = 3
TOTAL ACCESSIBLE UNITS = 12

* - ACCESSIBLE UNITS ARE ICC/ANSI A117.1 - 2003 TYPE A UNITS
REMAINING UNITS ARE ICC/ANSI A117.1 - 2003 TYPE B UNITS

Project North
E
S
W

OWNER:

ARCHETYPE, P.A.
ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6823 Fax (207) 772-4056

Project:
DANFORTH ON HIGH
81 DANFORTH STREET
PORTLAND, MAINE

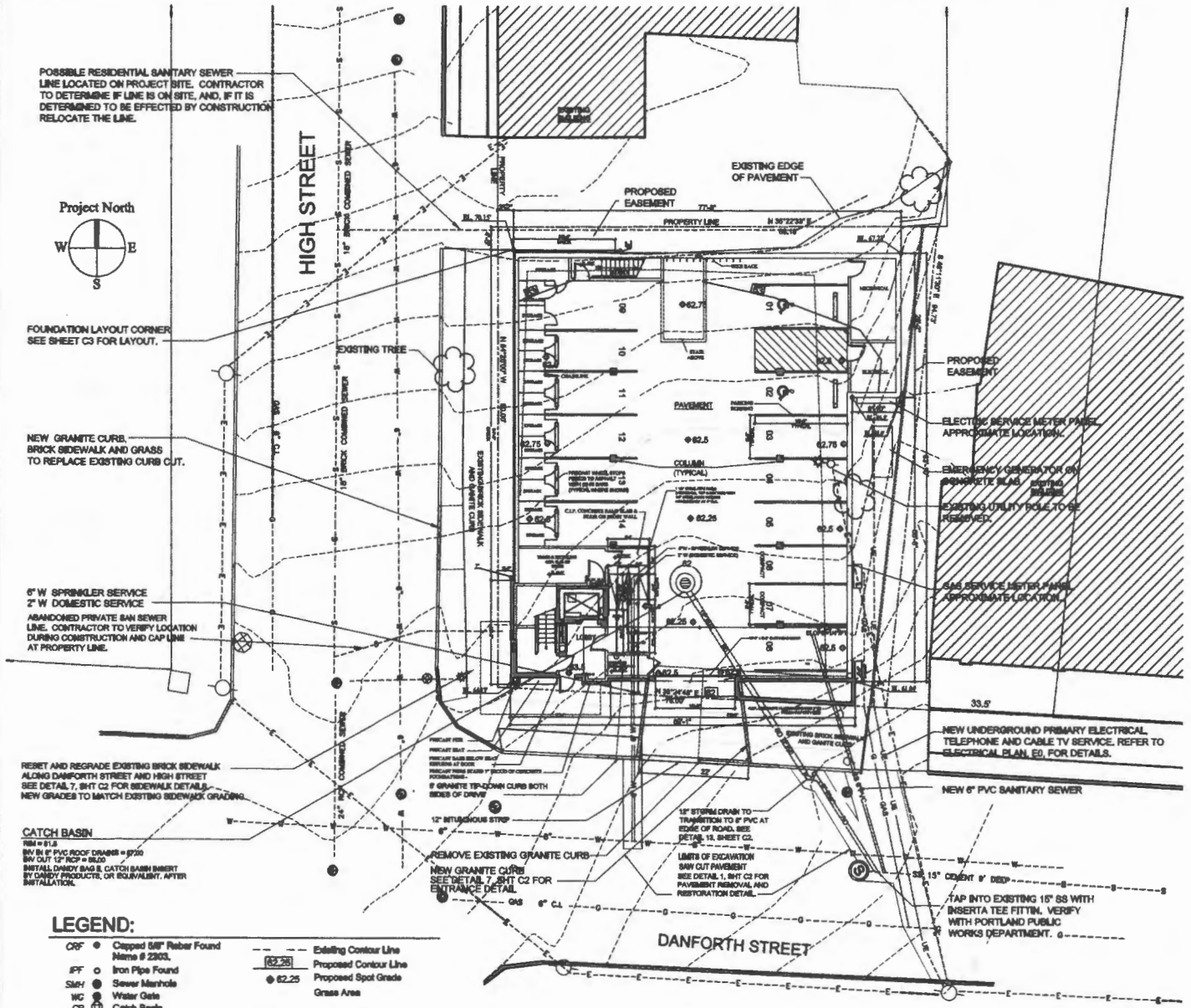
Revisions:

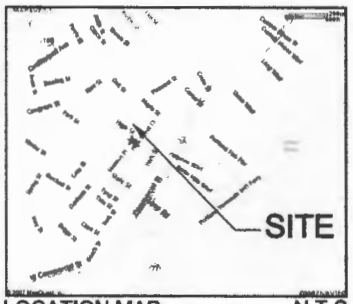
Date
23 November 2011

Scale
1/4" = 1'-0"

FIRST FLOOR PLAN

A1.02





LOCATION MAP N.T.S.

GENERAL NOTES:

1. RECORD OWNER OF PARCEL: CITY OF PORTLAND DEED BOOK 4274, PAGE 155, FORMERLY OWNED BY ANITA NICHOLS , BOOK 3304, PAGE 289 AS RECORDED IN THE CUMBERLAND COUNTY REGISTRY OF DEEDS
2. AREA OF SUBJECT PARCEL: 7,655.9 SQ. FT. 0.18 ACRES
3. ZONE: CONDITIONAL R-7 ZONE
   THIS LOT IS ALSO IN THE SMALL RESIDENTIAL LOT DEVELOPMENT ZONE. SEE THE ZONING ORDINANCE FOR SPECIFIC REGULATIONS PERTAINING TO THAT ZONE.
4. THE PROPOSED BUILDING WILL CONSIST OF 26 CONDOMINIUM UNITS:
   GARAGE LEVEL: PARKING/MECHANICAL
   2ND FLOOR: 7 EFFICIENCIES, 1 ONE BEDROOM
   3RD FLOOR: 7 EFFICIENCIES, 2 ONE BEDROOM
   4TH FLOOR: 1 TWO BEDROOM, 5 ONE BEDROOM, 3 EFFICIENCIES

   PARKING SPACES PROVIDED: 14
5. ELEVATIONS ARE BASED UPON THE WEST CORNER OF A GRANITE MONUMENT FOUND AT THE NORTHWEST CORNER OF STATE STREET AND GRAY STREET, ELEVATION OF SAID MONUMENT = 102.36 FEET N.G.V.D. 1929 SUPPLIED BY THE CITY OF PORTLAND ENGINEERING DEPARTMENT.
6. ALL SITE WORK TO BE IN CONFORMANCE WITH CITY OF PORTLAND OR UTILITY COMPANY SPECIFICATIONS AND DETAILS.
7. PATCH AND REPAIR ALL DAMAGE TO SITE PER CITY OF PORTLAND SPEC
8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO HAVE ALL THE UTILITIES LOCATE THEIR SERVICES PRIOR TO THE START OF CONSTRUCTION.

   EXISTING UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR SHALL CONTACT DIG SAFE AT LEAST THREE (3) BUT NOT MORE THAN THIRTY (30) DAYS PRIOR TO COMMENCEMENT OF EXCAVATION TO VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH THE REQUIREMENTS OF 23 MSRA 3360-A.
9. PROVIDE PEDESTRIAN ACCESS ALONG ALL STREETS AS DIRECTED BY THE CITY OF PORTLAND.
10. ALL WORK NOTED ON THIS SHEET NEEDS TO BE CO-ORDINATED WITH PUBLIC WORKS AND NOT IMPEDE COMMUTER TRAFFIC
11. LOCATION OF UTILITY STRUCTURES AND INVERTS OF PIPED UTILITIES MAY BE ADJUSTED TO MEET FIELD CONDITIONS ONLY AFTER APPROVAL OF THE OWNER, THE AFFECTED UTILITY COMPANY AND THE CITY OF PORTLAND.
12. CONTRACTOR TO INSTALL CATCH BASIN SEDIMENT FILTER IN IN THE NEW CATCH BASIN AFTER IT HAS BEEN SET. CONTRACTOR WILL MONITOR THE FILTER FOR SEDIMENT BUILD-UP AND REMOVE ANY SEDIMENT. SEE DETAIL 11, SHT C2, FOR DANDY BAG INSTALLATION DETAIL.
13. EXISTING PAVEMENT SHALL BE SAW CUT AND BUTTED TO THE NEW PAVEMENT. NO FEATHERING OF PAVEMENT WILL PERMITTED.
14. ALL MATERIALS AND INSTALLATIONS SHALL MEET MDOT AND/OR CITY OF PORTLAND SPECIFICATIONS.
15. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES ON THE GROUND. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE PROJECT ENGINEER FOR DIRECTION AND RESOLUTION PRIOR TO ANY FURTHER WORK.
16. DO NOT SCALE FROM DRAWINGS. ANY OMISSIONS IN DIMENSIONING SHALL BE REPORTED IMMEDIATELY TO THE PROJECT ENGINEER. ANY DISCREPANCIES BETWEEN DRAWINGS, DETAILS, NOTES AND SPECIFICATIONS SHALL BE REPORTED TO THE PROJECT ENGINEER FOR FURTHER RESOLUTION BEFORE ANY ADDITIONAL WORK IS PERFORMED.
17. PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED AND SHALL NOT BE DISTURBED. IF DISTURBED, THEY SHALL BE REPLACED BY A LICENSED SURVEYOR AT THE CONTRACTOR'S EXPENSE.
18. ANY GRANITE CURBING REMOVED DURING CONSTRUCTION IS THE PROPERTY OF THE CITY OF PORTLAND.
19. ANY DAMAGE TO THE EXISTING CITY CURBING, BRICK SIDEWALK, ROADWAY AND SANITARY SEWER WILL BE REPAIRED BY THE OWNER.
20. CONNECTION TO THE COMBINED SEWER-STORMWATER LINE IN DANFORTH STREET TO BE VERIFIED IN THE FIELD. ANY CHANGES REQUIRED TO THE INTERNAL STORMWATER SYSTEM DUE TO INVERT VARIATION FROM DRAWINGS ARE TO BE REPORTED TO THE PROJECTENGINEER FOR REVISIONS.
21. LANDSCAPE PLANTINGS AND DETAILS, INCLUDING PROPOSED STREET TREES, ARE SHOWN ON THE SUBMITTED LANDSCAPE PLAN.
22. WORK IN HIGH STREET WILL REQUIRE A STREET OPENING PERMIT FROM THE CITY OF PORTLAND DEPARTMENT OF PUBLIC WORKS. ALL WORK WILL MEET THE DEPARTMENT OF PUBLIC WORK STANDARDS.

LEGEND:

CRF ● Capped 5/8" Rebar Found Name # 2303,	Existing Contour Line
IPF ○ Iron Pipe Found	62.26 Proposed Contour Line
SMH ● Sewer Manhole	◆ 62.25 Proposed Spot Grade
WG ● Water Gate	Grass Area
CB ⊕ Catch Basin	New Brick Paving
Abutter Line	Edge of traveled way
Property Line	E Overhead Utility
Street Line	Utility Pole
Setback Line	Hydrant
Old Lot Line	Proposed Easement
Indicates Ownership In Common	

PLAN REFERENCE:

"BOUNDARY SURVEY/SITE PLAN, 81 DANFORTH STREET, PORTLAND, MAINE, FOR RANDORM ORBIT INC.", BY BACK BAY BOUNDARY, INC., 643 FOREST AVE., PORTLAND, MAINE 04101, DATED MAY 6, 2007.

SEAL OF MAINE — STEPHEN E. TIBBETTS NO. 3314 — REGISTERED PROFESSIONAL ENGINEER

OWNER:

ARCHITECTS
ARCHETYPE, P.A.
46 Union Wharf Portland, Maine 04101
(207) 772-4822 Fax (207) 772-4824

Project: DANFORTH ON HIGH
81 Danforth Street Portland, Maine 04101

Scale: 1" = 10'-0"

Date: 23 April 2008

Revisions:

SUBDIVISION & SITE PLAN

C1

***Draft** Jan 5 2012~~102207~~*

CONDITIONAL ZONE AGREEMENT
~~RANDOM ORBIT, INC.~~DANFORTH ON HIGH, L.P.

This Agreement made this _____ day of _____, 20~~0~~____ by ~~RANDOM ORBIT, INC.~~DANFORTH ON HIGH, L.P. a Maine corporation with an office in Portland, Maine (hereinafter "~~RANDOM ORBIT~~DANFORTH ON HIGH").

WITNESSETH:

WHEREAS, ~~RANDOM ORBIT~~DANFORTH ON HIGH has entered into a contract to purchase a parcel of land from ~~the City of Portland~~Random Orbit, Inc. **consisting of approximately 7,655 square feet located at 81-85 Danforth Street in Portland, being a parcel shown on City of Portland Tax Map 40, Block A, Lot 16, and more particularly described in a deed recorded in Cumberland County Registry of Deeds in Book 3304, Page 289 (collectively the "Property"); and**

WHEREAS, ~~RANDOM ORBIT~~DANFORTH ON HIGH proposes to construct upon the Property a maximum of ~~26 condominium~~30 rental apartment **units** for seniors aged 55 and older **in one building, which are designed to contribute innovative, pedestrian oriented and affordable housing to the peninsula housing stock, to enhance alternative transportation options, and to provide a unique residential living experience compatible with the established urban neighborhood; and**

WHEREAS, the proposed development is consistent with the purposes of the R-7 Compact Urban Residential Overlay Zone as it is on the peninsula; in a location characterized by moderate to high density multi-family housing; within walking distance of downtown or other work places, shopping and community facilities; will have access to public transit service; and will provide opportunities for compact in-city living for ~~owners, and possibly~~ renters, representing a variety of income levels in small households;

WHEREAS, in December 2007 the **CITY OF PORTLAND** granted a conditional rezoning from R-6 to R-7 Compact Urban Residential Overlay Zone for Random Orbit, Inc

Formatted: Font: Not Bold
Formatted: Font: Not Bold

WHEREAS, certain easements are in place between Random Orbit and abutters that remain in effect and will be assigned to DANFORTH ON HIGH at the time of closing;

Formatted: Font: Bold

WHEREAS, **~~RANDOM ORBIT~~DANFORTH ON HIGH has requested** an amendment to the above-referenced **~~the~~ rezoning of the site ~~from R-6 to R-7 Compact Urban Residential Overlay Zone with a conditional zone as~~ further outlined below; and**

Formatted: Indent: First line: 0.5"

WHEREAS, the Planning Board of the CITY OF PORTLAND (hereinafter "CITY"), pursuant to 30-A M.R.S.A. § 4352(8) and §§ 14-60 to 14-62 and 14-127 of the Code, after notice

and hearing and due deliberation thereon, recommended the rezoning of the Property as aforesaid, subject, however, to certain conditions; and

WHEREAS, the **CITY**, by and through its City Council has determined that because the innovative concept and design of the proposed development:

- Contributes a desirable, unique type of housing to the peninsula stock;
- Provides affordable senior rental housing ~~home ownership~~ opportunities for traditionally underserved groups;
- Promotes reuse of an underutilized lot to provide new housing development consistent with the compact urban residential development pattern typically found on the peninsula; and
- Encourages pedestrian, public transit, bicycle, and alternative ~~private vehicle~~ transportation options;

it is necessary and appropriate to impose, by agreement, the conditions and restrictions set forth herein, in order to insure that said rezoning is consistent with the **CITY'S** comprehensive land use plan; and

WHEREAS, the City Council of the **CITY** authorized the execution of this Agreement on _____ by City Council Order No. _____, a true copy of which is attached hereto as Attachment 1; and

WHEREAS, ~~RANDOM ORBIT~~DANFORTH ON HIGH has agreed to enter into this contract, with its concomitant terms and conditions, which shall hereinafter bind ~~RANDOM ORBIT~~DANFORTH ON HIGH, its successors or assigns;

NOW, THEREFORE, in consideration of the rezoning of the Property, ~~RANDOM ORBIT~~DANFORTH ON HIGH contracts to be bound by the following terms and conditions:

1. The **CITY** hereby amends the Zoning Map of the City of Portland dated December 2000, as amended from time to time and on file in the Department of Planning and Development, and incorporated by reference into the Zoning Ordinance by Section 14-49 of the Code, by adopting the map change amendment shown below (rezoning to R-7 Compact Urban Residential Overlay Zone with contract zone). If this Agreement is not recorded within thirty (30) days of the City Counsel's approval of said rezoning, then the rezoning shall become null and void and the zoning of the Property shall revert to the pre-existing R-6 zone.

Insert map

2. ~~RANDOM ORBIT~~DANFORTH ON HIGH is authorized to establish and maintain the following uses on the Property:

a. Residential units: Up to 3026 residential units located in one building, which shall be developed and ~~sold and/or~~ rented as age- and rent-restricted apartments~~condominium units~~; and

b. Related amenities: to be located within the building, namely, ~~a shared guestroom with private bath;~~ shared lounge for residents and guests; shared laundry facilities; bicycle storage areas with a minimum capacity for 102 10 bicycles bicycles; ~~shared workshop;~~ and storage areas to be used by individuals or in common

c. Parking:

1) shall be provided on-site in an amount of not less than a total of 14 spaces,

~~2)2 of said 14 parking spaces shall be used and occupied by two shared vehicles owned or controlled by RANDOM ORBIT and/or the condominium association. RANDOM ORBIT and/or the condominium association shall be obligated at all times to possess and make available to residents of the units two shared vehicles, subject to rules and regulations governing shared use as may be approved by the Portland Planning Board. At the time of site plan/ subdivision application, RANDOM ORBIT shall provide, for Planning Board review and/or, modification and approval, a shared vehicle management plan which shall include specific information on the capitalization and ongoing financial plan for the purchase, maintenance and replacement of said shared vehicles.~~

Formatted: Indent: Left: -0.25"

Formatted: Bullets and Numbering

~~3)12 parking spaces may be sold to or otherwise assigned to individual unit owners or occupants.~~

Formatted: Bullets and Numbering

~~4)~~2) ~~RANDOM ORBIT~~DANFORTH ON HIGH agrees that it, its successors and assigns shall require ~~purchasers and/or~~ renters of the residential units, or any guests thereof, to accept the restriction that they shall be prohibited from seeking an on-street residential parking permit from the City of Portland and this covenant and restriction shall be contained in the ~~Condominium Declaration as well as in any deed or~~ lease of the residential units.

Formatted: Bullets and Numbering

3. The Property will be developed substantially in accordance with the Site Plan and Subdivision Plan, elevations and floor plans prepared by Archetype, P.A., Architects (last

revised _____), attached hereto as Exhibits_____, subject to such subsequent modifications as may be required by the Planning Board during site plan and subdivision review and such subsequent modifications as may be required by the Portland Historic Preservation Committee during its review and approval.

4. Dimensional Requirements: The following shall be the dimensional requirements which shall be applied in subsequent review and shall be met by the proposed development:

Rear yard minimum setback:	4 feet
Rear yard minimum distance between buildings:	20 feet
Side minimum setback, not abutting street:	4 feet
Side minimum setback, abutting street:	0 feet
Side minimum distance between buildings:	12 feet
Minimum land area per dwelling unit:	Two hundred ~~ninety~~ fifty (2590) square feet per dwelling unit
Maximum units allowed:	3026
Minimum parking spaces per unit:	0.4753 spaces/unit (14 for 3026 unitsunits, ~~2 of which shall be for common or association use~~)

To the extent that the dimensional, density and related standards are not otherwise specified herein to the contrary, the dimensional requirements of the R-7 Compact Urban Residential Overlay Zone shall apply.

5. The Planning Board shall review and approve this development according to the subdivision and site plan provisions of the Portland Land Use Code.

6. Any change in ownership to an owner other than ~~RANDOM ORBIT~~DANFORTH ON HIGH shall be brought to the Planning Board for its review and approval, but this requirement shall not apply to the granting of mortgages by ~~RANDOM ORBIT~~DANFORTH ON HIGH or any successor in interest, or to the enforcement by the mortgagees of their rights under such mortgages, or to the assignment or conveyance of the ownership to an entity in which ~~RANDOM ORBIT~~DANFORTH ON HIGH ~~and/or Peter Bass~~ holds at least a 30% interest ~~nor shall this requirement apply to the conveyance of individual condominium units or to the granting of mortgages upon individual condominium units.~~

7. The above stated restrictions, provisions and conditions are an essential part of the rezoning, shall run with the Property, shall bind and benefit ~~RANDOM ORBIT~~DANFORTH ON HIGH, its successors and assigns, and any party in possession or occupancy of said Property or any part thereof, and shall inure to the benefit and be enforceable by the CITY, by and through its duly authorized representatives.

8. If any of the restrictions, provisions, conditions, or portions thereof set forth herein is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portions shall be deemed as a separate, distinct and independent provision and such determinations shall not affect the validity of the remaining portions thereof.

9. In the event of a breach by ~~RANDOM ORBIT~~DANFORTH ON HIGH or its successors or assigns of the zoning provisions contained herein (whether the Zoning Administrator, the Zoning Board of Appeals or a court determines such breach), the Planning Board, after notice and hearing, may recommend to the City Council that the Conditional Zone and this Agreement be amended, or be rescinded, such rescission to result in the termination of this Agreement and a reversion of the Property to the R-6 zone in place before the execution of this Agreement.

10. In the event that ~~RANDOM ORBIT~~DANFORTH ON HIGH does not close upon the purchase of the Property from ~~the City~~Random Orbit,Inc. pursuant to the Purchase and Sale Agreement, as it may be amended, ~~by December 31, 2012~~08, ~~then~~ the zoning for the Property shall automatically revert to the existing zoning~~R-6 zone~~.

11. ~~RANDOM ORBIT~~DANFORTH ON HIGH shall file a counterpart original of this Agreement in the Cumberland County Registry of Deeds.

12. Except as expressly modified herein, the development, use and occupancy of the Property shall be governed by and comply with the applicable provisions of the Portland City Code and any applicable amendments thereto or replacements thereof.

WITNESS:

~~RANDOM ORBIT, INC.~~DANFORTH ON HIGH, L.P.

By: CHOM DEVELOPMENT CORPORATION
Its General Partner

Formatted: Level 1, Indent: Left: 2.5", First line: 0.5"

_____

By:_____
~~Cullen Ryan~~Erin Cooperrider~~Peter L. Bass~~
Its Development ~~Executive~~ Director~~President~~

STATE OF MAINE
CUMBERLAND, SS.

_____, 20~~0~~__

Then personally appeared the above-named ~~Cullen Ryan~~Erin Cooperrider~~Peter L. Bass~~, ~~Executive~~Development Director~~President~~ of ~~RANDOM ORBIT, INC.~~CHOM DEVELOPMENT

CORPORATION as aforesaid, and acknowledged the foregoing instrument to be his free act and deed in his said capacity and the free act and deed of said corporation.

Before me,

_____
Notary Public/Attorney-at-Law

Printed name: _____

My Commission Expires: _____

Zoning Assessment
Danforth and High Project
R-6 Zone

Minimum Area per Dwelling Unit:

- R-6: 1000 per unit
- Proposed: 255 per unit

250 new in contract

Front Set Back:

- R-6: 10 feet or not to exceed average of abutting properties which = 5'
- Proposed: 2'-10'

Side Yard:

- R-6: 12'
- Proposed: 4' 6" to 14'

Rear Yard:

- R-6: 20'
- Proposed: 4 feet

Building Height: R-7 allows 50'

- R-6: 45'
- Proposed: ~~47' – 8"~~ 48.7825 / per previous to top of main building

Parking Ratio:

- R-6: 2 spaces per unit
- Proposed: total of 14 spaces

Maximum Lot Coverage:

- R-6: 40%
- Proposed: 74%

R-7 allows 100%

Open Space Ratio:

- R-6: 30%
- Proposed: 26%

Below is a comparison between our proposed project and the current zoning standards. We have used R-6 small lot standards as our base since these standards most closely reflect our project. We have also shown R-7 standards for comparison purposes. Discrepancies are highlighted in yellow. We propose a contract zone as the solution to these discrepancies.

Dimension	Proposed	R6 small res lot <10,000	R7
minimum lot size	7,655	none	none
yard dimensions: front rear set backs	2 to 10	<10	none mentioned
rear setback	4	4" min setback, **and either rear or side must be at least 15 feet**	use R6 (ie12') when abutting res lots, but see below:
rear- distance between buildings	21.5	Min. either 10 ft between buildings or sum of heights of both buildings/5, whichever is greater, ie 49 +45=94/5=19.5' required to rear building	"in no cases shall this provision require a setback such that the distance between the existing res building and proposed new res structure exceed the combined setbacks of respective zones." ie R6 would imply 20, but can't require distance between buildings to be more than 20 (R6) +0 (R6 infill) /2=10' to rear building
side setback	4	4" min setback, **and either rear or side must be at least 15 feet**	use R6 (ie 12' for 4 stories) when abutting res lots, but see below:
side- distance between buildings	16	Min. either 10 ft between buildings or sum of heights of both buildings/5, whichever is greater, ie 48 + 52=100/5=20' required on corner lot at side oabutting street.	Same language as for rear ie R6 would imply 12 but can't require distance between buildings of more than 12 (R6)+0 (R7)=12' to side building
max lot coverage	74%	non mentioned	100%
max res density	250 in control ~~255~~ sq. ft./unit	725 sq. ft./unit	725 excert unless within 500 feet for park or playground, then 435 (for portion of lot that doesn't exceed size of park)
max units allowed	**30**	**10.6**	**10.6**
max height	47.66	45	50
min parking spaces	**.46/unit**	**1/unit**	**1/unit**
min total parking	**14**	**26**	**26**
open space	795 sq. ft. open, non-impervious space provided	must have a deck for each unit (48 sq. ft. min.) unless there is an open space equal to 10% of lot on site (10% in this case would be 765 sq. ft.)	none

PROJECT DATA

The following information is required where applicable, in order complete the application

Total Site Area	7656 sq. ft.
Proposed Total Disturbed Area of the Site	7400 sq. ft.

(If the proposed disturbance is greater than one acre, then the applicant shall apply for a Maine Construction General Permit (MCGP) with DEP and a Stormwater Management Permit, Chapter 500, with the City of Portland.)

Impervious Surface Area

Proposed Total Paved Area	495 sq. ft.
Existing Total Impervious Area	287 sq. ft.
Proposed Total Impervious Area	6482 sq. ft.
Proposed Impervious Net Change	6195 sq. ft.

Building Area

Existing Building Footprint	0 sq. ft.
Proposed Building Footprint	5987 sq. ft.
Proposed Building Footprint Net change	NA sq. ft.
Existing Total Building Floor Area	0 sq. ft.
Proposed Total Building Floor Area	28501 sq. ft.
Proposed Building Floor Area Net Change	28501 sq. ft.
New Building	28501 (yes or no)

Zoning

Existing	R-6
Proposed	CONTRACT ZONE

Land Use

Existing	PARKING LOT
Proposed	RESIDENTIAL

Residential, if applicable

Proposed Number of Affordable Housing Units	30
Proposed Number of Residential Units to be Demolished	0
Existing Number of Residential Units	0
Proposed Number of Residential Units	30
Subdivision, Proposed Number of Lots	30

Parking Spaces

Existing Number of Parking Spaces	16
Proposed Number of Parking Spaces	(14) shown on plans
Number of Handicapped Parking Spaces	2
Proposed Total Parking Spaces	14

Bicycle Parking Spaces

Existing Number of Bicycle Parking Spaces	0
Proposed Number of Bicycle Parking Spaces	12
Total Bicycle Parking Spaces	12

Estimated Cost of Project: $4,149806.00

December 21, 2011

Alex Jaegerman, Planning Division Director
City of Portland
389 Congress Street
Portland, ME 04101

Subject: Danforth on High Conditional Zoning Amendment and Site Plan Approval Preliminary Application

Dear Alex,

Community Housing of Maine is pleased to submit this application for Conditional Zoning Amendment and Site Plan Approval for the Danforth on High Project located at 81 Danforth Street. As you are aware, 81 Danforth Street was provided a conditional rezoning in the end of 2007. CHOM now has an option to purchase the lot from Random Orbit and provide affordable rental housing for seniors while only making minor changes to the building and not making any changes to the building footprint or height already approved in 2007.

This application is requesting an amendment to the conditional rezoning as well as requests preliminary site plan approval.

Project Description

Danforth on High will be a smart growth development on Portland's downtown peninsula that provides badly needed rental housing for Portland's senior population. The building will consist of 30 units of new construction rental housing on four floors with parking at the first level. There will be 24 one-bedroom apartments and 6 studio apartments. Over 40% of the units will be targeted toward seniors whose income does not exceed 50% of the Area Median Income (AMI). The remaining units will all be affordable to those below 60% AMI. This community of 55 and older seniors will be within walking distance of Maine's largest arts district, Portland's Downtown district and Portland's waterfront and will enjoy views of Portland harbor.

CHOM is working with Archetype Architects to design a modern high performance building with a façade and details that compliment the historic district in which it is located. The building was originally conceived as "micro-condominiums" for active seniors by Random Orbit, a Portland developer. The concept design was approved by the Portland Planning Board and the City's Historic Preservation Board. Now CHOM has the opportunity to build on what was proposed before and

develop affordable rental housing with a design that has already received City support. The immediate neighborhood has residential uses mixed with small businesses and in close proximity to a high concentration of amenities and services.

CHOM also has an ongoing commitment to design buildings that are beautiful, durable, as well as energy efficient. The envelope design is super-insulated and air-sealed to allow for a small and efficient mechanical system that will reduce CHOM's operating costs and tread lightly on the environment. Indoor air quality, water use reduction, and environmentally responsible materials are included in the design.

Assessment of Zoning

In December of 2007, the Portland City Council approved a conditional rezoning of this site for Random Orbit Inc. from an R-6 to an R-7 Compact Urban Residential Overlay Zone.

This action by the Council and the Planning Board in 2007 laid the groundwork for the current development scope. Higher density on this site was critical to make this a project work on the peninsula. Financing for the project dictate that 30 units is the optimal number of units for this site and we are at a maximum height for the building as well as at zero lot lines on the two back sides of the lot.

We will have more parking data and a transportation demand strategy shortly, but do feel that the population expected to live at Danforth on High, as well as its location, are well-suited to needing less than typical parking space counts.

See attached for Zoning Assessment.

Easements

There are four non-utility easements currently in place that were negotiated between Random Orbit, Inc. and neighboring owners.

An easement was granted to Mid-Town Properties in order to grant them access to a five foot strip of land along the northwesterly border of our lot. This allows pedestrians and vehicles to pass along this side of the lot. This is recorded as Easement Deed Document #68125, Book 26501, Page 253. A temporary construction easement was granted back to the current owner of 81 Danforth Street at the time and recorded as Document 68124, Book 26501, Page 251.

An emergency egress easement was granted to the current owner of 81 Danforth Street for pedestrian access over a portion of the driveway of the property known as 65 High Street. This was recorded as Easement Deed Document # 68123, Book 26501, Page 249.

An easement was granted to the East Danforth LLC in order to grant them access to a three foot strip of land along the northeasterly border of our lot. This allows pedestrians and vehicles to pass along this side of the lot and to maintain and repair a driveway the grantee uses that passes

CHOM
Community Housing of Maine

over the easement area. This is recorded as Easement Deed Document #68122, Book 26501, Page 247.

Comprehensive Plan

The housing portion of the City's Comprehensive Plan, entitled Housing: Sustaining Portland's Future has certain goals that are exemplified by the Danforth on High development. Some of the housing goals are as follows:

- Be pedestrian oriented and accessible
  - The project is located in Portland's urban center on the downtown peninsula within walking distance of Portland's Old Port, the Congress Street Arts District, the Victorian Mansion and five parks within a half-mile walk. The project gets a WalkScore.com score of 97 out of 100.
  - The plan's objectives for diverse housing also call for "high density housing [on] small lots." This proposed project has 30 units on a 7,656 square feet lot. This is approximately 170 units per acre.
- Ensure that an adequate supply of housing is available to meet the needs, preferences, and financial capabilities of all Portland households, now and in the future.
  - One of the objectives of this goal is to create "Housing units for decreasing household size, such as young professionals, empty nesters, single-parent households, and senior citizens"
  - Danforth on High will provide efficiency and one-bedroom units for senior that have been greatly underserved by affordable housing development on the peninsula in recent years.
  - This development is across the street from a family housing community also developed by Community Housing of Maine. There will be interactions between residents and between generations of Mainers with the proximity of these two buildings.
- Incorporate environmental, economic and neighborhood considerations in municipal decision-making
  - The Danforth project turns a vacant gravel lot into a vibrant home for Portland's senior citizens who are eager to be in an exciting area of the City and benefit from all the nearby amenities. The minimum age for seniors in the development is 55 years old, so there will be plenty of active seniors in this development.
  - CHOM is committed to delivering high quality housing that addresses environmental issues in the creation of new construction housing. The project is striving to reduce it's impact on the environment by designing a building that will be 20-30% more energy efficient than an average code building. A high-performing envelope and mechanical system will be complemented with excellent indoor air quality, local material choices and water-saving fixtures. Please note: the building will also be built to achieve Maine State Housing Authorities Green Building Standards.
- Strengthen alternative transportation options.

CHOM
Community Housing of Maine

- This community of seniors will have access to municipal bus lines and will be able to walk to numerous amenities. With a WalkScore of 97 out of 100, most residents will not need to travel beyond a half-mile to meet their daily needs.

- The City should support sustainable development patterns and efficient land use, conserving natural resources
  - The lot size is 0.17 acre. At a density of 170 units per acre, the project is one of the higher density developments on the peninsula. Portland needs to provide higher density alternatives to typical suburban zoning if it is going to truly be a city. This follows Smart Growth patterns that protects our greenfields, uses existing infrastructure instead of extending it to suburban areas and provides housing where people want to live.
  - By building senior housing on this lot, CHOM is also ensuring a traditionally residential neighborhood remains a residential neighborhood and stems the tide of commercial and institutional "creep."

Right Title and Interest

Please see the attached Option Agreement with Random Orbit Inc. that gives CHOM right, title and interest in the property in order to be able to submit this application.

Financial Capacity and Technical Capacity

Please find attached letters from Maine Housing and Camden National Bank indicating their willingness to finance the development.

Please do not hesitate to contact Community Housing of Maine or David Lloyd at Archetype Architects with any questions.

Sincerely,

Jay Waterman
Development Officer
Community Housing of Maine

Marge Schmuckal - 81-85 Danforth St

From: Marge Schmuckal
To: Barbara Barhydt
Date: 1/31/2012 2:02 PM
Subject: 81-85 Danforth St

Barbara,
I have put my real comments in the system
Marge

A R C H E T Y P E

February 5, 2008

2/6/08

Carrie Marsh
Portland City Hall
389 Congress Street
Portland, Maine 04101

RE: Proposed New Housing – 81-85 Danforth Street

Dear Carrie,

Attached is our final submission for Site Plan Review.

Sincerely,

David Lloyd
Architect

CC: Peter Bass

2/8/08 – left a voice message with DAVID ~~full time~~ generator or ~~part time~~ emergency generator

2/8/08 Emergency Generator only per David Lloyd

Enclosures:
Site Plan Application (copy)
Neighborhood Meeting Certification
Neighborhood Meeting Minutes
Neighborhood Meeting Sign-Up-Sheet
Copy of Neighborhood Meeting Invitation Sent
Information on Generators and Sound Levels
Stormwater Analysis
Portland Fire Department Site Review Checklist
Sewer Capacity Letter
Portland Water District Water Capacity Letter & Map
Geotech Report
Exterior Lighting Information
C1 Subdivision & Site Plan
C2 Site Details
Survey Plan
Recording Plat
L1 Planting Plan
Boring Plan
A1.01 First & Second Floor Plans
A1.02 Third & Forth Floor Plans
A1.03 Mezzanine & Roof Floor Plans
A2.01 South & West Elevation
A2.02 North & East Elevations
E0 Photometric Lighting Plan

FEB - 6 2008

48 Union Wharf, Portland, Maine 04101 (207) 772-6022 • Fax (207) 772-4056

Benjamin Wallace - FW: Danforth on High 81 Danforth street

From: David Lloyd <lloyd@archetypepa.com>
To: <WALLACEB@portlandmaine.gov>
Date: 8/24/2012 10:30 AM
Subject: FW: Danforth on High 81 Danforth street

David Lloyd
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
Tele: (207) 772-6022
Fax: (207) 772-4056
Cell: (207) 831-8627
lloyd@archetypepa.com
http://www.archetype-architects.com

From: Bartlett Design [mailto:bartlettdesigninc@comcast.net]
Sent: Wednesday, August 22, 2012 4:09 PM
To: David Lloyd
Subject: Re: Danforth on High 81 Danforth street

David:
My answers are indicated below. The only issue that needs to be addressed is to have the generator monitored by the fire alarm system (item 17) which I willcoordinate with the generator and fire alarm system suppliers.
Larry Bartlett

From: "David Lloyd" <lloyd@archetypepa.com>
To: sue@archetypepa.com, "Larry Bartlett" <bartlettdesigninc@comcast.net>, "Magnusson Kurt" <kurt@mechanicalsystemseng.com>
Cc: "Barry Yudaken" <Yudaken@archetypepa.com>
Sent: Tuesday, August 21, 2012 5:58:15 PM
Subject: FW: Danforth on High 81 Danforth street

Larry, please answer items 9,11,16 and 17
Kurt please answer item 18
Sue please print out item 2 and 15

David Lloyd
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
Tele: (207) 772-6022
Fax: (207) 772-4056
Cell: (207) 831-8627
lloyd@archetypepa.com
http://www.archetype-architects.com

From: Benjamin Wallace [mailto:wallaceb@portlandmaine.gov]
Sent: Tuesday, August 21, 2012 3:04 PM
To: David Lloyd
Cc: Chris Pirone; Jeanie Bourke
Subject: Re: Danforth on High 81 Danforth street

Hi David,
Sorry to give you more homework, but please review my comments below.
Thanks,
Ben

1. This building is type V(111) construction and 5 stories in height. Occupancy is Storage (Enclosed Parking Structure) on the level of exit discharge, and apartment building on floors 2 thru 5. The building protection scheme is multiple, mixed occupancies in accordance with NFPA 101:6.1.14; specifically 6.1.14.1.2.

2. The building shall comply with City Code Chapter 10 and the City of Portland Fire Department Rules and Regulations.

3. Per the City of Portland Fire Department Rules and Regulations: Re-identify Stair 1 as Stair A and Stair 2 as Stair B. The floors and the room numbers shall be numbered starting with Floor 1 at the parking level and room numbers as appropriate.

4. Stair re-entry shall be provided in accordance with NFPA 101:7.2.1.5.7.

5. Door 203 from Bathroom 23 into the corridor and doors 103, 204, 304, 402 into Stair B do not appear to meet the 7 inch encroachment requirement of NFPA 101:7.2.1.4.3.1. Please verify compliance.

6. Boiler room door B08 requires 45-minute fire rated assembly per NFPA 101:30.3.2.1.1.

7. Duct work from Unit 106 thru Stair B as shown on plan M7 does not appear to comply with NFPA 101:7.1.3.2.1(9). Please verify and document compliance.

8. Please document how this building complies with NFPA 101:7.2.12 and 7.5.4 for areas of refuge and accessible means of egress as modified by 30.2.2.12.

9. Local CO alarms in each dwelling and System CO detector installation shall be in accordance with NFPA 720.

ANSWER: LOCAL CO DETECTORS ARE BEING PROVIDED IN ACCORDANCE WITH NFPA 720.

10. Compliance with NFPA 1, Fire Code, Annex O for In-building Public Safety Radio Enhancement Systems shall be verified by an RF Engineer.

11. Per City Code 10-101 and City of Portland Fire Department Rules and Regulations: an AES master box fire alarm system will be required.

ANSWER: THE SPECIFICATIONS REQUIRE THAT THE CONTRACTOR PROVIDE A MASTER BOX IN ACCORDANCE WITH THE CITY OF PORTLAND FIRE DEPARTMENT REGULATIONS.

12. A supervised, automatic sprinkler system in accordance with NFPA 13 will be required. Individual floor control assemblies shall be provided per the City of Portland Fire Department Rules and Regulations.

13. Per NFPA 1 and the City of Portland Fire Department Rules and Regulations: Manual wet or automatic Class I standpipes shall be installed in accordance with NFPA 14.

14. Per the City of Portland Fire Department Rules and Regulations: A Knox key switch model 3502 shall be provided for the garage door and a Knox box provided at the entrance. The building should be master keyed.

15. Building shall comply with City Code 10-4 for *Special Hazard Dwelling Units*, including low

proximity exit signage.

16. Emergency lighting is required per NFPA 101:7.9. Please confirm how this will be satisfied including the provisions of 7.9.2.3.

ANSWER: EMERGENCY EGRESS LIGHTING AS REQUIRED BY NFPA 101 IS BEING SERVED BY THE EMERGENCY GENERATOR WITH A SEPARATE, DEDICATED AUTOMATIC TRANSFER SWITCH. THE LOCAL EMERGENCY LIGHTING CIRCUITS ARE CONNECTED TO A DEDICATED PANELBOARD THAT CONTAINS NO OTHER CIRCUITS. FAILURE OFTHE UTILITY ELECTRICAL POWER SUPPLY WILL AUTOMATICALLY START THE GENERATOR WHICH WILL OPERATE THE EMERGENCY EGRESS LIGHTS. OPENING OF THE EMERGENCY LIGHTING FEEDER CIRCUIT BREAKER ON THE NORMAL SIDE OF THE AUTOMATIC TRANSFER SWITCH WILL AUTOMATICALLY START THE GENERATOR TO OPERATE THE EMERGENCY LIGHTS. ACCIDENTAL OPENING OF CIRCUIT BREAKERS SERVING NORMAL LIGHTING CIRCUITS WILL NOT IMPACT THE OPERATION OF THE EMERGENCY LIGHTING CIRCUITS.

17. Emergency generators shall comply with NFPA 101:9.1.3.

ANSWER: THE GENERATOR IS BEING PROVIDED IN ACCORDANCE WITH NFPA 110. THE GENERATOR WILL BE MONITORED BY THE FIRE ALARM SYSTEM.

18. Installation of HVAC systems shall be in accordance with NFPA 101:9.2.

19.

Lt. BenjaminWallace Jr.
Fire Prevention Officer
Portland Fire Department
380 Congress Street
Portland, Maine 04101
(207)874-8400
wallaceb@portlandmaine.gov

>>> David Lloyd <lloyd@archetypepa.com> 8/21/2012 12:59 PM >>>
Ben
Ben
Per our phone conversation we will change from a 13R to full NFPA 13 system
Thank You
David Lloyd
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
Tele: (207) 772-6022
Fax: (207) 772-4056
Cell: (207) 831-8627
lloyd@archetypepa.com
http://www.archetype-architects.com

My response to your answers is in green. I'm going to need updated plans and would expect a completed and updated specifications manual.

8/27/12 response from architect

1. This building is type V (111) construction and 5 stories in height. Occupancy is Storage (Enclosed Parking Structure) on the level of exit discharge, and apartment building on floors 2 thru 5. The building protection scheme is multiple, mixed occupancies in accordance with NFPA 101:6.1.14; specifically 6.1.14.1.2. we understand this interpretation and will sprinkle entire building with NFPA 13. Ok. Condition of approval.

2. The building shall comply with City Code Chapter 10 and the City of Portland Fire Department Rules and Regulations. We understand these requirements and they will be met. Ok. Condition of approval.

3. Per the City of Portland Fire Department Rules and Regulations: Re-identify "Stair 1" as "Stair A" and "Stair 2" as "Stair B." The floors and the room numbers shall be numbered starting with Floor 1 at the parking level and room numbers as appropriate. We will renumber per your requirements. Ok. Show on updated plans.

4. Stair re-entry shall be provided in accordance with NFPA 101:7.2.1.5.7. yes doors do not lock out reentry. Ok. Condition of approval.

5. Door 203 from Bathroom 23 into the corridor and doors 103, 204, 304, 402 into Stair B do not appear to meet the 7 inch encroachment requirement of NFPA 101:7.2.1.4.3.1. Please verify compliance. Door 23 will be relocated , see attached sketch showing stair B compliance with code. I was not questioning if these doors left less than one-half or the required corridor or landing width. The issue is that when the doors are fully open they appear to be more than 7 inches into the required width. In the case of the stair doors the clear width would need to be no less than 37 inches with the doors fully open. The bathroom door arrangement is less than 29 inches when open, unless the door actually opens 180 degrees. The plan only shows it opening 90 degrees. Show compliance on updated plans.Agree will show dimensions 8/27/12

6. Boiler room door B08 requires 45-minute fire rated assembly per NFPA 101:30.3.2.1.1. Agree this will be noted on plans. Ok. Condition of approval.

7. Duct work from Unit 106 thru Stair B as shown on plan M7 does not appear to comply with NFPA 101:7.1.3.2.1(9). Please verify and document compliance. Drawing is misleading ductwork is above rated stir and does not penetrate rated

assembly. Ok. Please provide an elevation detail showing this on the updated plans. Will show on drawings 8/27/12

8. Please document how this building complies with NFPA 101:7.2.12 and 7.5.4 for areas of refuge and accessible means of egress as modified by 30.2.2.12. 30.2.2.12.2 exempts an apartment building that is fully sprinkled from having to provide two separate fore rated enclosed rooms. It allows the entire floor to be considered as the area of refuge. Then the code allows an area of refuge of a fully sprinkled building to have access to a single exit which can be either an elevator or a stair. We have an elevator so the stair does not have to be accessible. When the code says an accessible area of refuge it is talking about the area of refuge itself being accessible and accessible from other areas on the floor the area of refuge is located on. Our entire common corridor and all the apartments are considered as the area of refuge! They are all accessible at least as far as doors and the access pathways to the elevator so no accessible stair required. Ok. I agree you can use the elevator if it complies with 7.2.12.2.4; specifically the smokeproof enclosure requirements. If you are providing enclosure pressurization in accordance with 7.2.3.9 you may be fine with that. This one was a shock and obviously a new addition to the 2009 code which we were not aware of , we will design enclosure pressurization 8/27/12 If natural or mechanical ventilation 7.2.3.6 is going to require access by way of a vestibule with all the requirements that come along with it. NFPA 101 does not appear to have an exception of vestibules like IBC does for elevator lobbies. You also need to protect the elevator power supply and provide a two-way communications panel at each elevator landing.We will comply8/27/12 Please document/show how you will be providing the smokeproof enclosure requirements on the updated plans. We will satisfy with pressurization as noted above. The elevator power supply equipment will be protected within 1-hour rated rooms at the Electrical Room 07 and Trash Room 05. The electrical conduits running between these two rooms will be routed under the floor slab. The electrical circuit serving the elevator shaft pressurization fan will be protected by being routed within the 2-hour masonry elevator shaft wall. The drawings will be revised to indicate the necessary conduit routing. Two-way communications stations will be located at each elevator landing, to be connected to a central panel to be located in Lobby 03. 8/27/12

9. Local CO alarms in each dwelling and System CO detector installation shall be in accordance with NFPA 720. All specified section 16721 and shown on drawings. I did not see it specifically addressed in section 16721. The electrical plans appear to show the CP alarms in the correct locations; however the CO detection outside the dwellings is not the correct number and/or locations. I will of course approve the building permit with this as a condition of approval and review it as a part of the fire alarm permit scope; however the location and operation of the required system CO detectors is as follows:

a. On the ceiling in the same room as permanently installed fuel burning appliances.
b. Centrally located on every habitable level and in every HVAC zone of the building.
c. CO detectors only need to activate the temporal-4 signal in its zone (temporal-3 for fire alarm signaling is not permitted for CO alarm signaling). They shall transmit an alarm signal to remote or central station, but shall not trip the master box.

Also section 1.4, which is essentially an excerpt from our old regulations, is out of date. 16721 should refer to the City of Portland Fire Department Rules & Regulations. Requirements for the carbon monoxide detection system are listed in specification section 16725. This specification section calls for the system to comply with NFPA 720. A CO detector will be added to Mechanical Room 08. The drawings will be revised to include this detector. According to the current design, CO detectors are located in public corridors on each floor level. There is only one HVAC zone for the building that covers all public areas. The CO detection system shall be monitored by the fire alarm system per floor, connected so as not to trip the master box. Specification section 16721 will be revised to include the monitoring of the carbon monoxide system alarms. 8/27/12

10. Compliance with NFPA 1, Fire Code, Annex O for In-building Public Safety Radio Enhancement Systems shall be verified by an RF Engineer. We will comply during construction of shell. Ok. Condition of approval.

11. Per City Code 10-101 and City of Portland Fire Department Rules and Regulations: an AES master box fire alarm system will be required. Provided in section 16721. Ok. Condition of approval.

12. A supervised, automatic sprinkler system in accordance with NFPA 13 will be required. Individual floor control assemblies shall be provided per the City of Portland Fire Department Rules and Regulations. provided and specified to meet city of Portland code. Condition of approval. However item 1.04-A-1 of section 15710 still calls for NFPA 13R. Also item 2.03-A of the same section calls for a 4" FD connection. All FD connections should be 2 ½". Needs to be corrected. Also there is no reference to the requirement for individual floor control valve assemblies as required by City Regulations. Recommend adding it and something to the that indicates the installation shall comply with the City of Portland Fire Department Rules & Regulations. I will have mechanical engineer review and modify 8/27/12

13. Per NFPA 1 and the City of Portland Fire Department Rules and Regulations: Manual wet or automatic Class I standpipes shall be installed in

accordance with NFPA 14. provided and specified section 15710. Ok. Condition of approval. Same comment regarding the FD connection type.

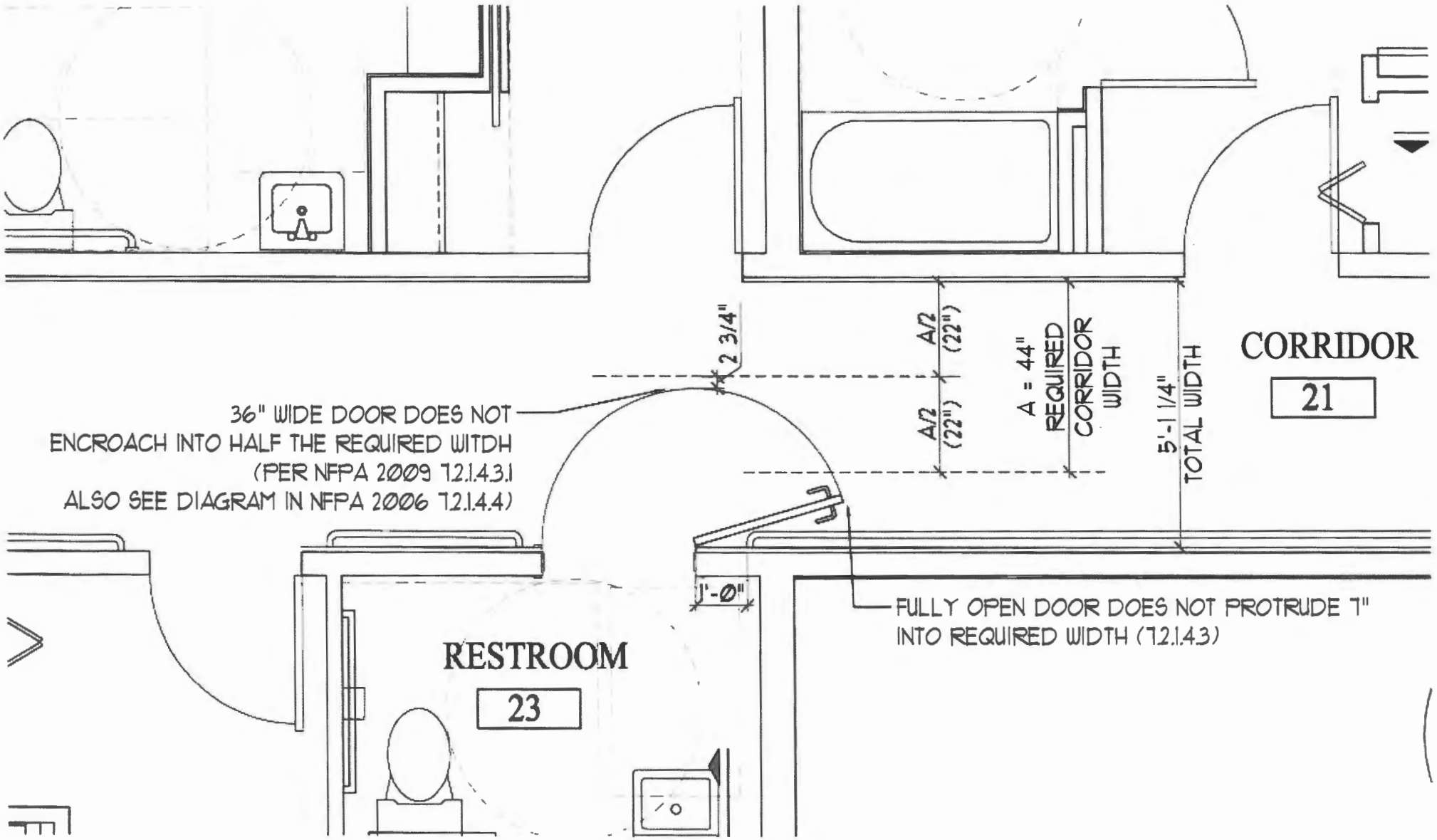
14. Per the City of Portland Fire Department Rules and Regulations: A Knox key switch model 3502 shall be provided for the garage door and a Knox box provided at the entrance. The building should be master keyed. provided section 16721. Ok. I don't see it but will put it down as a condition of approval.

15. Building shall comply with City Code 10-4 for *Special Hazard Dwelling Units*, including low proximity exit signage. we understand requirements and will provide low proximity signage which is specified section 10440. Condition of approval.

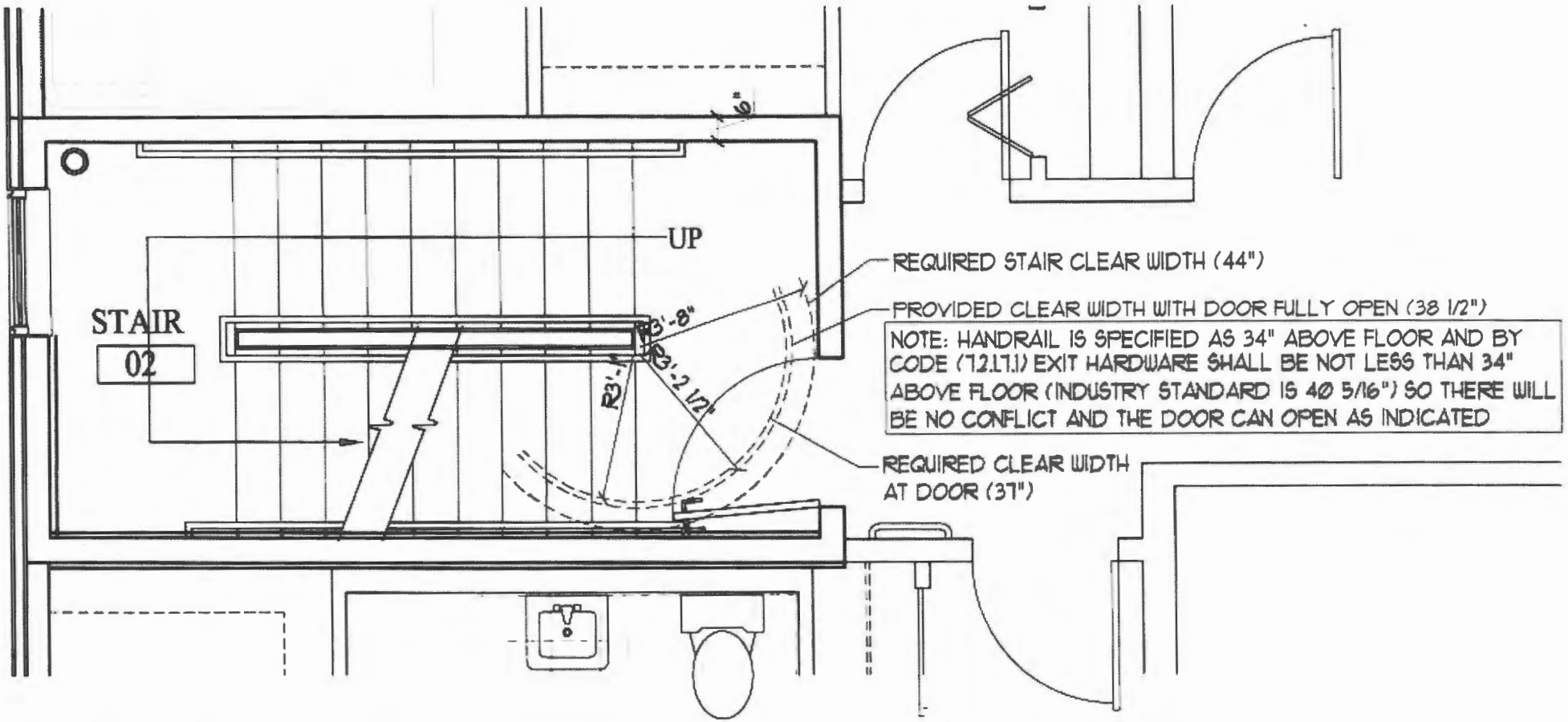
16. Emergency lighting is required per NFPA 101:7.9. Please confirm how this will be satisfied including the provisions of 7.9.2.3. We meet this code see electrical section16535. Note back up battery packs and we also are providing emergency generator. The section you provided appears to be for another job (Sanford Mill), I do not see them on the electrical plan, and there was no life safety plan showing them either. Condition of approval. We will send you the correct specification today under separate e mail. Emergency egress lighting as required by NFPA 101 is being served by the emergency generator with a separate, dedicated automatic transfer switch. The local emergency lighting circuits are connected to a dedicated panelboard that contains no other circuits. Failure of the utility electrical power supply will automatically start the generator which will operate the emergency egress lights. Opening of the emergency lighting feeder circuit breaker on the normal side of the automatic transfer switch will automatically start the generator to operate the emergency lights. Accidental opening of circuit breakers serving normal lighting or power circuits will not impact the operation of the emergency lighting circuits. 8/27/12

17. Emergency generators shall comply with NFPA 101:9.1.3. yes we comply reference section 16910. Ok. What type, class and level will it be installed to? Type 10, Class 1.5, Level 1 for emergency lighting; Type 60, Class 2, Level 2 for mechanical ventilation or enclosure pressurization of smoke proof enclosures; etc? Condition of approval. The Emergency Power Supply System shall be provided according to Type 10, Class 1.5, Level 1. The specification section 16910 will be modified to state this. 8/27/12. Enclosure pressurization requires a Type 60, Class 2, Level 2 EPSS. Emergency lighting requires a Type 10, Class 1.5, Level 1 EPSS. Unless they are independent EPSS systems, the more restrictive Type, Class, and Level are Type 10, Class **2**, Level 1. Please review also the last paragraph of 101:A.7.9.2.3.

18. Installation of HVAC systems shall be in accordance with NFPA 101:9.2. The system was designed to comply with all the requirements of NFPA9.2 (NFPA90A & NFPA90B). Ok. Condition of approval.


2 3/4"
A/2
(22")
A/2
(22")
A = 44"
REQUIRED
CORRIDOR
WIDTH
5'-1 1/4"
TOTAL WIDTH
CORRIDOR
21
36" WIDE DOOR DOES NOT
ENCROACH INTO HALF THE REQUIRED WITDH
(PER NFPA 2009 7.2.1.4.3.1
ALSO SEE DIAGRAM IN NFPA 2006 7.2.1.4.4)
1'-0"
FULLY OPEN DOOR DOES NOT PROTRUDE 7"
INTO REQUIRED WIDTH (7.2.1.4.3)
RESTROOM
23

ITEM 5



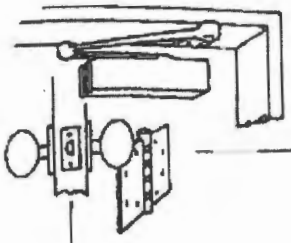
REQUIRED STAIR CLEAR WIDTH = 44 INCHES

REQUIRED CLEAR WIDTH AT DOOR = 44 INCHES MINUS 7 INCHES (ALLOWABLE PROJECTION OF DOOR)

REQUIRED STAIR CLEAR WIDTH AT DOOR = 37 INCHES

PROVIDED CLEAR WIDTH AT DOOR = 38 1/2 INCHES

ITEM 5



RECOMMENDED

LOCATIONS

FOR

ARCHITECTURAL HARDWARE

FOR

STANDARD STEEL DOORS AND FRAMES

DHI
DOOR AND HARDWARE INSTITUTE

BUILDER'S HARDWARE MANUFACTURERS ASSOCIATION INC
bhma

NAAMM
The National Association of Architectural Metal Manufacturers

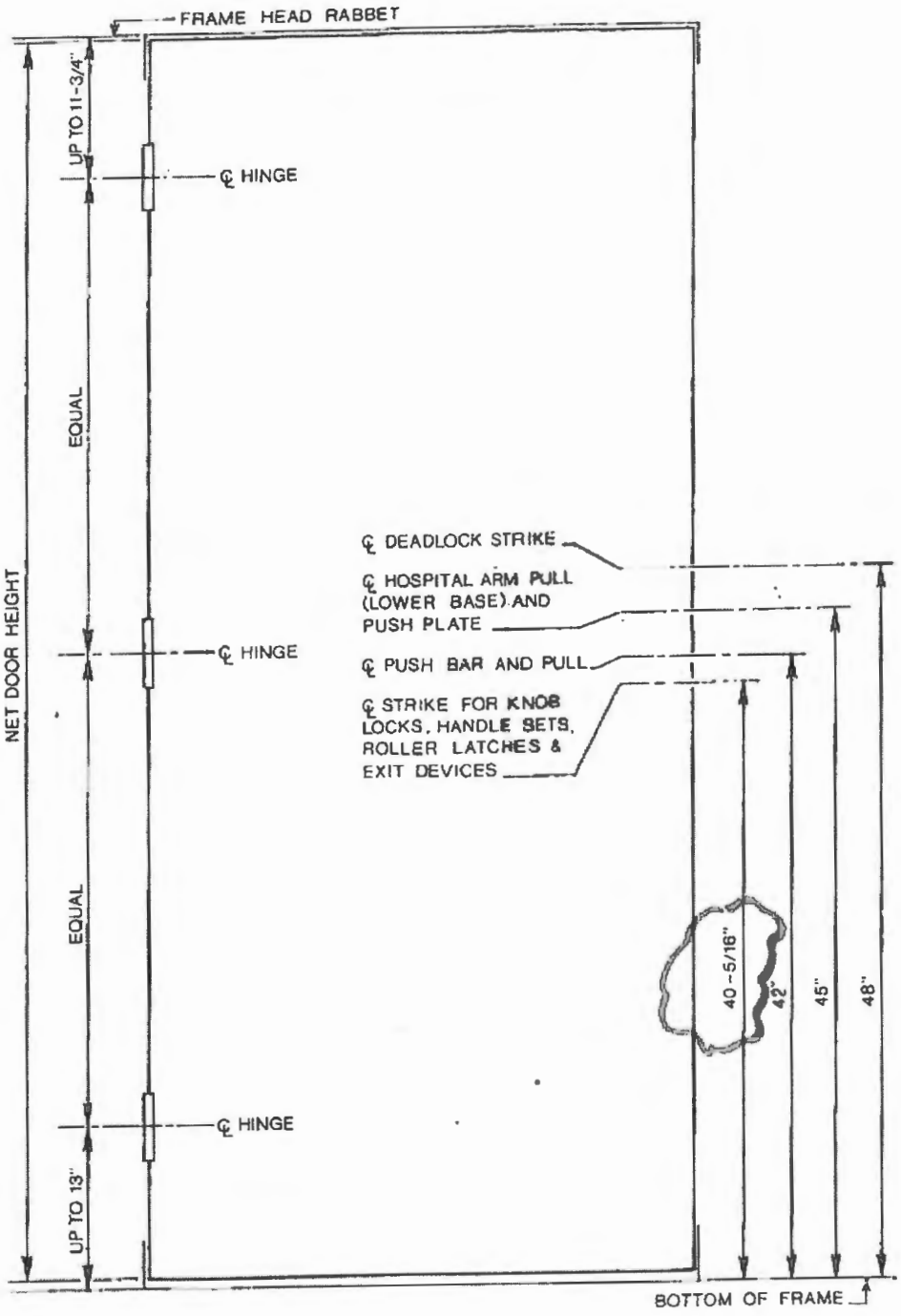
SDI
STEEL DOOR INSTITUTE

AIA File No. 27

Published By
Door and Hardware Institute
Printed in U.S.A.

LOCATIONS DIAGRAM

USE 3 HINGES FOR DOORS UP TO AND INCLUDING 7'-6". ADD 1 HINGE FOR EACH 2'-6" IN HEIGHT OR FRACTION THEREOF.

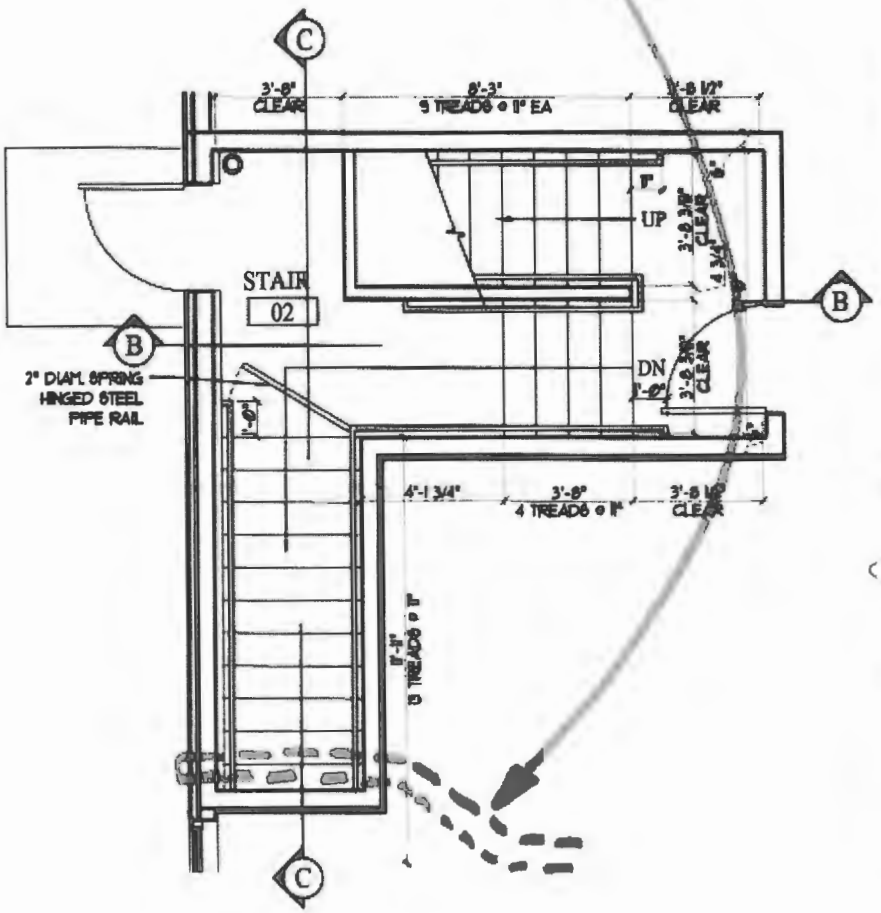


EXPLANATORY NOTES

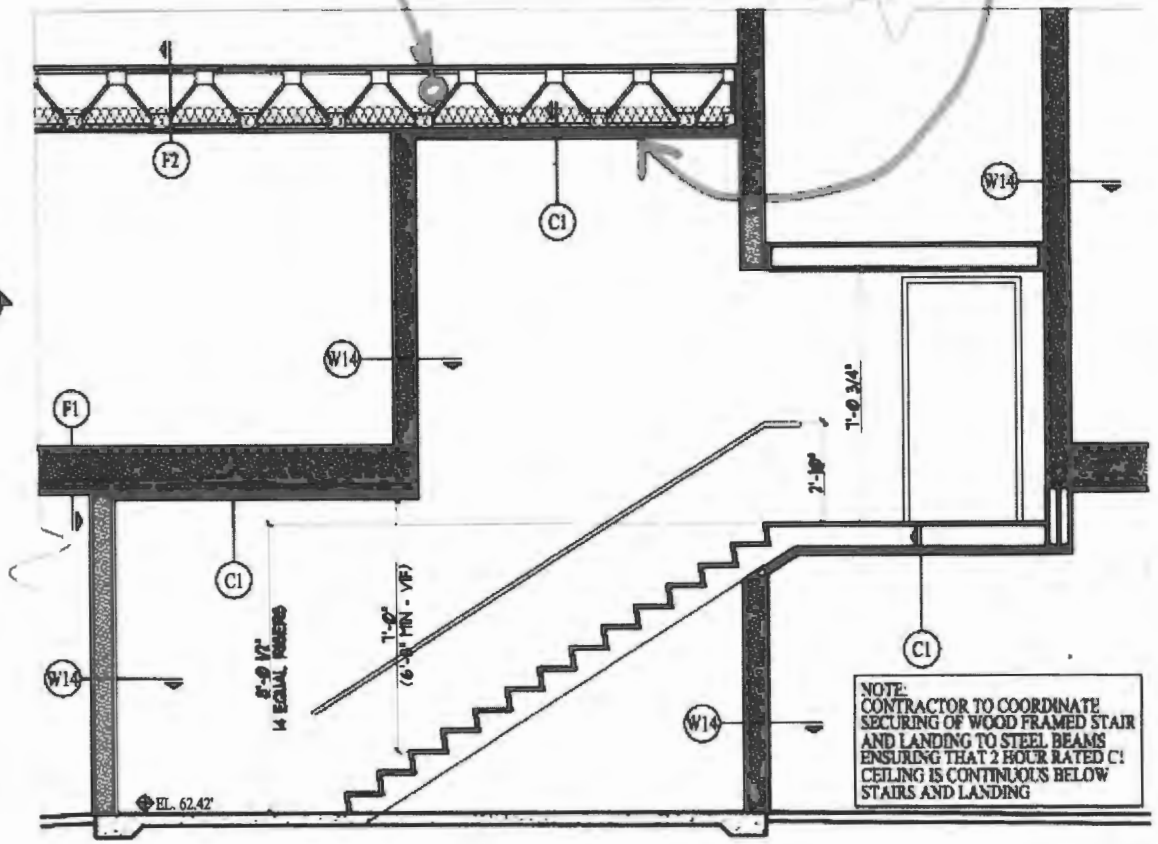
The need for a formal recommendation concerning hardware locations arises principally from changing conditions in the building construction field. Architectural handbooks treat the subject from the standpoint of traditional practice, which was based on wood doors and frames, job-fitted for hardware. In today's buildings, frames usually are of steel, and a large percentage of doors, whether of wood or metal, are being pre-fitted for hardware.

DUCTWORK IS IN CEILING SPACE

RATED ASSEMBLY (C1) IS BELOW DUCTWORK



FIRST FLOOR PLAN



C | STAIR 2 SECTION

SCALE: 1/4"=1'-0"

ITEM 7

DOOR SCHEDULE

	DOOR No.	LOCATION	SIZE W x H x T	DOOR Type	DOOR Material	FINISH	THRESH	FRAME Material	LABEL	REMARKS
BASEMENT	B01	LOBBY ENTRANCE	3'-0 x 8'-3 x 1-3/4"	6	WOOD/GLASS	STAINED	ALUMINUM	WOOD		WHITE OAK & GLASS DOOR AN
	B02	STAIR 01	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	B03	LOBBY TO PARKING	3'-0 x 7'-0 x 1-3/4"	10	METAL/GLASS INSUL.	PAINTED	ALUMINUM	METAL		INSULATED DOOR
	B04	SPRINKLER ROOM	3'-0 x 6'-8 x 1-3/4"	3	METAL	PAINTED	ALUMINUM	METAL		
	B05	TRASH ROOM	3'-0 x 6'-8 x 1-3/4"	3	METAL	PAINTED		METAL	1 HR	SMOKE CONTROL; CLOSER
	B06	ELEV. MACHINE	3'-0 x 7'-0 x 1-3/4"	3	METAL	PAINTED	ALUMINUM	METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	B07	STAIR 02	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED	ALUMINUM	METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	B08	MECHANICAL	3'-0" x 6'-8 x 1-3/4"	3	METAL	PAINTED	ALUMINUM	METAL	1 HR	SMOKE CONTROL; CLOSER
	B09	ELECTRICAL	3'-0" x 6'-8 x 1-3/4"	3	METAL	PAINTED	ALUMINUM	METAL	1 HR	SMOKE CONTROL; CLOSER
1st FLOOR	101	STAIR 01	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	102	OFFICE	3'-0 x 7'-0 x 1-3/4"	1	WOOD	STAINED	ALUMINUM	METAL	20 MIN	SMOKE CONTROL
	103	STAIR 02	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	104	STAIR 02 EXIT	3'-0 x 6'-8 x 1-3/4"	3	INSULATED METAL	PAINTED		METAL	1 1/2 HR	CLOSER; INSULATED DOOR
	105	ELECTRICAL CLOSET	(2)3'-0 x 7'-0 x 1-3/4"	11	WOOD	STAINED		METAL		
2nd FLOOR	201	STAIR 01	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	202	COMMUNITY ROOM	(2) 3'-0 x 7'-0 x 1-3/4"	1	WOOD	PAINTED	ALUMINUM	METAL	20 MIN	MAG. HOLD OPEN; SMOKE CONT
	203	RESTROOM	3'-0 x 7'-0 x 1-3/4"	3	WOOD	PAINTED		METAL	20 MIN	SMOKE CONTROL; CLOSER
	204	STAIR 02	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
3rd FLOOR	301	STAIR 01	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	302	LAUNDRY	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED	ALUMINUM	METAL	1 HR	SMOKE CONTROL; CLOSER
	303	JANITOR	3'-0 x 7'-0 x 1-3/4"	3	METAL	PAINTED	ALUMINUM	METAL		
	304	STAIR 02	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
4th FLOOR	401	STAIR 01	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER
	402	STAIR 02	3'-0 x 7'-0 x 1-3/4"	7	METAL	PAINTED		METAL	1 1/2 HR	SMOKE CONTROL; CLOSER

ITEM 8

ARCHETYPE architects
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Scale: Not To Scale
Date: 27 August 2012

ELEC ROOM
DOOR B09 FIRE
RATED 1 HR

SK TO DRAWING A8.01

Project:
DANFORTH ON HIGH

81 DANFORTH STREET
PORTLAND, MAINE

SK03

Jeanie Bourke - Danforth on High, 81-85 Danforth Street - Building Permit Issuance

From: Philip DiPierro
To: Code Enforcement & Inspections
Date: 8/22/2012 3:13 PM
Subject: Danforth on High, 81-85 Danforth Street - Building Permit Issuance

Hi all, this project, site plan #2011-405, the Danforth on High project located at 81-85 Danforth Street, meets minimum DRC site plan requirements for the issuance of a building permit. Please see 1S for sign off.

Thanks.

Phil

Jeanie Bourke - Re: FW: Plan review 81 Danforth BP# 2012-07-4399

From: Jeanie Bourke
To: Barry Yudaken
Date: 8/21/2012 2:48 PM
Subject: Re: FW: Plan review 81 Danforth BP# 2012-07-4399
CC: Erin Cooperrider; RDomingo@swcole.com

Yes, thank you Barry, I will also put this as a condition on the permit.
Jeanie

Jeanie Bourke
CEO/LPI/Plan Reviewer

City of Portland
Planning & Urban Development Dept./ Inspections Division
389 Congress St. Rm 315
Portland, ME 04101
jmb@portlandmaine.gov
Direct: (207) 874-8715
Office: (207) 874-8703

>>> Barry Yudaken <yudaken@archetypepa.com> 8/21/2012 2:21 PM >>>

Jeanie,

Regarding special inspections of the sprayed fireproofing, will the email from S W Cole below be sufficient at this stage?

Barry Yudaken
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
(207) 772-6022
(207) 772-4056 Fax
yudaken@archetypepa.com
http://www.archetype-architects.com

From: Roger Domingo [mailto:RDomingo@SWCole.com]
Sent: Tuesday, August 21, 2012 2:13 PM
To: 'Barry Yudaken'
Subject: RE: Plan review 81 Danforth BP# 2012-07-4399

Jeanie Bourke - FW: Plan review 81 Danforth BP# 2012-07-4399

From: Barry Yudaken <yudaken@archetypepa.com>
To: Jeanie Bourke <JMB@portlandmaine.gov>
Date: 8/21/2012 2:28 PM
Subject: FW: Plan review 81 Danforth BP# 2012-07-4399
CC: Erin Cooperrider <erin@cooperrider.org>, <RDomingo@swcole.com>

Jeanie,

Regarding special inspections of the sprayed fireproofing, will the email from S W Cole below be sufficient at this stage?

Barry Yudaken
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
(207) 772-6022
(207) 772-4056 Fax
yudaken@archetypepa.com
http://www.archetype-architects.com

From: Roger Domingo [mailto:RDomingo@SWCole.com]
Sent: Tuesday, August 21, 2012 2:13 PM
To: 'Barry Yudaken'
Subject: RE: Plan review 81 Danforth BP# 2012-07-4399

Barry,

We have ICC certified technicians able to provide thickness, adhesion/cohesion and density testing of fire-resistive material based on the approved submittal.

Roger

Roger E. Domingo | Construction Services Manager

S. W. Cole Engineering, Inc.
286 Portland Road
Gray, ME 04039-9586

Phone: (207) 657-2866

E-mail: rdomingo@swcole.com

Jeanie Bourke - RE: FW: Plan review 81 Danforth BP# 2012-07-4399

From: Barry Yudaken <yudaken@archetypepa.com>
To: Jeanie Bourke <JMB@portlandmaine.gov>
Date: 8/22/2012 11:48 AM
Subject: RE: FW: Plan review 81 Danforth BP# 2012-07-4399
CC: David Lloyd <lloyd@archetypepa.com>
Attachments: SK01 - Pipe rail barrier to Stair 2.pdf

Jeanie,

Please see our responses to your concerns highlighted below.

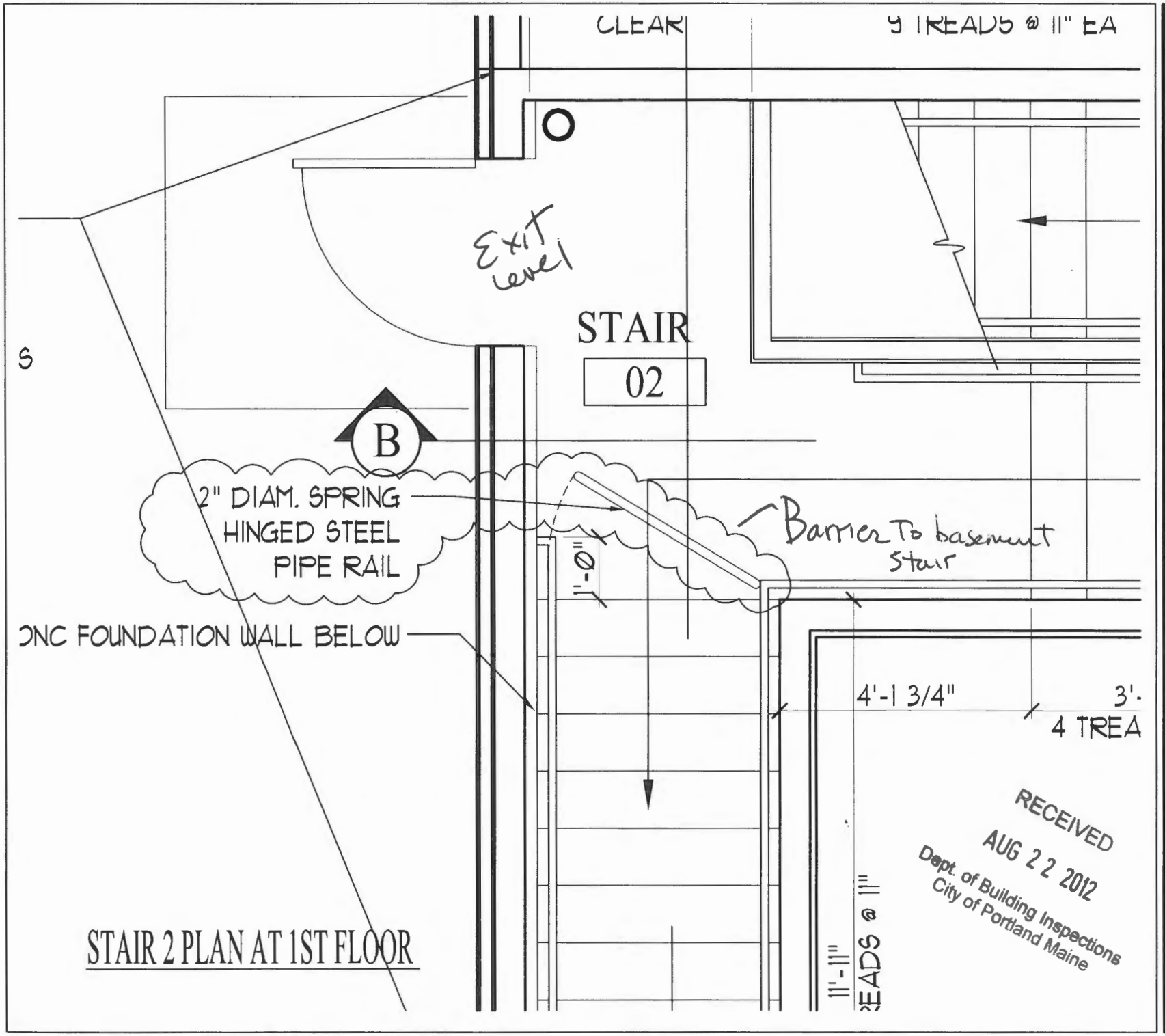
Barry Yudaken
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
(207) 772-6022
(207) 772-4056 Fax
yudaken@archetypepa.com
http://www.archetype-architects.com

From: Jeanie Bourke [mailto:JMB@portlandmaine.gov]
Sent: Wednesday, August 22, 2012 9:28 AM
To: Barry Yudaken
Subject: Re: FW: Plan review 81 Danforth BP# 2012-07-4399

Good Morning Barry,
After meeting with Ben Wallace yesterday for his NFPA review, I came across some additional items regarding IBC codes. I apologize for missing this in my original review.

1. Review Sec. 1023.3 thru 1023.5 under Exit Passageways for the area at Stair 01 on plan A1.01 where the exit enclosure enters the "lobby" or passageway to the Exit Discharge. It appears this area will need some modifications in order to comply. Section 1022.1 states " *Exit enclosures* shall lead directly to the exterior of a building with an *exit passageway*, except as permitted in Section 1027.1.
Section 1027.1 states " The exit discharge shall not reenter a building" but 2 exceptions are allowed for. We meet the requirements of Exception 1.

2. Review Sec. 1022.7, Discharge identification for the area at Stair 02 on plan A1.02 to provide a barrier at the stair leading below the level of exit discharge. A barrier will be provided at Stair 2 at the level of exit discharge. See attached SK01.



STAIR 2 PLAN AT 1ST FLOOR

ARCHETYPE architects
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Date: 22 August 2012
Scale: Not To Scale

PIPE RAIL BARRIER ADDED TO STAIR 2

SK TO DRAWING A3.22

Project:
DANFORTH ON HIGH

81 DANFORTH STREET
PORTLAND, MAINE

SK01

Jeanie Bourke - RE: Plan review 81 Danforth BP# 2012-07-4399

From: Barry Yudaken <yudaken@archetypepa.com>
To: Jeanie Bourke <JMB@portlandmaine.gov>, <tmm@portlandmaine.gov>, <ldobson...
Date: 8/7/2012 5:07 PM
Subject: RE: Plan review 81 Danforth BP# 2012-07-4399
CC: David Lloyd <lloyd@archetypepa.com>, <jay@chomhousing.org>, Erin Cooperr...
Attachments: Danforth on High COMcheck.pdf; Danforth on High Mechanical Compliance.pdf; A2.01 - Building Elevations.pdf; A3.02 -Building Sections.pdf; A3.12 -Wall Sections.pdf; A3.13 -Wall Sections.pdf; A5.02 -Details.pdf; A5.03 -Details.pdf; A8.04 - Window Schedule.pdf; Site Plan with Separation Distances and wall opening percentages.pdf

Tammy,

Jeanie said that as she was away I should email the comments and revised drawings pertaining to her plan review to you. She also said I should copy Lannie Dobson. The revised drawings are attached and relate to the comments highlighted below. Please let me know if you need any other information. Thank you.

Barry Yudaken
Archetype, P.A.
48 Union Wharf
Portland, ME 04101
(207) 772-6022
(207) 772-4056 Fax
yudaken@archetypepa.com
http://www.archetype-architects.com

From: Jeanie Bourke [mailto:JMB@portlandmaine.gov]
Sent: Thursday, August 02, 2012 4:59 PM
To: yudaken@archetypepa.com
Subject: Plan review 81 Danforth BP# 2012-07-4399

One more item Barry,
Provide the ComCheck certification for Energy code compliance or alternative program for the thermal envelope and MEP systems.
Tthanks **THE CERTIFICATION IS ATTACHED**
Hi Barry,
Per our conversation this afternoon these are the items we discussed:

1. Provide special inspection verification for spray applied fireproofing, Sec. 1704.12 **S.W.COLE WILL PROVIDE SPECIAL INSPECTION VERIFICATION**

2. Provide tempered window schedule **THE REVISED WINDOW SCHEDULE, SHOWING WINDOWS REQUIRING TEMPERED GLASS, IS ATTACHED (DWG A8.04**

3. Provide framing detail of Plan A3.02 for the 4th floor parallel truss to the corridor wall **THE**

DETAIL IS ON ATTACHED DETAIL DRAWING A5.03, DETAIL 25

4. Note that the steps/railing to a roof balcony on Plan A3.02 have been removed **THESE HAVE BEEN REMOVED**

5. Provide code review and site plan details for exterior wall separation window protection percentage per Table 705.8 **SITE PLAN SHOWING SEPARATION DISTANCES AND CODE REQUIREMENTS PER TABLE 705.8 HAS BEEN ATTACHED. NOTE THAT THE WINDOWS ON THE EAST ELEVATION HAS BEEN REVISED TO COMPLY □ THE REVISED EAST ELEVATION ON DRAWING A2.01 IS ATTACHED**

6. Provide the same for parapet requirements per Sec. 705.11 **THE WALL/ROOF DETAIL HAS BEEN REVISED WITH THE WALL NOW TERMINATING AT THE UNDERSIDE OF THE ROOF SHEATHING IN TO COMPLY WITH 705.11, EXCEPTION NO 4. THE REVISED WALL SECTIONS (DWG A3.12 & A3.13) AND REVISED DETAIL (A5.02, DETAIL 15) ARE ATTACHED**

7. Clarify if the range hood exhaust on Plan M-7 enters the 2 hour rated stair enclosure **THE EXHAUST DUCT DOES NOT PENETRATE THE STAIR ENCLOSURE. IT IS LOCATED IN THE TRUSSES ABOVE THE RATED CEILING C1 ABOVE THE STAIR ENCLOSURE □ SEE SECTION C OF STAIR 2 ON DRAWING A3.22**

8. Clarify if mixed NFPA (13 & 13R) sprinkler systems are allowed in a mixed use nonseparated occupancy per Sec. 508.3.1 and 903.2.10 **EACH USE GROUP HAS THE SYSTEM THAT MEETS THE CODE FOR THAT USE GROUP (WE HAVE USED THE MORE RESTRICTIVE R-2 FOR DETERMINING CONSTRUCTION TYPE OF THE NON-SEPARATED BUILDING, BUT HAVE STILL USED THE MORE STRINGENT NFPA 13 FOR THE BASEMENT SYSTEM)**

Thanks,

Jeanie

RECEIVED
AUG - 8 2012
Dept. of Building Inspections
City of Portland Maine

Jeanie Bourke
CEO/LPI/Plan Reviewer

City of Portland
Planning & Urban Development Dept./ Inspections Division
389 Congress St. Rm 315
Portland, ME 04101
jmb@portlandmaine.gov
Direct: (207) 874-8715
Office: (207) 874-8703

COM*check* Software Version 3.9.1
Envelope Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Danforth on High

Construction Site:
81 Danforth Street
Portland, ME 04101

Owner/Agent:
Danforth on High, LP
309 Cumberland Ave.
Portland, ME 04101

Designer/Contractor:
Archetype Architects PA
48 Union Wharf
Portland, ME 04101

Section 2: General Information

Building Location (for weather data):	**Portland, Maine**
Climate Zone:	**6a**
Building Type for Envelope Requirements:	**Residential**
Vertical Glazing / Wall Area Pct.:	**23%**

Activity Type(s)	Floor Area
Entire Building (Multifamily)	20908

Section 3: Requirements Checklist

Envelope PASSES: Design 16% better than code.

Climate-Specific Requirements:

Component Name/Description	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Insulation Entirely Above Deck	5317	---	60.0	0.016	0.048
Exterior Wall 1: Wood-Framed, 16" o.c.	14321	21.5	12.5	0.033	0.051
Window 1: Metal Frame with Thermal Break:Double Pane with Low-E, Clear, SHGC 0.35	3352	---	---	0.320	0.550
Door 1: Insulated Metal, Non-Swinging	48	---	---	0.200	0.500
Floor 1: Concrete Floor (over unconditioned space)	5317	---	35.0	0.026	0.057

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.

Air Leakage, Component Certification, and Vapor Retarder Requirements:

- ☐ 1. All joints and penetrations are caulked, gasketed or covered with a moisture vapor-permeable wrapping material installed in accordance with the manufacturer's installation instructions.
- ☐ 2. Windows, doors, and skylights certified as meeting leakage requirements.
- ☐ 3. Component R-values & U-factors labeled as certified.
- ☐ 4. No roof insulation is installed on a suspended ceiling with removable ceiling panels.
- ☐ 5. 'Other' components have supporting documentation for proposed U-Factors.
- ☐ 6. Insulation installed according to manufacturer's instructions, in substantial contact with the surface being insulated, and in a manner that achieves the rated R-value without compressing the insulation.
- ☐ 7. Stair, elevator shaft vents, and other outdoor air intake and exhaust openings in the building envelope are equipped with motorized dampers.
- ☐ 8. Cargo doors and loading dock doors are weather sealed.
- ☐ 9. Recessed lighting fixtures installed in the building envelope are Type IC rated as meeting ASTM E283, are sealed with gasket or caulk.
- ☐ 10. Building entrance doors have a vestibule equipped with self-closing devices.

Exceptions:

- ☐ Building entrances with revolving doors.
- ☐ Doors not intended to be used as a building entrance.
- ☐ Doors that open directly from a space less than 3000 sq. ft. in area.
- ☐ Doors used primarily to facilitate vehicular movement or materials handling and adjacent personnel doors.
- ☐ Doors opening directly from a sleeping/dwelling unit.

Section 4: Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed envelope system has been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.1 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title	Signature	Date

COMcheck Software Version 3.9.1
Mechanical Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Danforth on High

Construction Site:
81 Danforth Street
Portland, ME 04101

Owner/Agent:
Danforth on High, LP
309 Cumberland Ave.
Portland, ME 04101

Designer/Contractor:
Archetype Architects PA
48 Union Wharf
Portland, ME 04101

Section 2: General Information

Building Location (for weather data): **Portland, Maine**
Climate Zone: **6a**

Section 3: Mechanical Systems List

Quantity	System Type & Description
2	Plant 1: Heating: Hot Water Boiler, Capacity 399 kBtu/h, Gas, Efficiency: 92.00 % Et
1	Water Heater 1: Gas Storage Water Heater, Capacity: 119 gallons, Input Rating: 125 Btu/h w/ Circulation Pump, Efficiency: 92.00 % Et

Section 4: Requirements Checklist

Requirements Specific To: Plant 1 :

☐ 1. Equipment minimum efficiency: Boiler Thermal Efficiency 75% Et 80% Ec
☐ 2. Two-pipe changeover heating/cooling controls must have:
a) 15 degrees F deadband where boiler and chiller can not operate,
b) allow operation in either heating or cooling for at least 4 hrs. and
c) prevent difference between heating and cooling set points greater than 30 degrees F
Exception(s):
☐ Air/evap condenser and extensive outside-air filtration
☐ 3. Newly purchased heating equipment meets the efficiency requirements
- used equipment must meet 80% Et @ maximum capacity
☐ 4. Systems with multiple boilers have automatic controls capable of sequencing boiler operation
☐ 5. Hydronic heating systems comprised of a single boiler and >500 kBtu/h input design capacity include either a multistaged or modulating burner

Requirements Specific To: Water Heater 1 :

☐ 1. Water heating equipment meets minimum efficiency requirements: Gas Storage Water Heater efficiency: 80.00 % Et (166 SL, kBtu/h)
☐ 2. All piping in circulating system insulated
☐ 3. Hot water storage temperature controls that allow setpoint of 90°F for non-dwelling units and 110°F for dwelling units.
☐ 4. Automatic time control of heat tapes and recirculating systems present
☐ 5. Controls will shut off operation of circulating pump between water heater/boiler and storage tanks within 5 minutes after end of heating cycle

Generic Requirements: Must be met by all systems to which the requirement is applicable:

☐ 1. Plant equipment and system capacity no greater than needed to meet loads
Exception(s):
☐ Standby equipment automatically off when primary system is operating

- ☐ Multiple units controlled to sequence operation as a function of load

☐ 2. Minimum one temperature control device per system

☐ 3. Minimum one humidity control device per installed humidification/dehumidification system

☐ 4. Load calculations per ASHRAE/ACCA Standard 183.

☐ 5. Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup
Exception(s):

- ☐ Continuously operating zones
- ☐ 2 kW demand or less, submit calculations

☐ 6. Outside-air source for ventilation; system capable of reducing OSA to required minimum

☐ 7. Hot water pipe insulation: 1.5 in. for pipes <=1.5 in. and 2 in. for pipes >1.5 in.
Chilled water/refrigerant/brine pipe insulation: 1.5 in. for pipes <=1.5 in. and 1.5 in. for pipes >1.5 in.
Steam pipe insulation: 1.5 in. for pipes <=1.5 in. and 3 in. for pipes >1.5 in.
Exception(s):

- ☐ Piping within HVAC equipment.
- ☐ Fluid temperatures between 55 and 105°F.
- ☐ Fluid not heated or cooled with renewable energy.
- ☐ Piping within room fan-coil (with AHRI440 rating) and unit ventilators (with AHRI840 rating).
- ☐ Runouts <4 ft in length.

☐ 8. Operation and maintenance manual provided to building owner

☐ 9. Hot water distribution systems >= 300 kBtu/h must have one of the following:
a) controls that reset supply water temperature by 25% of supply/return delta T
b) mechanical or electrical adjustable-speed pump drive(s)
c) two-way valves at all heating coils
d) multiple-stage pumps
e) other system controls that reduce pump flow by at least 50% based on load - calculations required
Exception(s):

- ☐ Where the supply temperature reset controls cannot be implemented without causing improper operation of heating, cooling, humidification, or dehumidification systems.
- ☐ Hydronic systems that use variable flow to reduce pumping energy.

☐ 10. Demand control ventilation (DCV) present for high design occupancy areas (>40 person/1000 ft2 in spaces >500 ft2) and served by systems with any one of 1) an air-side economizer, 2) automatic modulating control of the outdoor air damper, or 3) a design outdoor airflow greater than 3000 cfm.
Exception(s):

- ☐ Systems with heat recovery.
- ☐ Multiple-zone systems without DDC of individual zones communicating with a central control panel.
- ☐ Systems with a design outdoor airflow less than 1200 cfm.
- ☐ Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.

☐ 11. Automatic controls for freeze protection systems present

☐ 12. Exhaust air heat recovery included for systems 5,000 cfm or greater with more than 70% outside air fraction or specifically exempted
Exception(s):

- ☐ Hazardous exhaust systems, commercial kitchen and clothes dryer exhaust systems that the International Mechanical Code prohibits the use of energy recovery systems.
- ☐ Systems serving spaces that are heated and not cooled to less than 60°F.
- ☐ Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
- ☐ Heating systems in climates with less than 3600 HDD.
- ☐ Cooling systems in climates with a 1 percent cooling design wet-bulb temperature less than 64°F.
- ☐ Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
- ☐ Laboratory fume hood exhaust systems that have either a variable air volume system capable of reducing exhaust and makeup air volume to 50 percent or less of design values or, a separate make up air supply meeting the following makeup air requirements: a) at least 75 percent of exhaust flow rate, b) heated to no more than 2°F below room setpoint temperature, c) cooled to no lower than 3°F above room setpoint temperature, d) no humidification added, e) no simultaneous heating and cooling.

Section 5: Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.1 and to comply with the mandatory requirements in the Requirements Checklist.

Kurt Magnusson P.E | Signature | 8/3/12

Name - Title | Signature | Date

Section 6: Post Construction Compliance Statement

- ☐ HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
- ☐ HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
- ☐ Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name	Signature	Date

COMcheck Software Version 3.9.1
Mechanical Requirements Description

2009 IECC

The following list provides more detailed descriptions of the requirements in Section 4 of the Mechanical Compliance Certificate.

Requirements Specific To: Plant 1 :

1. The specified heating and/or cooling equipment is covered by the ASHRAE 90.1 Code and must meet the following minimum efficiency:
   Boiler Thermal Efficiency 75% Et 80% Ec
2. Two-pipe changeover heating/cooling controls must:
   a) allow a deadband between changeover from one mode (heating/cooling) to the other of at least 15 degrees F outside temperatures
   b) allow operation in one mode (heating/cooling) for at least 4 hours before changing over to the other mode
   c) allow heating and cooling supply temperatures at the changeover point to be no more than 30 degrees F apart.
   Exception(s):
   - An economizer is not required due to unusual outside air filtration requirements. Section 403.3 of the Mechanical Code for New York State sets minimum outside air ventilation requirements and requirements for filtration or purification if the outside air does not meet minimum air-quality requirements. Economizers are not required for systems having air- or evaporatively cooled condensers (i.e., those that cannot use water economizers) when the outside air pollutants can be classified as "unusual."
3. The specified heating equipment is covered by Federal minimum efficiency requirements. New equipment of this type can be assumed to meet or exceed ASHRAE 90.1 Code requirements for equipment efficiency. Used equipment must meet 80% Et @ maximum capacity.
4. Systems with multiple boilers have automatic controls capable of sequencing the operation of the boilers.
5. Hydronic heating systems comprised of a single boiler and >500 kBtu/h input design capacity include either a multistaged or modulating burner.

Requirements Specific To: Water Heater 1 :

1. Water heating equipment used solely for heating potable water, pool heaters, and hot water storage tanks must meet the following miniumum efficiency: Gas Storage Water Heater efficiency: 80.00 % Et (166 SL, kBtu/h)
2. Insulation must be provided for recirculating system piping, including the supply and return piping of a circulating tank type water heater.
3. Service water-heating equipment shall be provided with controls to allow a setpoint of 110°F for equipment serving dwelling units and 90°F for equipment serving non-dwelling units. Lavatory outlet temperatures shall be limited to 110°F.
4. Systems designed to maintain usage temperatures in hot water pipes, such as recirculating hot water systems or heat trace, must be equipped with automatic time switches or other controls that can be set to switch off the temperature maintenance system during extended periods when hot water is not required.
5. When used to maintain storage tank water temperature, recirculating pumps must be equipped with controls limiting operation to the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle.

Generic Requirements: Must be met by all systems to which the requirement is applicable:

1. All equipment and systems must be sized to be no greater than needed to meet calculated loads. A single piece of equipment providing both heating and cooling must satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.
   Exception(s):
   - The equipment and/or system capacity may be greater than calculated loads for standby purposes. Standby equipment must be automatically controlled to be off when the primary equipment and/or system is operating.
   - Multiple units of the same equipment type whose combined capacities exceed the calculated load are allowed if they are provided with controls to sequence operation of the units as the load increases or decreases.
2. Each heating or cooling system serving a single zone must have its own temperature control device.
3. Each humidification system must have its own humidity control device.
4. Design heating and cooling loads for the building must be determined using procedures in the ASHRAE Handbook of Fundamentals or an approved equivalent calculation procedure.
5. The system or zone control must be a programmable thermostat or other automatic control meeting the following criteria:
   a) capable of setting back temperature to 55°F during heating and setting up to 85°F during cooling,
   b) capable of automatically setting back or shutting down systems during unoccupied hours using 7 different day schedules,
   c) have an accessible 2-hour occupant override,
   d) have a battery back-up capable of maintaining programmed settings for at least 10 hours without power.
   Exception(s):
   - A setback or shutoff control is not required on thermostats that control systems serving areas that operate continuously.

- A setback or shutoff control is not required on systems with total energy demand of 2 kW (6,826 Btu/h) or less.

6. The system must supply outside ventilation air as required by Chapter 4 of the International Mechanical Code. If the ventilation system is designed to supply outdoor-air quantities exceeding minimum required levels, the system must be capable of reducing outdoor-air flow to the minimum required levels.
7. All pipes serving space-conditioning systems must be insulated as follows:
   Hot water piping for heating systems:
   1 1/2 in. for pipes <=1 1/2-in. nominal diameter,
   2 in. for pipes >1 1/2-in. nominal diameter.
   Chilled water, refrigerant, and brine piping systems:
   1 1/2 in. insulation for pipes <=1 1/2-in. nominal diameter,
   1 1/2 in. insulation for pipes >1 1/2-in. nominal diameter.
   Steam piping:
   1 1/2 in. insulation for pipes <=1 1/2-in. nominal diameter,
   3 in. insulation for pipes >1 1/2-in. nominal diameter.
   Exception(s):
   - Pipe insulation is not required for factory-installed piping within HVAC equipment.
   - Pipe insulation is not required for piping that conveys fluids having a design operating temperature range between 55°F and 105°F.
   - Pipe insulation is not required for piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
   - Piping within room fan-coil (with AHRI440 rating) and unit ventilators (with AHRI840 rating).
   - Pipe insulation is not required for runout piping not exceeding 4 ft in length and 1 in. in diameter between the control valve and HVAC coil.
8. Operation and maintenance documentation must be provided to the owner that includes at least the following information:
   a) equipment capacity (input and output) and required maintenance actions
   b) equipment operation and maintenance manuals
   c) HVAC system control maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions; desired or field-determined set points must be permanently recorded on control drawings, at control devices, or, for digital control systems, in programming comments
   d) complete narrative of how each system is intended to operate.
9. Hot water space-heating systems with a capacity exceeding 300 kBtu/h supplying heated water to comfort conditioning systems must include controls that automatically reset supply water temperatures by representative building loads (including return water temperature) or by outside air temperature.
   Exception(s):
   - Where the supply temperature reset controls cannot be implemented without causing improper operation of heating, cooling, humidification, or dehumidification systems.
   - Hydronic systems that use variable flow to reduce pumping energy.
10. Demand control ventilation (DCV) required for high design occupancy areas (>40 person/1000 ft2 in spaces >500 ft2) and served by systems with any one of 1) an air-side economizer, 2) automatic modulating control of the outdoor air damper, or 3) a design outdoor airflow greater than 3000 cfm.
    Exception(s):
    - Systems with heat recovery.
    - Multiple-zone systems without DDC of individual zones communicating with a central control panel.
    - Systems with a design outdoor airflow less than 1200 cfm.
    - Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.
11. All freeze protection systems, including self-regulating heat tracing, must include automatic controls capable of shutting off the systems when outside air temperatures are above 40°F or when the conditions of the protected fluid will prevent freezing. Snow- and ice-melting systems must include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F.
12. Individual fan systems with a design supply air capacity of 5000 cfm or greater and minimum outside air supply of 70 percent or greater of the supply air capacity must have an energy recovery system with at least a 50 percent effectiveness. Where cooling with outdoor air is required there is a means to bypass or control the energy recovery system to permit cooling with outdoor air.
    Exception(s):
    - Hazardous exhaust systems, commercial kitchen and clothes dryer exhaust systems that the International Mechanical Code prohibits the use of energy recovery systems.
    - Systems serving spaces that are heated and not cooled to less than 60°F.
    - Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
    - Heating systems in climates with less than 3600 HDD.
    - Cooling systems in climates with a 1 percent cooling design wet-bulb temperature less than 64°F.

- Systems requiring dehumidification that employ energy recovery in series with the cooling coil..
- Laboratory fume hood exhaust systems that have either a variable air volume system capable of reducing exhaust and makeup air volume to 50 percent or less of design values or, a separate make up air supply meeting the following makeup air requirements: a) at least 75 percent of exhaust flow rate, b) heated to no more than 2°F below room setpoint temperature, c) cooled to no lower than 3°F above room setpoint temperature, d) no humidification added, e) no simultaneous heating and cooling.

COM*check* Software Version 3.9.1
Interior Lighting Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Danforth on High

Construction Site:
81 Danforth Street
Portland, ME 04101

Owner/Agent:
Danforth on High, LP
309 Cumberland Ave.
Suite 203
Portland, ME 04101
207 882-8349

Designer/Contractor:
Bartlett Design, Inc.
942 Washington Street
Bath, ME 04530
207 443-5447
bartlettdesigninc@comcast.net

Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Elderly Housing (Multifamily)	25586	0.7	17910
		Total Allowed Watts =	17910

Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Elderly Housing (Multifamily 25586 sq.ft.)				
Linear Fluorescent 1: Type J1: 48"x4" surf clg strip light / 48" T8 32W / Premium efficiency	2	1	55	55
Linear Fluorescent 2: Type J2: 50"x12" dec surf cltg mtd / 48" T8 32W / Premium efficiency	2	4	55	220
Compact Fluorescent 1: Type C1: 13" dia surface clg mtd / Quad 2-pin 26W / Electronic	2	52	54	2808
Compact Fluorescent 2: Type C2: 16" dia flush mtd dec surf clg / Quad 2-pin 26W / Electronic	2	42	54	2268
Compact Fluorescent 3: Type C3: semi-flush verion of Type C2 / Quad 2-pin 26W / Electronic	2	76	54	4104
Compact Fluorescent 4: Type C4: 12" sq surface clg / Quad 2-pin 18W / Electronic	2	37	38	1406
Compact Fluorescent 5: Type C5: 16" dia flush mtd dec clg mtd / Quad 2-pin 18W / Electronic	2	19	38	722
Compact Fluorescent 6: Type L1: lensed surf wall mtd elev pit / Quad 2-pin 13W / Electronic	1	1	16	16
Linear Fluorescent 3: Type W1: 27" lensed surf wall mtd / 24" T8 17W / Premium efficiency	2	64	32	2048
Linear Fluorescent 4: Type W2: 22.5" dec glass surf wall mtd / 24" T8 17W / Premium efficiency	2	28	32	896
Compact Fluorescent 7: Type W3: 11"x7" dec surf wall sconce / Quad 2-pin 13W / Electronic	2	26	29	754
Linear Fluorescent 5: Type W4: 25" dec surf wall mtd vanity lt / 24" T8 17W / Premium efficiency	2	31	32	992
Linear Fluorescent 6: Type W5: 48" damp location wall mtd / 48" T8 32W / Premium efficiency	1	6	28	168
Linear Fluorescent 7: Type G1: 48" damp location surf clg mtd / 48" T8 32W / Premium efficiency	2	22	55	1210
			Total Proposed Watts =	17667

Section 4: Requirements Checklist

Interior Lighting PASSES: Design 1% better than code.

Lighting Wattage:

☐ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
17910	17667	YES

Controls, Switching, and Wiring:

☐ 2. Daylight zones under skylights more than 15 feet from the perimeter have lighting controls separate from daylight zones adjacent to vertical fenestration.

☐ 3. Daylight zones have individual lighting controls independent from that of the general area lighting.

Exceptions:

☐ Contiguous daylight zones spanning no more than two orientations are allowed to be controlled by a single controlling device.

☐ Daylight spaces enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.

☐ 4. Independent controls for each space (switch/occupancy sensor).

Exceptions:

☐ Areas designated as security or emergency areas that must be continuously illuminated.

☐ Lighting in stairways or corridors that are elements of the means of egress.

☐ 5. Master switch at entry to hotel/motel guest room.

☐ 6. Individual dwelling units separately metered.

☐ 7. Medical task lighting or art/history display lighting claimed to be exempt from compliance has a control device independent of the control of the nonexempt lighting.

☐ 8. Each space required to have a manual control also allows for reducing the connected lighting load by at least 50 percent by either controlling all luminaires, dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps, switching the middle lamp luminaires independently of other lamps, or switching each luminaire or each lamp.

Exceptions:

☐ Only one luminaire in space.

☐ An occupant-sensing device controls the area.

☐ The area is a corridor, storeroom, restroom, public lobby or sleeping unit.

☐ Areas that use less than 0.6 Watts/sq.ft.

☐ 9. Automatic lighting shutoff control in buildings larger than 5,000 sq.ft.

Exceptions:

☐ Sleeping units, patient care areas; and spaces where automatic shutoff would endanger safety or security.

☐ 10. Photocell/astronomical time switch on exterior lights.

Exceptions:

☐ Lighting intended for 24 hour use.

☐ 11. Tandem wired one-lamp and three-lamp ballasted luminaires (No single-lamp ballasts).

Exceptions:

☐ Electronic high-frequency ballasts; Luminaires on emergency circuits or with no available pair.

Section 5: Compliance Statement

Compliance Statement: The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.1 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title	Signature	Date

Project Notes:

COM*check* Software Version 3.9.1

Exterior Lighting Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Danforth on High
Exterior Lighting Zone: **2 (Residentially zoned area)**

Construction Site:
81 Danforth Street
Portland, ME 04101

Owner/Agent:
Danforth on High, LP
309 Cumberland Ave.
Suite 203
Portland, ME 04101
207 882-8349

Designer/Contractor:
Bartlett Design, Inc.
942 Washington Street
Bath, ME 04530
207 443-5447
bartlettdesigninc@comcast.net

Section 2: Exterior Lighting Area/Surface Power Calculation

A Exterior Area/Surface	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B x C)	F Proposed Watts
Entry canopy	232 ft2	0.25	Yes	58	84
Other door (not main entry)	3 ft of door width	20	Yes	60	28
			Total Tradable Watts* =	118	112
			Total Allowed Watts =	118	
			Total Allowed Supplemental Watts** =	600	

* Wattage tradeoffs are only allowed between tradable areas/surfaces.
** A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Section 3: Exterior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Entry canopy (232 ft2): Tradable Wattage				
Compact Fluorescent 1: Type S2: 13"dia glass surf clg mtd / Quad 2-pin 26W / Electronic	1	3	28	84
Other door (not main entry) (3 ft of door width): Tradable Wattage				
Compact Fluorescent 2: Type S3: 12"x5.75" cut off surf wall mtd / Quad 2-pin 26W / Electronic	1	1	28	28
			Total Tradable Proposed Watts =	112

Section 4: Requirements Checklist

Lighting Wattage:

☐ 1. Within each non-tradable area/surface, total proposed watts must be less than or equal to total allowed watts. Across all tradable areas/surfaces, total proposed watts must be less than or equal to total allowed watts.
Compliance: Passes.

Controls, Switching, and Wiring:

☐ 2. All exemption claims are associated with fixtures that have a control device independent of the control of the nonexempt lighting.

☐ 3. Lighting not designated for dusk-to-dawn operation is controlled by either a a photosensor (with time switch), or an astronomical time switch.

☐ 4. Lighting designated for dusk-to-dawn operation is controlled by an astronomical time switch or photosensor.

☐ 5. All time switches are capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.

Exterior Lighting Efficacy:

☐ 6. All exterior building grounds luminaires that operate at greater than 100W have minimum efficacy of 60 lumen/watt.

Exceptions:

☐ Lighting that has been claimed as exempt and is identified as such in Section 3 table above.

☐ Lighting that is specifically designated as required by a health or life safety statue, ordinance, or regulation.

☐ Emergency lighting that is automatically off during normal building operation.

☐ Lighting that is controlled by motion sensor.

Section 5: Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.1 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title	Signature	Date

SECTION 10440

SIGNAGE

Part 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products that meet or exceed the requirements of these specifications as manufactured by Welch Signage *and digital graphics*, 7 Lincoln Avenue, Scarborough, ME 04092. Phone (800) 635-3506 - Fax (800) 225-6859

2.2 SIGNAGE - GENERAL

A. Provide all interior signage required by code. Provide numbers on all apartment doors. Note: One raised set at 5' 0" off finish floor and one set 18" off finish floor.

2.3 COMPLIANCE

A. All signs must comply with the Americans with Disabilities Act including all conditions noted and all other requirements.

1. **Sign Finish & Contrast** - The color selected for the character and symbols should be in marked contrast to the sign background. Characters and background must be matte or other non-glare finish.
2. **Tactile & Braille** - Characters must be raised 1/32" and be accompanied by Grade II Braille.
3. **Typestyle** - Characters must be uppercase and San Serif or simple Serif style. Directional and informational signs are allowed to include lower case letters. Characters must have width-to-height ratio of between 3:5 to 1:1. Characters must have a stroke to height ratio of 1:5 to 1:10.
4. **Character Height** -Tactile characters height must be between 5/8" and 2", all caps. Characters on projected or overhead signs must be a minimum of 3" high. Characters on directional signs and informational signs must be sized appropriate or the viewing distance.
5. **Pictograms** - Pictograms shall be accompanied by the equivalent written description placed directly below pictogram and be in a background area of at least 6" x 6".

2.4 SIGN TYPES

A. Interior Panel Signs - Provide signs having the following characteristics:

1. **Substrate:** Fabricate signs from 1/8 inch thick matte clear acrylic with edges mechanically and smoothly finished to eliminate cut marks. Background color to be subsurface.
2. **Background Color:** Choose from - Colors to be selected by Architect from manufacturer's standards. Or custom color to be selected by Architect
3. **Edges:** Straight
4. **Corners:** Choose from - square or 3/8" radius
5. **Size:** As indicated or if not indicated provide 6" x 6"
6. **Copy:** Helvetica or as shown on drawings
7. **Copy Color:** To be selected by Architect from manufacturer's standards

8. **Letterform:** Apply 1/32" computer precision cut tactile copy. All uppercase, normal spacing, 5/8" minimum letter height. Tactile letters will be applied in a manner which avoids scoring of the sign's surface at base of tactile letters.
9. **Braille:** Use engraved process for all Braille areas. Engrave Braille dots into surface of clear material.

B. Message Insert Signs - Provide signs having the following characteristics:
1. **Substrate:** Fabricate signs from 1/8 inch thick matte clear acrylic with edges mechanically and smoothly finished to eliminate cut marks. Background color to be subsurface.
2. **Assembly:** Sandwich two exact sized acrylic pieces with foam tape as dividers. Face plate to have clear windows for message inserts. (See drawings for details.)
3. **Background Color:** Choose from -
Colors to be selected by Architect from manufacturer's standards.
Or custom color to be selected by Architect
4. **Edges:** Straight
5. **Corners:** Choose from - square or 3/8" radius
6. **Size:** As indicated or if not indicated provide 6" x 6"
7. **Copy:** Helvetica or as shown on drawings
8. **Copy Color:** To be selected by Architect from manufacturer's standards
9. **Letterform:** Apply 1/32" computer precision cut tactile copy. All uppercase, normal spacing, 5/8" minimum letter height. Tactile letters will be applied in a manner which avoids scoring of the sign's surface at base of tactile letters.
10. **Braille:** Use engraved process for all Braille areas. Engraved Braille dots into surface of clear material.

SECTION 15600
MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

General Provisions of Contract, including General and Supplementary conditions and General Requirements (if any) apply to work specified in this Section.

1.02 ALTERNATES

There are alternates that apply to this section of the project. See Part 4, "ALTERNATES".

1.03 DEFINITIONS

ATC Automatic Temperature Control
EC Electrical Contractor (Division 16)
GC General Contractor
HC Heating (mechanical) Contractor
PC Plumbing Contractor

1.04 INTENT

It is the intent of the drawings and specifications to provide for the installation of heating, ventilating and dehumidification systems which are safe, quiet, and economical in operation and complete in all respects. The heating system will provide a uniform temperature of 74°F. in all living spaces as may be noted on the drawings, when the outside temperature is -2°F. All materials and equipment necessary to accomplish the intent shall be furnished and installed by the heating (mechanical) contractor.

1.05 COMMISSIONING

A. A commissioning agent has been retained by and works directly for the Owner. The commissioning agent's primary responsibility shall include ensuring the mechanical systems function as designed. A full scope of the agent's duties may be provided on request.

B. This contractor shall provide documentation on mechanical equipment that may be requested by the commissioning agent with notification provided to the Architect of such.

C. Should the commissioning agent requested changes or alterations to the mechanical systems, said changes or alterations must be authorized by the Architect or Engineer of record prior to work. See part 1.20, "CHANGE ORDERS".

D. The scope of the mechanical contractor's responsibility regarding commissioning shall be (but not limited) to:

1. Attend commissioning meetings.

2. Coordinate factory start up of the ATC and boiler systems to include the commissioning agent. Coordination shall include as a minimum 1 week notice of factory start up tests.
3. Coordinate and provide at least one week notice of testing and balancing contractor being on site to allow the commissioning agent to observe the process.
4. Complete one page check lists on boilers, hot water heat pumps and controls.
5. Demonstrate all sequences of operation of all equipment within the boiler room.

1.06 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation and perform all operations required to install a complete heating, ventilating, heat recovery and dehumidification system in the building, in accordance with these specifications and applicable drawings.

2. All temperatures are expressed in degrees Fahrenheit.

3. Perform demolition and removal as required.

4. Work to be performed shall include, but is not limited to, the following:

   a. Provide and install forced hot water heating system in building areas indicated on drawings.
   b. Provide and install forced hot water snow melting system in areas indicated on drawings (see part 4, "ALTERNATES").
   c. Provide and install forced air heat recovery ventilating systems in building areas indicated on drawings.
   d. Provide and install direct expansion dehumidification system in building areas indicated on drawings.
   e. Pipe, valve and fittings
   f. Hot water specialties
   g. Circulating pumps and boiler work
   h. Radiation
   i. Air handling units
   j. Unit heaters and cabinet unit heaters
   k. Insulation
   l. Fans
   m. Sheetmetal
   n. Automatic Temperature Control (ATC)
   o. Tests and balance

5. Specifications and accompanying drawings do not indicate every detail of pipe, valves, fittings, hangers, ductwork and equipment necessary for complete installation; but are provided to show general arrangement and extent of work to be performed.

6. Before submitting proposal, Mechanical Contractor shall be familiar with all conditions. Failure to do so does not relieve Mechanical Contractor of responsibility regarding satisfactory installation of the system.

7. Mechanical contractor shall be responsible for rigging to hoist his own (and his sub-contractors') materials and equipment into place.

8. Mechanical contractor and his sub-contractors shall be responsible for start-up of all equipment provided under this section.

B. Related Work Described Elsewhere

1. Excavation and backfill
2. Cutting and patching
3. Firestopping between building construction and pipe sleeves and between building construction and ductwork.
4. Electrical conduit and wiring, except as noted below
5. Roofing, curb openings and framing of openings.
6. Setting of sleeves in masonry work (sleeves provided by Mechanical Contractor)
7. Door louvers
8. All finish work

C. Mechanical Electrical Work

1. Provide and erect all motors, temperature controls, limit switches as specified.

2. Power supply to switches, fused switches, outlets, motor starters, to line terminals of equipment, and all related wiring and fuses to properly connect and operate all electrical equipment specified shall be furnished and installed under Division 16, "ELECTRICAL". Division 16 shall not mount electrical equipment to indoor mechanical equipment without the consent of Division 15. Division 16 shall not drill wiring holes in equipment casings but shall make use of factory wiring knockouts when present. Coordinate all wiring between Mechanical and Electrical to provide a complete and operating system.

3. All wiring provided under this section shall be in accordance with the latest rules and regulations of the National Fire Underwriters, National Electric code, National Fuel Gas Code and Local Codes. Install all wiring under the supervision of Division 16. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 16 in type, quality and appearance shall be corrected by Division 16 at the expense of this section.

4. Automatic Temperature Control (ATC) Systems

Electric wiring shall be furnished and installed by ATC Contractor under supervision of Division 16. Any wiring that is not installed according to these standards, and which does not match wiring installed by Division 16 in type, quality and appearance shall be corrected by Division 16 at the expense of this section.

Low voltage control wiring must be plenum rated and adequately supported with no sags or "droops". Low voltage wiring need not be installed in conduit unless required by local code.

5. Boilers

Division 16 shall provide a separate circuit breaker for each boiler and wire to line terminals on unit control. Licensed boiler contractor shall provide all other wiring, including control and safety circuits, low water cut-off, door safety switch, and fusible switches. Note: Boilers may require only a power receptacle rather than hard wiring to unit line terminals. Division 15 to coordinate with Division 16.

6. Fans

a. Single phase 120 volt units: Division 16 to wire to unit mounted disconnect switch with overload protection provided with unit.
b. Fans shall operate as indicated on "FAN SCHEDULE", drawing M14 and as indicated in "Automatic Temperature Control" section of this specification.
c. Division 16 to provide 120 volt power from exhaust fans to motor operated dampers associated with each fan (where indicated). Dampers and actuators to be provided by ATC Contractor.

7. Automatic Temperature Control (ATC) Panels

Division 16 shall provide a dedicated 120 volt, 15 amp circuit breaker for each temperature control panel. Wiring from circuit breaker to temperature control panels will be provided and installed by the ATC Contractor. Division 16 shall also provide a duplex convenience receptacle on a separate circuit within 6 feet of each panel.

8. Heat Recovery Unit

Division 16 shall provide and install disconnect switch and wire to line terminals in unit junction box.

9. Compressor/condenser (Outdoor) Unit

Division 16 shall provide and install disconnect switches and wire to line terminals in unit.

10. Air Handling (Dehumidification) Units

Division 16 shall provide and install disconnect switches and wire to line terminals in unit junction box.

11. Circulating Pumps

Division 16 shall provide and install disconnect switches and wire to line terminals in unit junction box.

12. Unit Heaters

    a. Cabinet Type: Division 16 shall wire to disconnect switch provided with unit.
    b. Propeller type: Division 16 shall provide and wire service switch with overload protection.

13. Lighting and Convenience Receptacles

    Division 16 is requested to provide and install duplex convenience receptacles within 8 feet of each heat recovery ventilator and within 2 feet of ATC panel.

14. All motors 1/3 HP and smaller shall be wired for 120 volt, 1 phase, 60 hz; motors 1/2 hp and larger shall be wired for 208 volt, 1 or 3 phase, 60 hz, unless specifically shown otherwise.

15. Duct Smoke Detectors

    Duct smoke detectors shall be furnished and wired by Division 16. Wiring shall include connection to heat recovery unit starting circuit(s) to interrupt power to the unit fan(s) to stop unit(s) on smoke alarm. The ATC system shall not be used to stop equipment on signal from fire alarm system. Mechanical Contractor shall install detectors in ductwork.

1.07 PERMITS

A. This Contractor shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for the legal installation and operation of the systems and/or equipment furnished under this Section of the Specifications.

B. The Contractor shall frame under glass/ clear plastic all permits, secured by him, adjacent to the respective system and/or equipment and required to be displayed by Code, law or ordinance. Those permits secured but not required to be displayed shall be laminated in plastic and included in the Owner's maintenance manual.

1.08 CODES, ORDINANCES AND PERMITS

A. All work performed under this Section of the Specifications shall be done in accordance with applicable National, State and local Codes, Laws and Ordinances. The following abbreviations are used for reference to standards which are to be followed:

AABC	Associated Air Balance Council
ADA	Americans With Disabilities Act
AMCA	Air Movement & Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials

BOCA	Building Officials and Code Administrators
NEC	National Electrical Code
NFPA	National Fire Protection Association
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Act
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriter's Laboratories

B. The latest issue of each Code in effect at the time of bidding shall be used. Code requirements are the minimum quality and/or performance acceptable. Where the Specifications and/or Drawings indicate more stringent requirements, these requirements shall govern.

1.09 QUALITY ASSURANCE

A. Mechanical Contractor shall have prior experience with at least two projects of this nature, size and scope and be capable of producing references indicating as such.

B. Use sufficient qualified workpersons and competent supervisors in execution of this portion of the work to ensure proper and adequate installation of systems throughout. Technical training and certification of workpersons installing the systems specified, by the systems manufacturer, shall be mandatory prior to commencement of work. Documentation of such certification shall be made available to the Architect upon request within 5 business days.

C. Work performed shall conform with all Local and State Rules and Regulations, as well as those of the International Building Code and National Fire Protection Association (N.F.P.A.).

D. Piping design shall conform to ANSI, ASME B31.9 and AWS D10.9 codes.

E. Welding standards shall conform to ANSI Boiler Code, Section IX, B31.1

1.10 MATERIALS AND SUBSTITUTIONS

All materials and equipment shall be new and of the latest design of respective manufacturers. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise.

A. Any proposal for substitution of Mechanical equipment, materials or vendors shall be made in writing *prior to opening of bids*. Submit full details for consideration and obtain written approval of the Architect. Allow sufficient time for the Architect to include any approval to submit substitutions in an addendum so all bidders may be made aware. The phrase "or approved equal" shall be defined to mean that the Architect, not the contractor, shall make final determination whether or not substitute materials are an equal to that which is specified. The contractor shall be responsible to certify within his submittals that any equipment to be considered as an "approved equal" meets or exceeds the requirements of this specification in all aspects and will physically fit within the space provided and still provide adequate space adjacent to the equipment for service. If requested by the Architect the contractor shall provide said certification in the form of

scale drawings before review will be made. Architect will not be responsible to provide drawings for substituted materials unless the substitution is agreed upon prior to opening of bids. Architect's decision on acceptability of substitute materials shall be final.

B. Approval by Architect for such substitution shall not relieve Mechanical Contractor from responsibility for a satisfactory installation and shall not affect his guarantee covering all parts of work

C. Any material or equipment submitted for approval which are arranged differently or is/are of different physical size from that shown or specified shall be accompanied by shop drawings indicating different arrangements of size and method of making the various connections to equipment. Final results will be compatible with system as designed.

D. Materials and equipment determined as an "approved equal" and/or substitutions must meet the same construction standards, capacities, code compliances, etc. as the equipment (i.e. Manufacturer, model, etc.) specified.

E. Any additional cost(s) resulting from the substitution of equipment, regardless of acceptance by the Architect or Engineer, shall be paid by this Contractor. Additional costs may include, but not be limited to, electrical and/or structural alterations from the contract documents. Contractor shall be solely responsible to verify that substitutes will fit within the designated spaces provide while permitting adequate clearances for servicing of equipment as required by the manufacturers. Contractor shall, upon request from the Architect or Engineer of record, provide such verification of ample space and clearances in the form of drawings or any other manner requested.

F. All materials not specified otherwise shall be manufactured within the United States and supplied locally (within the State of Maine) when available. It is preferable to obtain materials that are manufactured within 500 miles of the work site when practical.

1.11 PLANS AND SPECIFICATIONS

Mechanical Contractor shall provide his sub-contractors with a copy of the entire portion of Part 1 of this specification, portions of this specification and copies of drawings which pertain to the equipment to be supplied at no cost to the sub-contractor. Provide ATC Contractor with entire set of Electrical plans and specifications. Provide Testing and Balancing sub-contractor with copies of shop drawings indicating coil gpm's, air handling unit air volumes, etc. Failure to do so may result in the Architect providing the required materials at the Contractor's expense.

Sketches pertaining to changes and amendments during construction (ASI's, RFI's and RFP's for example) shall be contract form documents issued by the Architect and/or Engineer for use during construction and it shall be the Architect's and/or Engineer's discretion to provide sketches or full size drawings. Requests for documentation other than what is provided (full size revised drawings for instance) and deemed suitable for the particular situation shall be paid for by the contractor making the request. The cost(s) shall include, but not limited to, drafting time and reproduction costs.

1.12 ELECTRONIC DRAWINGS AND FILE SHARING

Plans and specifications may be made available in electronic format on request. Plans may be provided in either Adobe (.pdf) or CAD (.dwg or .dxf) formats and will be compressed using WinZip (.zip format). Recipient is responsible to obtain the necessary software to open the files. Note: CAD (.dwg and .dxf) files will be made available to successful bidders only after a contract is awarded.

CAD drawings are produced with AutoCAD and may be provided in the 2004 or 2010 file format. Upon request for CAD files a release form will be provided which must be signed and returned to the Engineer prior to transmission of electronic files. Physical mailing address and telephone number for the engineer of record are indicated on each drawing. E-mail address for drawing requests is rob@mechanicalsystemseng.com A signed release will not be required for Adobe based files.

All contract documents are copyrighted material. No portion of materials may be reproduced or duplicated except as indicated in the release form. Where release forms are not required (Adobe based files), materials may be printed for use by the intended recipient only and may not be reproduced or copied in any other manner or for any purpose other than for use pertaining to the construction of this project unless written permission is obtained.

1.13 SHOP DRAWINGS & SUBMITTALS

A. As soon as possible after award of contract (*but not longer than 21 calendar days*), before any material or equipment is purchased, Mechanical Contractor shall submit shop drawings for review. Unless prior arrangements are made with the Architect all shop drawings must be submitted to the General Contractor who in turn will forward them to the Architect. The quantity of copies shall be as outlined in Division 01. If shop drawings are rejected or returned for re-submittal, Mechanical Contractor shall provide said re-submittals within 14 calendar days of receipt of original submittals with engineer's comments. If original or re-submitted shop drawings are not submitted within the allotted time frames indicated all substitutions included in the late shop drawings will be invalid and the equipment primarily specified must be provided. Any costs resulting from delays in the project schedule due to failure to submit shop drawings related to this section in a timely manner shall be the responsibility of the Mechanical Contractor. Mechanical Contractor's and vendor's name, address, telephone & fax numbers and e-mail addresses shall be provided with every shop drawing submission. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.

B. Shop drawings shall be properly identified and shall describe in detail the material and equipment to be provided, including all dimensional data, performance data clearly indicated, fan curves, pump curves, computer selection print-outs, etc. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.

C. Corrections or comments made on the shop drawings do not relieve the contractor from compliance with requirements of the drawings and specifications. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting

fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.

D. Should any materials or products be purchased and/or installed without prior review and comment the contractor shall be required to remove or replace those products and/or materials, if directed by the Architect, at his expense. If the materials are not removed (or replaced) or if the project is delayed as a result of the contractor's actions, the Architect reserves the right to order the withholding of payment until the situation is resolved in a manner satisfactory to the Architect.

E. Mechanical shop drawings shall be separate from Plumbing shop drawings. Submittals not separated from plumbing shop drawings will be refused for re-submittal.

F. Electronic submission of shop drawings is required. Paper copies are not acceptable. Electronic files must be accessible and in an open format, meaning files must not be locked and comments may be added without altering the original content, or have interactive fields intended specifically for commenting. Locked files will not be reviewed. Hard copies of shop drawings must be original documents or good quality photocopies of original documents (photocopies of color samples are not acceptable). Faxed copies of submittal sheets will be refused unless prior arrangements are made.

G. Review must be obtained on the following items:

1. Ductwork and Accessories

   a. Registers, diffusers, and grilles
   b. Duct access doors
   c. Volume control dampers (manual and automatic)
   d. Duct sealant
   e. Fire dampers and sleeves
   f. Turning vanes
   g. Side takeoff fittings
   h. Flexible duct
   i. Ceiling and wall access panels
   j. Backdraft dampers
   k. Manual dampers
   l. Louvers and brick vents - provide color chips (photocopies not acceptable) – provide samples if substituting
   m. Filters
   n. Vents from gas heating appliances
   o. Roof vents

2. Mechanical Equipment (sound data must be provided with all interior motorized equipment).

   a. Full warrantee information must be included with all submittals.
   b. Air handling units and accessories
   c. Outdoor (compressor/condensing) unit
   d. Boiler units and accessories
   e. Cabinet unit heaters - provide color chips (photocopies not acceptable)
   f. Horizontal unit heaters

g. Domestic hot water storage heater and accessories
h. Fans and accessories - provide full fan curves and computer selection printouts.
i. Heat recovery units and accessories - provide computer selection printouts.
j Pumps and accessories - provide full pump curves and computer selection printouts.
k. Water to water converter and accessories
l. Equipment identification tags

3. Piping and Accessories

a. Pipe, valves, unions and flanges
b. Air separator
c. Air vents (automatic and manual)
d. Backflow preventer
e. Balancing valves with read-out gauge and pressure tappings. Provide a schedule clearly indicating every valve, its location, GPM, size and pressure drop.
f. Expansion tank(s) and accessories
g Exterior piping support system.
h. Flow control valves
i. Flow measuring stations
j. Sight flow monitors
k. PEX tubing, fasteners, connectors and accessories
l. Pipe and valve markers
m. Pipe hangers and insulated pipe supports
n. Pipe sleeve wall closure devices
o. Pressure gauges and thermometers
p. Pressure reducing valves
q. Relief valves

4. Terminal Units

a. Duct heating coils - provide computer selection printouts.
b. Convectors
c. Finned radiation
d. Radiant snowmelt system and accessories (see part 4, "ALTERNATES").

5. Insulation

a. Duct
b. Equipment
c. Pipe
d. Pipe fittings
e. Hydraulic separator

6. Automatic Temperature Control (ATC) System

1.14 PRODUCT HANDLING

A. Protection

Use all means necessary to protect heating, ventilating and dehumidification materials before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements

In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.15 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blueprints furnished for this job. On this special set of blueprints, record *completely and accurately* all differences between the work as actually installed and the design as shown on the drawings. These record prints must be kept up to date by recording all changes within one week of the time that the changes are authorized. At the completion of the work, this set of drawings shall be delivered to the Architect for the Owner electronically in the form of CAD drawings. If a complete record of changes is not made and electronic CAD drawings not provided by the Mechanical Contractor, a record shall be made by the Engineers, and *the cost of the record shall be the responsibility of the Mechanical Contractor.* Copies of the mechanical CAD drawings (minus professional engineering stamps) may be made available at no cost to the Mechanical Contractor of record if desired. Drawings shall be dated accordingly and clearly identified as "AS-BUILT". See par. 1.12, "ELECTRONIC DRAWINGS AND FILE SHARING" for additional information.

1.16 MAINTENANCE MANUAL

A. On completion of this portion of the work, and as a condition of its acceptance, submit for approval two copies of a manual describing the system. Mechanical equipment manuals shall be separate from plumbing manuals. All manuals shall be original copies, not photocopies or they will be refused for re-submittal. Prepare manuals in durable 3-ring binders approximately 8½ inches by 11 inches in size with at least the following:

1. Identification on the front cover and spine stating general nature of the manual.
2. Neatly typewritten index.
3. Complete instructions regarding operation and maintenance of all equipment involved.
4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name, address and telephone number of nearest vendor of parts.
5. Copy of all guarantees and warranties issued.
6. Where contents of manuals including manufacturer's catalog pages, clearly indicate the precise item included in this installation and delete, or otherwise clearly indicate, all manufacturers' data with which this installation is not concerned.

B. In addition to above, provide two (2) separate offset style binders properly identified, each containing a copy of all reviewed shop drawings and catalog cuts. (NOTE: May be incorporated in Maintenance Manuals, if binders are of adequate size.)

C. Provide to the Owner, all shop drawings on CD media in a hard plastic case.

1.17 OBJECTIONABLE NOISE AND VIBRATION

Mechanical equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus, piping or ducts, as determined by the Architect, the necessary changes eliminating the noise or vibration shall be made by this Mechanical Contractor at no extra cost to the Owner.

1.18 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner. Any additional costs required to extend manufacturer's guarantee and warranty for the period specified, shall be included in Contractor's base bid.

1.19 DEVIATIONS AND DISCREPANCIES

A. The drawings are intended to indicate only diagrammatically the extent, general character and approximate locations of mechanical work. Work indicated, but having minor details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, plumbing and electrical drawings so that work under this section is properly installed and coordinated with other Sections.

B. The drawings and specifications are complimentary to each other and what is called for in one, shall be as binding as if called for by both. In the event of conflicting information on section 15600 drawings, or between section 15600 drawings and this specification notify the Architect immediately so a clarification may be issued by addenda.

C. Questions to the Architect or Engineers are encouraged, however any answers and/or advice is non-binding unless incorporated into the contract documents in the form of addenda, change order, etc. Inquiries requiring an answer prior to opening of bids should be made at least 4 days prior to when bids are due to allow time for a clarifying addendum to be issued.

D. Any conflicts arising from duplication of equipment specified in different portions of the specifications shall be brought to the attention of the Architect prior to submitting bids. Failure to do so does not relieve the Contractor from responsibility of providing said materials and equipment and a credit will be taken for the duplicated item(s).

E. Should unforeseen job conditions require re-arrangement of piping and/or ductwork resulting in deviation from the intent of the contract documents or potentially compromising the integrity of the mechanical systems, the Architect shall be notified immediately prior to commencement of work. Failure to do so will result in the

contractor being responsible to correct any work installed that is contrary to the contract documents at his own expense.

1.20 CHANGE ORDERS

A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.

B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.21 COORDINATION

A. Contractor shall be responsible to coordinate his work with that of other trades to adjust to field conditions prior to commencing work. It is also this contractor's responsibility to coordinate locations of his own piping and ductwork to ensure the two do not conflict. If a reasonable solution cannot be achieved without compromising the integrity of the intended design or would result in additional cost the Architect must be notified immediately prior to commencement of work. Failure to do so does not relieve the Contractor from providing and installing the systems to the satisfaction of the Architect at no additional cost.

B. Contractor shall be responsible to review job conditions and identify conflicts and/or obstructions to ductwork and piping prior to fabrication. If conflicts and/or obstructions are noted the Architect must be notified immediately prior to commencement of work. The cost of any fabrication work performed without confirmation and notification of conflicts and/or obstructions shall be the responsibility of the contractor.

1.22 REQUESTS FOR INFORMATION

Requests for Information (RFI) or other correspondences which are submitted electronically must be in an open format, meaning files must not be locked and comments may be added without altering the original content, or have interactive fields intended specifically for commenting. Locked files will not be accepted.

Requests for design criteria of the mechanical systems must be submitted in the form of an RFI and shall include the purpose for the request.

1.23 WORKPLACE SAFETY

Mechanical contractor shall be responsible for the safety of his workpeople.

1.24 MAINE HOUSING GREEN BUILDING STANDARDS

A. SECTION 4 R1: ENERGY EFFICIENCY – SYSTEMS & APPLIANCES

Standard - Energy Star labeled systems and appliances

Intent - Energy Star systems and appliances are the most fuel efficient and save resources, energy and money.

Requirements

1. Energy Star rated furnaces, boilers utilizing sealed combustion up to 300,000 BTU sizes, then use AFUE greater than or equal to 85%
2. Energy Star rated refrigerators for all units
3. Energy Star rated clothes washers for on-site laundry facilities
4. Where installed - Energy Star rated dishwashers, freezers
5. Where installed - Energy Star rated heat pumps
6. Where installed - Energy Star rated ceiling Fans
7. Energy Star rated exhaust fans
8. Energy Star rated range hoods

Verification

1. Submittals for systems and appliances highlighting Energy Star rating
2. Construction Analyst to verify installation

Resources - Consortium for Energy Efficiency: www.cee1.org/

Energy Star: www.energystar.gov/index.cfm?c=home.index

Rehab/Renovation - The requirements of this standard must be followed where building systems and appliance improvements are included within the scope of the renovation project.

Cost Implications:

Low cost - Energy Star appliances are currently often specified.

B. SECTION 4 R2 : ENERGY EFFICIENCY – SYSTEMS & APPLIANCES

Standard - Bathroom exhaust fans shall meet the requirements of ASHRAE 62.2 - 2003 Ventilation & Acceptable Indoor Air Quality in Low-Rise Residential Buildings.

Intent - To provide systems adequate for spot ventilation that could also provide background whole house ventilation if needed.

Requirements

Fan CFM rating and sone level to be sized according to ASHRAE 62.2 2003 Guidelines regarding the number of bedrooms in the unit and whether or not fans run continuously or intermittently.

Verification

1. Contractor submittals
2. Construction Analyst to verify on site.

Resources

1. Maine PUC: www.state.me.us/mpuc/doing_business/rules/part9.htm

Notes:

1. Timer controls (such as Airtrak or equivalent) can be installed to cycle the air on a set schedule in order to provide supplemental ventilation and improve air quality - this is an option and is not required by MaineHousing.

2. Airtrak Controller, Tamarack Technologies: www.tamtech.com

3. Rehab/Renovation - The requirements of this standard must be followed in all rehab projects.

Cost Implications - Low cost

C. SECTION 4 R5: ENERGY EFFICIENCY – SYSTEMS & APPLIANCES

Standard - Seal ductwork with duct mastic to prevent air leakage

Intent - Optimize performance and prevent air leakage from ductwork

Requirements - Seal duct connections with water based* duct mastic.

Areas that must be sealed include:

1. Swivel elbows
2. Branch take-offs from trunk ducts
3. Finger jointed connections
4. Folded corners of boots & fittings
5. Filter racks & plenum connections

Verification

1. Provide appropriate language in project specifications
2. Construction Analyst to verify installation

Resources – None

Notes - * Water based duct mastic has low VOC content

Rehab/Renovation - The requirements of this standard must be followed in all rehab projects

Cost Implications - Very low additional labor and material costs

PART 2 - PRODUCTS

2.01 PIPING

A. General

Provide and erect in accordance with best practice of trade all hot water supply and return, refrigerant, pump discharge, drain and vent piping shown on the plans and as required to complete intended installation. Contractor shall make offsets as shown or required to place all piping in proper position to avoid other work, and to allow application of insulation and finish painting.

B. Pipe Materials:

1.	Heating hot water	Schedule 40 standard weight black steel, ASTM 120
2.	Heating water branches above grade, 200°F. maximum	PEX crosslinked flexible tubing, ASTM F876 and F877.
3.	Snow melt tubing (see part 4, 'ALTERNATES")	PEX crosslinked flexible tubing, ASTM F876 and F877.
4.	Cold water, drains from relief valves and automatic vents.	Type "L" hard drawn copper tubing
5.	Refrigerant	Type "L" hard drawn copper tubing.
6.	Boiler vents and combustion air piping	Schedule 40 polyvinyl chloride plastic, ASTM-A-2665 or latest standard.

C. Pipe Fittings:

1.	Screwed	125# cast iron screwed pattern ASTM A126, ASA B16.1
2.	Welded	Standard weight butt weld carbon steel ASTM A234, ANSI B16.9 from A106 Gr. B. seamless Tube
3.	Unions	250 malleable iron, brass to iron seats
4.	Flanges	150# forged steel slip-on ASTM A234
5.	Sweat	Cast bronze or wrought copper made up with 95-5 solder
6.	PVC	Standard socket fittings with glued joints. Solvent as per ASTM-D-2564. Elbows to be long radius.

7.	Connections to equipment	2inches and smaller - screwed unions 2½ inches and larger – flanged
8.	Refrigerant	Cast bronze or wrought copper, long radius elbows, made up with Sil-Fos silver solder.
9.	Dielectric fitting	Steel or copper pipe to ASTM A-53, zinc electroplated body with non-corrosive thermoplastic lining, thread connections. Victaulic Style 47-TT or approved equal.

D. All mains 2½ inches and larger shall have welded connections using standard factory-fabricated tees, elbows, reducers, and caps. Branch outlets in welded sizes shall be made with tees for full size or one size reduction and with either "Weldolets" and "Threadolets" or factory shaped nipples for all other sizes. All welds shall be made by welders certified by the State of Maine and shall be capable of welding in any position "in the field". All welds shall conform with the rules set forth in the Standard Manual on Pipe Welding of the Heating, Piping and Air Conditioning Contractors national Association. All slip on fittings shall be back welded. Fire extinguishing equipment shall be kept within 25 feet of welding areas at all times. Contractor shall take additional measures when welding close to wood structures to protect the wood from igniting.

E. Steel piping 2 inches and smaller shall have screwed connections. All threads on piping must be full length and clean-cut with inside edges reamed smooth to the full inside bore.

F. The Mechanical Contractor may, at his option, use type "L" hard drawn copper tube for piping 2 inches and smaller in lieu of steel. His option of steel or copper MUST be stipulated in his bid and thereafter no deviation will be acceptable. If copper is to be used, the piping system shall be 100% copper with no mixture from copper to steel. New piping which is to be connected to existing shall be schedule 40 steel.

G. The Mechanical Contractor may also, at his option, use Victaulic grooved piping products in lieu of welded and screwed joints on steel piping 2½ inches and larger. This option MUST be stipulated in his bid and thereafter no deviation will be acceptable. All grooved components shall be of one manufacturer and conform to local code approval and/or as listed by ANSI B-31.1, B-31.9, ASME, UL-FM, IAPMO or BOCA. Grooved end product manufacturer to be ISO-9001 certified.

Pipe to be grooved in accordance with Victaulic current listed standards conforming to ANSI/AWWA C-606.

Mechanical couplings shall be Victaulic Style 107H QuickVic™ "Installation Ready" stab-on coupling and Victaulic Style 07 Zero-Flex standard rigid coupling. Victaulic Style 177 QuickVic and Victaulic Style 77 or 75 standard coupling shall be used where system flexibility is desired at pumps and other mechanical equipment to reduce noise and vibration and eliminate flexible connectors. Vic-Flange adapter Style 741 shall be used for connections to ANSI class 125/150 flanged components. Gasket shall be Grade EHP EPDM compound with a temperature operating range -30°F to +250°F and Grade E EPDM compound with a temperature operating range -30°F to +230°F.

AGS mechanical couplings 14" through 60" shall be Victaulic Style W07 rigid and Style W77 flexible. Couplings shall consist of two ductile iron housings cast with a wide key profile and flat bolt pads for metal-to-metal contact. Gaskets shall be wide-width Grade E EPDM compound of a FlushSeal® design and temperature operating range -30°F to +230°F. Vic-Flange adapter Style W741 shall be used for connections to ANSI Class 125/150 flanged components.

Fittings shall be cast ductile iron conforming to ASTM A 536, forged steel conforming to ASTM A 234, or fabricated from carbon steel pipe conforming to ASTM A 53 with factory grooved ends designed to accept Victaulic stab-on, standard, and AGS "W" series couplings.

Bolted branch outlet - branch reductions on 2" through 8" header piping shall be made with Victaulic Style 920/920N Mechanical-T outlet.

Butterfly valves are not permitted.

Ball valves 1½ inches to 6 inches in size shall be Victaulic Series 721 or Series 726 standard port valve. Ductile iron body, TFE coated seats, 800 PSI.

Miscellaneous Components - Checks, strainers and other components as recommended by the manufacturer for a minimum rating of 300 PSI for the intended service.

H. Use dielectric fittings when connecting dissimilar metals.

2.02 INTERIOR HANGERS AND SUPPORTS

A. General

1. All interior hangers and supports shall be specially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.

2. Piping specified shall not be supported from piping of other trades.

3. Hangers on hot water and drain piping shall be sized for the piping only (not including insulation). Hangers on refrigerant piping, cold water piping and where specifically indicated on drawings, shall be sized to include the insulation and include thermal hanger shields (insulated pipe supports).

Hangers for piping 2½ inches and larger shall be steel, adjustable clevis type; plain for steel pipe and copper plated for copper tubing. Carpenter & Paterson, Inc., Fig. 100 (Fig. 100 CT copper plated) or approved equal.

Hangers for piping 2inches and smaller shall be steel, band type; plain for steel pipe and copper plated for copper tubing. Carpenter & Paterson, Inc., Fig. 1A (Fig. 1A CT copper plated) or approved equal.

Hangers and mounting devices for PEX tubing shall be a product of the tubing manufacturer.

4. Thermal hanger shields shall be Carpenter & Paterson, Inc., Fig. 265P or approved equal.

5. Exposed vertical risers ¾ inch and smaller shall be supported at the mid-point between floor and ceiling with split ring type hangers; copper plated for copper tubing. Carpenter & Paterson, Inc., Fig. 81 (Fig. 81 CT copper plated) or approved equal.

6. Attachments to wide flange steel members shall be adjustable beam clamp, Carpenter & Paterson, Inc., Fig. 82 or approved equal.

7. Piping suspended from walls, trench walls and partitions shall be supported by steel support bracket. Carpenter & Paterson, Inc., Fig. 69 or approved equal.

B. Hanger Rods

1. Hanger rods shall be galvanized all thread rod. Rod size shall be as follows:

Pipe Size	Rod Size
½" to 2"	3/8"
2½" to 3½"	1/2"

2. Provide toggle bolts for fastening to concrete blocks and compound anchor shields for bolts for fastening to poured concrete.

3. Provide lag points with rod couplings or side beam connectors with drive screws for fastening to wood.

4. All nuts for hanger rod to be stainless steel.

C. Supports

Provide and install angle iron supports for pipe hangers as required. Angle iron supports shall be adequate size for span and piping or equipment load.

2.05 VALVES

A. General

1. Valves shall be provided as shown and as required to make the installation and its apparatus complete in operation, locate to permit easy operation, replacement and repair. All pressures specified are steam working pressure.

2. All valves must be so constructed that they may be repacked under pressure while open.

3. Ball valves shall be installed where shut-off and isolation is required.

4. Globe valves shall be installed in all lines where regulation is required.

5. Check valves shall be installed in all lines where flow may reverse from intended direction.

6. Except for above or as otherwise noted on drawings, ball valves shall be installed in all water supply and return lines and on all drain lines.

7. All valves to comply with federal specifications and be so listed.

8. Butterfly valves shall not be used.

B. Types and Manufacturers

All valves shall be of one manufacturer and by one of the manufacturers listed. The following list is provided as a means of identifying the quality and type required.

1. Globe Valves 2 inches in size and smaller shall have bronze bodies, union bonnet, renewable composition disc for service intended, rated for 150# WSP, 300# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	1590-T	590-T
Stockham	B-24-T	B-22-T
NIBCO	S-235-Y	T-235-Y
Hammond	IB423	IB413T

2. Globe Valves 2½ inches in size and larger shall have iron bodies, union trim, OS&Y, bolted bonnet, solid disc, gland packed, flanged ends. Rated for 125# WSP, 200# WOG:

	Flanged Ends
Milwaukee	F-2981
Stockham	G-512
NIBCO	F-718-B
Hammond	IR116

4. Ball valves 1¼ inches in size and smaller shall have bronze bodies, brass stems and chrome plated brass balls, reinforced Teflon seats an seals, blow-out proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be "full port". Rated for 400# WOG and 350°F:

	Soldered Ends	Screwed Ends
Milwaukee	BA-350	BA-300
Apollo	82-200	82-100
Watts	B-6081	B-6080
NIBCO	------	------
Hammond	8614	8604

5. Ball valves 1½ and 2 inches in size shall have bronze bodies, two piece, standard port, brass stems and chrome plated brass balls, reinforced Teflon seats an seals, blow-out proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Rated for 400# Bar non-shock cold working pressure.

	Soldered Ends	Screwed Ends
Apollo	70-200	70-300
Watts	B-6000	B-6001
NIBCO	S-580-70-66	T-580-70-66
Hammond	8513	8503

6. Ball valves 2½ inches in size and larger shall have carbon steel bodies, Type 316 stainless steel stems, Type 351 stainless steel balls (vented), glass filled Teflon seats and seals and blow-out proof stems. Shall be equipped with suitable packing for service intended. Rated for 150# WOG and 350°F:

	Flanged Ends
Apollo	88-140
NIBCO	F-510-CS-R-66-FS

7. Plug type Globe valves 2 inches in size and smaller shall have bronze bodies, union bonnet, stainless steel plug type disc and seat. Rated for 150# WSP, 300# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	591-A	
NIBCO	T-256-AP	

8. Check Valves 2 inches in size and smaller shall be horizontal swing type with bronze body, Teflon disc. Rated for 125# WSP, 200# WOG:

	Soldered Ends	Screwed Ends
Milwaukee	1509-T	509-T
Stockham	B-310-T	B-320-T
NIBCO	S-413-Y	T-413-Y
Hammond	IB945	IB904

9. Check valves 2½ inches in size and larger shall be horizontal swing type with iron body, bronze trim and flanged ends. Rated for 125# WSP, 200# WOG:

	Flanged Ends
Milwaukee	F-2974
Stockham	G-931
NIBCO	F-918-B
Hammond	IR1124

2.06 PIPE SLEEVES AND ESCUTCHEONS

A. Interior Sleeves

1. Mechanical Contractor shall set sleeves for all piping penetrating interior concrete and masonry walls and floors. Sleeves shall be schedule 40 steel pipe, two sizes larger than the carrying pipe. Pipes passing through walls and floors of frame construction need not be provided with sleeves.

2. Sleeves set in floors shall finish flush with the underside, but extend a minimum of 1 inch above the finish floor. Sleeves set in walls shall finish flush with each side. General Contractor shall grout between sleeves and surrounding masonry.

3. Spaces between sleeves and pipes shall be sealed fire and smoke tight by the General Contractor. Spaces between pipes and floors and between pipes and fire rated walls in frame construction shall also be sealed fire and smoke tight by this section. Sealant material shall be 3M brand fire barrier caulk CP25 or putty 303, Ciba-Geigy CS240 Firestop Sealant, or approved equal and shall be U.L. listed.

B. Exterior Sleeves

Where piping passes through exterior walls, provide and install a complete pipe sleeve/hydrostatic wall closure system as shown on drawings.

1. Wall sleeve shall be schedule 40 steel pipe, two pipe sizes larger than carrier pipe. Sleeve shall be the same length as the thickness of the wall served.

2. The hydrostatic closure device shall consist of identical interlocking links of solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations. Each link shall be connected by corrosion resistant bolts and nuts to form a belt which is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air tight and water tight seal.

3. Units to be Link-Seal system Model LS wall seal by Thunderline Corp. or approved equal.

C. Escutcheons

Where uninsulated piping passes through finish walls, floors, ceilings and partitions, provide and set two piece nickel plated steel floor and ceiling plates. Provide deep type floor plates as required for projecting sleeves. Piping through walls with insulation shall not require escutcheons.

2.07 ANCHORS

Anchors shall be provided and installed as detailed and shown on the drawings, or as required to control expansion.

2.08 PAINTING

Painting shall be provided for all equipment supports within mechanical room, exposed flanges and fittings within mechanical rooms, and where specified elsewhere within this section. Temperature control devices *shall not* be field painted.

Painting shall consist of no less than two (2) coats of rust inhibiting paint, Rust'O'leum or approved equal. Paint shall be capable of withstanding temperatures of up to 250°F.

Color shall be flat black.

2.09 POLYETHYLENE HEATING HOT WATER PIPING

A. General

Furnish and install complete system of pre-manufactured piping as shown on plans for heating hot water run-outs to individual zones and snow melt systems. Piping systems shall consist of flexible crosslinked polyethylene tubing known in the trade as PEX. Tubing shall meet ASTM F876 and F877 standards and shall be capable of service temperatures up to 200°F. & 80 psi (180°F. & 100 psi). See part 4, "ALTERNATES" for snow melt system.

B. Construction and Components

The carrier pipe shall be PEX flexible crosslinked tubing, internal diameter as indicated on drawings. Connections to copper piping shall be sweat connectors and connections to steel piping shall be threaded connectors, all provided by the tubing manufacturer and installed in strict accordance with manufacturer's instructions.

Insert fittings shall be copper or brass, ASTM F 1807
Crimp rings shall be copper (black for PEX systems), ASTM F 1807

C. PEX tubing must be labeled (on the tubing) as follows:

1. The manufacturer's name or trademark
2. The standard to which it conforms (ASTM F876, F877, or both)
3. Tube size and CTS
4. Material designation code (PEX0006)
5. Pressure/temperature rating(s)
6. SDR9

The marking interval shall be not more than five feet.

2.10 REFRIGERANT SPECIALTIES

A. Sight glass and moisture indicator shall be provided in the liquid line at the outdoor compressor-condenser unit if not provided by the equipment manufacturer.

B. Externally equalized expansion valve shall be installed on each liquid connection to the evaporator coil(s) if not provided by the evaporator manufacturer. Valve size shall be as verified with unit manufacturer based on actual length of piping, quantity of fittings and difference of elevation. Valve shall be manufactured by ALCO or Sporlan and installed in accordance with manufacturer's instructions.

C. A complete charge of R-410A shall be provided for the system.

D. The liquid line shall be provided with removable core type filter-dryer and refrigerant valves as shown on the drawings. Units to be provided with ¼ inch male pipe plug in flange plate for installation of charging valve. Units to be Sporlan for refrigerant R-401A or approved equal.

E. Suction and liquid refrigerant piping shall be provided and installed. The refrigerant piping shall be run in an approved manner providing traps where necessary to maintain the proper gas velocities and to keep the system free of oil.

2.11 HOT WATER SPECIALTIES

A. Automatic (Preset) Balancing Valves

1. All finned radiation, convectors, cabinet unit heaters, unit heaters, coils and elsewhere as indicated, shall be provided on the return line from each unit with a balancing type valve equipped with readout taps to facilitate the connecting of a differential pressure meter. Valve body shall include a ball valve, flow control cartridge assembly, two (2) pressure/temperature plugs and inlet union. Valve bodies shall be line size.

2. Design

a. The GPM for the automatic flow control valves shall be factory set and shall automatically limit the rate of flow to within 5% of the specified amount.
b. For ½ inch to 2 inch sizes the flow cartridge shall be removable from the Y body housing without the use of special tools to provide access for regulator changeout, inspection and cleaning without breaking the main piping (Access shall be similar to that provided for removal of a Y-strainer screen).
c. True operating ranges of 2 - 32 psid or 5 - 60 psid are required. The design flow should be achieved at the minimum psi differential. A 50% safety factor applied to the lower operating range is not acceptable.
d. Each valve shall have two PIT ports.
e. All automatic flow control devices shall be supplied by a single source and certified flow tests, witnessed by a professional engineer, shall be available.
f. Provide factory product warranty of not less than five (5) years and free first year cartridge exchange.

3. Construction

   a. Internal wear surfaces of the valve cartridge shall be electroless nickel or stainless steel.
   b. Internal flow cartridge body shall have machined threads so the spring free height may be compensated for without the use of fixed shims. A crimped sheet metal design is not acceptable.

   c. Internal flow cartridge shall be permanently marked with the GPM and spring range.
   d. All valves shall be factory leak tested at 100 psi air under water.

4. Minimum ratings

   a. ½ inch through 2 inch pipe size: 400 PSIG at 250DF
   b. 2½ inch through 14 inch pipe size: 600 P516 at 250^{0}F

5. Flow Verification

   a. Where indicated on the plans, the differential pressure across the Automatic Flow Control Valve shall be measured for flow verification and to determine the amount of system over heading or under pumping.
   b. Flow shall be verified by measuring the differential pressure across the coil served or the wide open temperature control valve and calculating the flow using the coil or valve Cv.

6. Test Kit

   A differential pressure test kit shall be supplied to verify flow and measure overheading. The kit shall consist of a 4½ inch diaphragm gauge equipped with ten foot hoses and P/T adapters all housed in a vinyl case. Calibration shall be 0-35 PSID for 2-32 PSI spring range or 0 - 65 PSID for 5-60 PSI range.

7. Installation

   a. Install automatic flow control valves on the return lines of coils as indicated on the plans. Balancing valve on supply side is not acceptable.
   b. The standard ports and handles shall clear 1 inch thick insulation. Handle and port extensions are required for over 1 inch thick insulation.

8. Units shall be Flow Design "AutoFlow" or approved equal.

   a. Model ACM for ¾ inch sizes.
   b. Model AC for 1 inch to 2 inch sizes.
   c. Model WS for 2½ inch pipe sizes and larger. Ductile iron body suitable for mounting wafer style between standard 150# or 300# flanges. The long flange bolts and nuts shall be provided with each control valve.

B. Strainers

1. All finned radiation, convectors, cabinet unit heaters, unit heaters, coils and elsewhere as indicated, shall be provided on the supply line to each unit with a strainer equipped with ports to facilitate the connecting of a pressure gauge or thermometer and a hose end drain. Body shall include a ball valve and shall be line size.

2 Construction

a. 20 mesh stainless steel strainer, removable without breaking the main piping.
b. Ball valve shall have Teflon packing, brass packing nut, blowout-proof stem, large diameter plated ball and a handle with vinyl grip.
c. An integral union shall be provided on the discharge end of the strainer and shall incorporate an EPDM O-ring and tailpiece. Unions shall be available in both male & female threaded and sweat configurations.
d. Units shall be rated for 400 psig at 250°F.

3. Strainers shall be mounted upstream of ATC control valves (see typical piping diagrams on drawings).

4. Units shall be by Flow Design or approved equal.

a. Model YCM for ½ inch and ¾ inch sizes.
b. Model YC for 1 inch to 2 inch sizes.

C. Strainers (Mains)

Provide and install line size "Y" type strainers on heating mains where shown on drawings.

Units 2 inches and smaller to be bronze construction with SS 304 screen, 250 psig at 400°F. Spirax Sarco model BT for threaded pipe and model TBT for sweat connections or approved equal.

Units 2½ inches to 8 inches in size to be cast iron construction with SS 304 screen, 125 psig at 450°F. Spirax Sarco model CI-125 for flanged pipe connections or approved equal.

D. Drains

Each downfeed radiator, convector, cabinet unit heater, unit heater and coil shall be provided with a drain valve between the shut-off valves and heating equipment at the lowest point in the piping. All low points in piping mains shall be provided with drain valves. Drain valves shall be ball valves as specified under VALVES with hose connections and metal caps.

E. Radiator Valves

All radiation shall be provided with ball valve for 125 psig at 250°F. as specified under valves.

F. Air Vents

1. Air vents shall be installed at the equipment, all high points in the piping as indicated on the plans or as may be required.

2. Automatic air vents shall be Taco 409 brass vent with ¾ inch I.D. flexible tube drain. Units by Anderson, Armstrong (No. 1-AV) or Sarco will also be considered. Pet cocks shall be installed with each unit and the drains from the vents shall be run as indicated on the plans. An air chamber shall be installed at each air vent on piping 2 inches and larger piping. Do not use on glycol systems, use manual vents only.

3. Manual air vents shall consist of air chamber with a Dole No. 14A Coin Valve with copper tube extension. Install valve in accessible location.

4. By-pass type vents shall be installed where shown and as detailed on the drawings. By-pass valves shall be plug-type globe as specified under VALVES.

G. Expansion Tanks

Furnish and install vertical pressurized replaceable bladder type water expansion tanks charged to pressures shown on the drawing M12. Tanks shall be constructed of steel for 125 psi working pressure in accordance with ASME Code, and have the necessary tappings for water connections and charging valve. Tanks shall be furnished with ASME stamp and certification papers. A copy of ASME certification shall be provided with equipment submittal.

1. Tank for heating system shall be installed with a manual shut-off valve between the tank and the system and a union between the tank and the valve.

2. Tank for heating system shall be Taco CBX series.

3. Tank for snow melt system shall be HTX Series by Flexcon Industries. See part 4, "ALTERNATES".

4. Units by Bell & Gossett or Wood will be considered. Capacities shall be as shown on drawings.

H. Backflow Preventer

Backflow preventer shall be furnished under division 15400, "PLUMBING".

I. Water Pressure Reducing Valve

Furnish and install a pressure reducing valve with brass body construction and built-in strainer in the cold water piping connected to hot water heating system as shown on the drawings. The valve shall be adjustable and be No. 335, as manufactured by Taco. Units by Bell & Gossett and Watts will be considered. Provide pressure relief valve with operating pressure 100% over system pressure, but not exceeding 100 psi.

J. Sight Flow Monitor

1. Furnish and install straight pattern sight flow monitors where shown on drawings. Units shall provide a visual indication of GPM flow.

2. Units shall be constructed of brass with a pressure rating of 3500 psi for liquid applications and a temperature rating of 240°F.

3. Materials shall include:

   a. Brass casing, end ports and tapered shaft.
   b. Buna-N seals
   c. PTFE coated Alnico magnet
   d. Type 304 stainless steel floating orifice disk
   e. Type 316 stainless steel spring
   f. Type 304 stainless steel pilot disk
   g. Type 316 stainless steel retainer ring
   h. Clear lexan window tube

4. Features shall include:

   a. Unrestricted mounting (horizontal, vertical or inverted)
   b. Measuring accuracy of plus/minus 2.5% of full scale in the center third of the measuring range and a plus/minus 4.0% of full scale accuracy over the entire flow measuring range.
   c. 1 to 15 GPM flow range
   d. Five year warranty.

5. Units shall be line size.

6. Model EFI Inflo Flow Rate Monitors, Basic Style B by Ernst Flow Industries or approved equal.

K. Flow Measuring Station

1. Provide and install flow measuring stations where show on drawings.

2. Units shall be welded, flanged or grooved into the main piping.

3. Units shall be ASTM A-120 carbon steel and shall include test ports for attachment of a flow measuring device. Maximum working pressure shall be 400 psig at a maximum temperature of 250°F. for welded or grooved application and 240 psig at a maximum temperature of 250°F. for flanged application.

4. Units shall be line size (2 inches minimum).

5. Units shall be FlowSet model VW, VG or VF by Flow Design, Inc. or approved equal.

L. Flow Control Valve

Furnish and install flow control valve with line size cast iron body and threaded ends on the discharge of pumps P4, P5 and P8. Working parts shall be easily removable for inspection and cleaning without removing valve body from the pipeline. Taco Model "Flo-Chek" or approved equal by Bell & Gossett.

M. Air Scoop

Furnish and install in-line air scoop on the inlet side of pump P8 as shown on drawings. Taco product No. 432, Bell & Gossett Model IAS or approved equal.

N. Pressure Gauges

Furnish and install pressure gauges with gauge cocks on piping where shown on drawings. Tubing to pressure gauges shall be of sufficient length to extend beyond pipe insulation and still leave enough space to easily operate the gauge cock. The dial range shall be such that the normal pressure shall be approximately midway of the dial. Gauges shall be Weiss Series 4CTS with 4½ inch dial size, stainless steel or cast aluminum case, with brass "T" handle cocks. Provide steam siphons on steam pressure gauges and bronze pressure snubbers on water pressure gauges. Units by Ashcroft, Nurnburg & Trerice will be considered.

Pressure range: Water Systems 0-60 psi

O. Thermometers

Furnish and install where indicated on the drawings and in Part 3 - EXECUTION, analog dial type thermometers with stainless steel case, 4½ or 5 inch dial size, bimetal, universal angle type. No other style will be accepted. Thermometers shall be Weiss 5VBM series. Units by Ashcroft, Nurnburg & Trerice will be considered. Provide and install thermometer wells on supply and return branch piping to duct reheat coils (when present) and two thermometers in boxes for the Owner's use.

Temperature Range: Heating System… 30°F. - 240°F.

2.12 GLYCOL AND ACCESSORIES (SEE PART 4, "ALTERNATES")

Glycol: Inhibited, nonflammable propylene glycol, low toxicity with density 8.65 lbs. per gallon and reserve alkalinity of 11 - 12. Provide a 50% (by volume) concentration of glycol in the snow melt system. Glycol shall be Proco 1000 by Chute Chemical Co. of Bangor, Maine, Safe-T-Therm by Houghton Chemical Corp. of Allston, Ma. (http://www.houghton.com) or approved equal. The approximate system volume is 24 gallons.

2.13 DOMESTIC HOT WATER STORAGE TANK AND HEATER

A. Storage Water Heaters

Furnish and install hot water storage tank and heater complete with all accessories as shown on drawings.

B. Tanks

Tank shall have size and capacity indicated on drawings, installed in a vertical position and constructed of 316L stainless steel in accordance with the ASME Code for Unfired Pressure Vessels to withstand a working pressure of 150 psi. Tanks shall be provided with a heating element, aquastat control tapping, cold water inlet and drain, hot water outlet and T&P relief valve connection. The heating element in the tank shall consist of a 90/10 cupronickel coil. Storage tank shall be covered with a 2 inch thick closed cell foam insulation. Outer covering shall be heavy duty rigid plastic. The entire unit shall carry a manufacturer's lifetime warranty. All connections shall be standard I.P.S. threads. The tanks shall be the dimension as shown on drawings.

C. Relief Valve

ASME temperature and pressure relief valves shall be provided and installed on the domestic hot water outlet by section 15400, "PLUMBING"

D. Units to be Super-Stor Model SS or approved equal.

2.14 CIRCULATING PUMPS P1, P2, P3, P4, P6, P7 & P8 (SEE PART 4, "ALTERNATES")

A. Furnish and install hot water circulating pumps of the type, size and capacity shown on drawings. Pumps shall employ ECM technology and capable of being dead-headed with no adverse effects. Wilo Stratos or approved equal.

B. Pumps shall be Wet rotor, glandless inline circulating pumps and shall include electronic variable speed control to operate at constant/variable differential pressure control without external sensors. Pumps must be capable of being dead headed with no damage to the pump or motor.

C. Materials and Construction

1. Circulating pumps shall be constructed with Cast-Iron bodies with factory applied Catephoresic coating.
2. Shafts shall be constructed of high quality stainless steel. Motor bearings shall be metal impregnated carbon sleeve bearing type. Impellers will be constructed of a high strength, glass filled polypropylene engineered composite.

D. Pumps shall include the following features:

1. Integrated synchronous motors using ECM technology with permanent magnetic rotors, sensorless control electronics and single phase electronic converters.
2. Infra-red (IR) interface for wireless communication and an infra-red monitor.
3. Integrated overload motor protection.

4. Fault contact "FC" terminals shall be included in the terminal box and are to be potentially free, normally closed contacts that open on the event of a failure.
5. Interface (IF) modules shall be included, installed in the terminal box (Pumps P6 and P7 only). Modules shall permit dual pump communication and pump operation status.
6. Internal programming to regulate pump on/off operation based on outdoor temperature.
7. Internal programming to regulate pump speed in response to changes in system pressure.
8. Internal programming to provide lead/lag operation for pumps P6 and P7. Provide interface wiring between pumps.

E. Pumps shall have a terminal box with NPT electrical connections and a secure, gasketed cover, Class 2 protection level. Include on the face of the terminal box cover a single adjustment button, front readable graphical pump display, field adjustable for horizontal or vertical positioning of the terminal box. The display shall indicate:

1. Operation status
2. Control mode
3. Differential pressure or speed/setpoint
4. Fault and warning signals

F. Pumps shall have a coded terminal strip indicating common/neutral/ground within the terminal box for field connections for single phase 230 volt, 60 Hz power.

G. Electrical

1. Motor shall be a minimum of class H winding insulation as defined by UL 778.
2. Voltage variances shall be less than +/- 10% from rated voltage with pump under load conditions. Maximum amperage not to be exceeded is indicated on the pump nameplate. Electrical power to the pump is confirmed when the face of the graphic display is lit.

H. Startup and adjustment

Manufacturer shall provide a factory authorized mechanic to provide startup services for the pumps. Startup shall include (but not be limited to):

1. Adjustment of required pressure settings.
2. Verification that the ATC system is able to communicate with the pumps for start/stop and alarming features as required by the ATC system.
3. Verification that pumps P6 and P7 are communicating with each other and that the lead-lag sequencing is operating properly.

2.15 CIRCULATING PUMP P5 (SEE PART 4, "ALTERNATES")

A. Furnish and install a hot water circulating pump of the type, size and capacity shown on drawings. Pump shall employ ECM technology and capable of being dead-headed with no adverse effects. Wilo Stratos ECO or approved equal.

B. Pump shall be Wet rotor, glandless inline circulating pump and shall include an electronic module capable of maintaining the pump generated differential pressure variable at a preset value of between 1 and 16 feet. Pump must be capable of being dead headed with no damage to the pump or motor.

C. Pump shall be a maintenance free, self venting, system lubricated type specifically designed for quiet operation with a horizontal motor mounted directly to the pump volute.

D. Pump volute shall be constructed of cast iron, rated at 145 PSI working pressure. Temperature range for shall be from 60° to 230°F, based on maximum ambient temperatures of 104°F.

E. Impeller shall be constructed of engineered composite polypropylene. Shaft shall be made of hardened stainless steel and sleeve bearings made of metal impregnated carbon. Rotor can and rotor cladding shall be constructed of high quality stainless steel. Water lubricated sleeve bearings to be constricted of metal impregnated carbon. Pump shall not incorporate the use of couplings or mechanical seals of any kind.

F. The integral motor shall be non-overloading at any point of the curve, include thermal overload protection and rated for continuous duty operating on 120 volt, 1 phase, 60 hertz alternating current.

G. Pumps shall be a manually selectable, two speed design regardless of voltage.

H. Pumps shall be UL and ULC approved.

2.16 HEAT EXCHANGER (SEE PART 4, "ALTERNATES")

A. Furnish and install where shown on the drawings a brazed water to water heat exchanger. Size and capacity shall be as indicated on the drawings. Unit shall have carbon steel heads, 316L stainless steel plates, copper braze material, male pipe thread connections and cross flow pattern. Unit shall be tested at not less than 450 psig at a maximum operating temperature of 350°F. All steel portions of the unit shall be epoxy painted by the manufacturer.

B. Unit shall be ASME certified.

C. Warranty shall be 18 months from date of manufacture or one year from date of installation, whichever is longer.

D. Unit shall be Model TFP by Taco or approved equal.

2.17 BOILERS

A. Furnish and install, where shown on the drawings, wall mounted natural gas fired condensing boilers of capacity scheduled on sheet M14. Units shall be completely assembled, modulating, sealed combustion, high efficiency with a stainless steel, fire tube heat exchanger.

B. General

1. Installation shall be according to manufacturer's installation instructions and all work shall be completed in a neat and workmanship like manner.
2. Boilers shall operate at a minimum Annual Fuel Utilization Efficiency of 95% and shall comply with the energy efficiency requirements of ASHRAE 90.1, latest edition and the minimum efficiency requirements of ASHRAE 103, latest edition.
3. AFUE efficiency shall be verified through a third party testing agency under the guidance of the Hydronics Institute Division of AHRI and listed in the AHRI Certification Directory.
4. Boilers shall be capable of full modulation, with a turn down of 4 to 1
5. Boilers shall be manufactured by an ISO 9001 registered company and shall bear the ASME "H" stamp according to Section IV of the ASME Boiler and Pressure Vessel Code. The stainless steel heat exchanger shall be hydrostatically pressure tested at the factory in accordance with ASME requirements. The maximum allowable working pressure shall be 30 psig water as listed on the rating plate. The heat exchanger shall be registered with the National Board and contain a registry number on the rating plate.
6. Boilers shall be ITS / ETL certified and listed to ANSI Z21.13/CSA 4.9 test standards for US and Canada.
7. Boilers shall meet or exceed the SCAQMD (South Coast Air Quality Management District of California) Low NOx emission requirement for 14 NG/J.
8. Boilers shall meet Department of Energy guidelines for Energy Star energy efficiency.

C. Construction

1. 439 stainless steel, fire tube heat exchanger of welded construction and shall not contain any banding materials, bolts, gaskets or O-rings in the construction.
2. Combustion chamber shall be sealed and located at the top of the heat exchanger which should be of a counterflow design and vertical to assure that sediment and any potential lime that may form will fall to the bottom away from the tube sheet.
3. Flue ways shall be of a vertical design that allows condensate to "wash down" the flue surface preventing potential combustion residue from adhering to the flue ways.
4. Boiler shall be supplied with a gas valve designed with negative pressure regulation.
5. The gas valve on the boiler shall operate with an inlet gas pressure of a minimum 5" w.c to a maximum of 13" w.c and shall be independent of the type of gas (natural or propane). If the inlet gas pressure exceeds the maximum allowable 13" w.c. a 100% lock-up type gas pressure regulator,

properly sized, must be installed in the gas supply piping and adjust as to prevent an inlet gas pressure in excess of 13" w.c.

6. The burner shall be a premix combustion type system, made with a burner head constructed of stainless material and able to provide a wide range of modulating firing rates.
7. Boiler shall be equipped with a variable speed blower system to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency.
8. Boilers shall be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides.
9. Boiler controls shall have an electronic display for boiler set-up, boiler status and boiler diagnostics.

D. Controls and Trim

All electrical components shall be of the highest quality manufacture and bear a UL or UL recognized label. Supply voltage shall be 120 volt / 60 hertz / single phase. ATC Contractor shall be responsible to install external control devices and wiring and adjust control sequences as specified. Boiler manufacturer shall provide qualified personnel to assist the ATC Contractor and Commissioning Agent and verify interlocks between boiler controls and building controls are installed and functioning properly and control sequences are properly adjusted.

Boiler shall be furnished with controls and boiler trim that provides:

1. High limit temperature control for a maximum of 200°F
2. Operating temperature limit of 60°F to 194°F
3. Pressure gauge dial that is clearly marked and easy to read.
4. ASME certified pressure relief valve, set to relieve at 40 psig.
5. Flue gas, outlet water temperature and return water temperature sensors
6. Low water protection
7. Built-in freeze protection
8. Outdoor sensor to provide Outdoor Reset Control
9. Domestic priority with ability to reset the boiler operating temperature
10. Allows a 0-10 VDC input signal to allow external BMS control
11. Venting and Combustion Air

Manufacturer shall provide factory authorized personnel to program and commission the boilers. Programmer shall work closely with the ATC contractor and Commissioning agent to ensure all interlocks with pumps and other external devices are in place and functioning as required.

Boiler programming shall include reset water sequences. See par. 2.35, "AUTOMATIC TEMPERATURE CONTROL (ATC)" for additional information.

Program boilers with a lead/lad sequence, switching each from lead boiler to lag boiler every 24 hours. Lead boiler shall cycle to maintain discharge temperature as required by the reset water schedule. When boiler capacity reaches 70% the lag boiler shall be

activated to share the load equally with the lead boiler. As the load increases both boilers shall modulate together to meet the demand. When the load falls below 35% of each boiler's capacity the lag boiler shall be deactivated and the lead boiler shall modulate alone to meet demand.

Installer shall be required to provide not less than one (1) hour of training to the Owner in the functions and controls of the boilers. This shall be separate from ATC system training.

E. Warranty

1. The boiler heat exchanger shall carry a ten (10) year limited warranty.
2. The parts used in the assembly of the boiler shall carry a one (1) year warranty.

F. Unit shall be a Triangle Tube Prestige SOLO series, Rinnai or approved equal.

2.18 GAS VENT SYSTEM

A. Furnish and install as indicated on drawings, a schedule 40 PVC gas vent system complete with all required supports, braces, stiffeners, hangers and roof flashing devices on the outside.

B. Vent system shall be installed in strict accordance with the boiler manufacturer's venting instructions and must comply with all applicable NFPA 54, ANSI Z223.1 and local codes and ordinances.

2.19 FINNED RADIATION

A. Provide and install finned pipe radiation as indicated. Radiation shall consist of ¾ inch copper pipe with 2¾ inch x 2½ inch x 0.011 inch aluminum fins, 55 per foot. Each radiator shall have the finned length, number of tiers (or rows) and heating surface indicated on the drawings.

B. Covers shall be 18 gauge steel with dampered top outlet, supported by a full 22 gauge (min) factory painted back plate screwed into wall studs (2 screws per stud). Elements shall be supported by approved slide cradle hangers and universal brackets spaced a maximum of 48 inches on center. Provide return line hangers where shown on drawings. Covers shall have baked enamel finish in standard factory color.

C. Unless shown differently on the drawings, the covers shall be a minimum of 18 inches longer than the finned length. End covers or wall sleeve and wall sleeve supports shall be provided for each end of the cover.

D. All ratings shown on the drawings are based on 150°F. average water temperature with a 20°F. temperature drop and 1.0 GPM (500#/hr) flow.

E. Sterling Senior. Equivalent units by Rittling and Vulcan will be considered.

2.20 CONVECTORS

A. Convectors of the size and types listed on the drawings shall be provided and installed. They shall have removable front panels. Backs and end enclosures of the cabinets shall be constructed of not less than 20 gauge steel. Fronts and tops shall be of not less than 18 gauge steel, if less than 48 inches long and 16 gauge if 48 inches or longer. Elements shall consist of round seamless copper tubes, non-ferrous fins securely fastened to the tubing, taps at each end for venting on up-feed units and drains on down-feed units, with ratings as shown on the drawings. Cabinets shall have baked enamel finish in color to be selected by Engineer. Provide not less than two (2) color chip cards with submittals (photocopies not acceptable). Ratings shown on the drawings are based on 150°F. average water temperature with a 20°F. temperature drop and inlet grilles (where present).

B. The following types are based on Sterling to establish a standard:

1. Fully recessed with front outlet and inlet grilles, four side overlapping front cover; Type FWG-A.

2. All units shall be firmly fastened to the walls.

C. Equivalent units by Rittling and Vulcan will be considered.

2.21 RADIANT SNOW MELT SYSTEM (SEE PART 4, "ALTERNATES")

A. General

1. Provide and install a radiant snow melt system where shown. System shall consist of flexible hydronic radiant tubing anchored to wire mesh and embedded in a sand sub-base for brick pavers and a surface mounted manifold assembly. Entire system shall be a product of one manufacturer and shall be installed by the manufacturer of the system or an installer authorized by the manufacturer.

2. The scope of work covered by these specifications includes the furnishing of labor, materials, equipment, testing, startup and owner walk through and instruction to make the heating systems indicated complete.

3. Contractor shall have a minimum of three years experience in radiant heating systems installation.

4. System design and layout shall be as shown on drawings. The radiant snow melt system shall be installed using tubing tied to wire mesh. Staples or any other means of anchoring the tubing is prohibited. Mechanical contractor must coordinate work with Site Contractor to provide wire mesh for tube installation. Should the radiant heat supplier and/or installer request any deviation from the design and layout shown on the drawings, the shop drawings must include detailed layout drawings generated by the supplier and/or installer.

5. Specification and plans are based on Wirsbo Systems to establish a standard of quality. Approved equals by Rahau Hydronic Systems, Stadler Corporation & Watts Radiant will be considered. Others must provide samples, references and qualifications with submittals for review.

6. System shall be complete and shall include system design, PEX tubing, wire ties, tubing 90° bend supports, manifolds, manifold support bracket assembly, manifold angle valves assembly, hePEX connection fittings, thermometers, air elimination devices, loop balancing valves and all other necessary valves, fittings, piping, and additional components required to complete the system installation.

B. Products

1. Loop Tubing

Radiant tubing shall be as outlined in par. 2.09, "POLYETHYLENE HEATING HOT WATER PIPING".

2. Manifolds

Manifolds shall be brass only, made up of Wirsbo 4 loop dezincification resistant manifolds to supply the number of loops required. The manifold assemblies shall include special compression couplings for Wirsbo PEX tubing, Blank end caps for supply manifolds and end caps with purge valve for return manifolds, and brass angle valve assembly for supply and return connections.

Each zone shall have a balancing valve mounted on the return manifold. Valves shall be a product of the snow melt system manufacturer.

Each zone shall have a shut off valve mounted on the supply manifold. Valves shall be a product of the snow melt system manufacturer.

Each manifold shall include a thermometer.

3. Thermometers

Hydronic Radiant Heating System Thermometers shall be Letro SL-2DW dial-faced with 2 inch brass sweat-wells. Letro thermometers to be installed adjacent to each other in a horizontal position in the supply and return lines on the secondary side of the mixing valve, allowing full inspection.

C. Installation

1. HePEX tubing to be installed as per manufacturers recommendations as outlined in the Wirsbo Installation Guide for snow melt systems, and in accordance with the layout and floor section detail on plan. Note hePEX tubing to be stored shielded from direct sunlight. Tubing must not be taped with adhesive tapes. Each loop shall be joint-free except where they connect to the manifolds.

2. The manifolds are to be assembled as outlined in the manufacturer's installation guide, with mounting brackets and end caps provided. Loop risers are to be made in a neat manner in a straight line and close packed to protect from damage. Loop numbers are to be clearly marked on manifolds with magic marker.

3. A pressure test shall be made on all concealed tubing and manifolds of distribution systems with 60psi air pressure prior to and during placement of the cement, and pressure shall be maintained for inspection by tradespersons as construction is completed.

4. Notification of all trades is to be coordinated with general contractor that a radiant floor system is installed and no nailing or drilling of floor shall be allowed without verification of tubing locations.

5. Tubing splices shall not be allowed except to repair puncture made during or after installation. If made, repair splice location must be carefully marked on layout and made a permanent record of installation provided to owner.

6. Clear access must be available to inspect all above ground piping.

D. Record Keeping and Notification of Changes

1. Installed layouts must be photographed before concealment. Photographs shall be properly identified as to their location, date photograph was taken and provided to the owner as a permanent record of installation.

2. A schedule of loop lengths actually installed shall be returned to the system supplier on coil cutting schedule provided.

3. Deviations from design layout. Installer shall notify designer if changes in construction, wall location, or loop layout result in loop lengths shorter than designed by 10% or more. Any changes from design shall be drawn on CAD to indicate actual loop layout and an "as installed" copy provided to supplier and for owners manual. CAD base drawings for such purposes may be available from the Architect or Engineer via disk or e-mail. Please specify CAD format. See par. 1.12, "ELECTRONIC DRAWINGS AND FILE SHARING" for additional information.

4. Deviations in sidewalk construction or materials other than those planned for shall be reported immediately to designer, as these may effect heating capacity or control plan.

E. Instructions

1. On completion of the project, instruct the owner in the floor heat system operation.

2. Provide two copies of the Owner's Operating and Maintenance Manual, bound in a three ring binder, including all component information sheets, clean copies of installation diagrams and layouts with as installed markings, and pictures of each floor area prior to enclosure.

2.22 DUCT REHEAT COIL

A. General

Furnish and install where indicated a duct mounted water heating coil, size and capacity as indicated on drawings. Coil shall be non-drainable, serpentine type, 1 or 2 rows, with same end piping connections.

B. Tube and Fins

Tubes shall be round, seamless copper tubing brazed into intruder header tube holes using copper brazing alloys, tested at 315 lbs and guaranteed for 250 psig working pressure. Tubes shall be staggered in the direction of air flow. Fins shall be rippled aluminum with full drawn collars to provide a continuous surface cover over the entire tube. The use of internal restrictive devices to obtain turbulent flow will not be allowed since they prevent complete drainage of the coil.

C. Mounting

Coil shall incorporate a slip flange casing for mounting in ductwork.

D. Coil shall be Trane Type ST. Units by Carrier, McQuay, USA Coil or York will be considered.

2.23 CABINET UNIT HEATERS 1 AND 2

A. Cabinet unit heaters shall be provided and installed where shown and fastened securely. The units shall be mounted as indicated on the drawings.

B. Units shall be cabinet style fan convectors with heavy gauge zinc coated painted steel cabinets, direct driven centrifugal fans and front mounted controls. Bearings shall be ball bearing type. Units shall include a low temperature aquastat on the supply pipe to the coil set at 90°F. Myson Hi-Line RC or approved equal.

C. Shut-off valves, strainer, control valve, balancing valve and drain with metal cap shall be provided for each unit.

2.24 CABINET UNIT HEATERS 3 AND 4

A. Cabinet unit heaters shall be provided and installed where shown and fastened securely. The units shall be mounted as indicated on the drawings and shall include multi-blade centrifugal fans with quiet operating three (3) speed high efficiency direct drive motor, insulated casing, coils of copper tubes with aluminum fins, tamper proof access door to motor control switch. Capacities indicated on drawings to be based on 180°F. inlet water with a 20°F. drop.

B. All units shall be provided with 3 speed fan switch and unit mounted disconnect switch with thermal overload protection, all factory installed and wired.

C. Cabinets shall be 18-gauge steel with exposed corners and edges rounded, easily removed

access panels. Finish shall be factory applied baked enamel in color as selected by Architect on visible surfaces of enclosure or cabinet. Provide two (2) color chip cards with submittals (photocopies not acceptable).

D. Cabinet insulation shall be 2 inch thick dual density bonded glass fiber. Exposed side shall be high density erosion proof material suitable for use in airstreams up to 4500 FPM.

E. Coils shall be evenly spaced aluminum fins mechanically bonded to copper tubes, designed for 200 psi and 220 degrees F.

F. Provide two (2) sets of 1 inch *pleated media* throwaway type filters for each unit as specified under paragraph 2.31, "FILTERS". One set to be provided WITH each unit from the manufacturer to be used during construction and the other set installed when project is completed.

G. Units shall be vertical surface mounted, Trane Cabinet Unit Heater Type FFMB inverted air flow. Remote thermostat and strap-on aquastat provided by ATC Contractor. Approved equals by American Air Filter, McQuay or Sterling will be considered.

H. Control valve, shut-off valve, balancing valve, drain valve with metal cap and air vent shall be provided on each unit.

2.25 HORIZONTAL UNIT HEATERS

A. Furnish and install hot water type horizontal propeller unit heaters as shown. Motors shall be totally enclosed and provided with overload protection and factory wired service disconnect switch.

B. Units shall have coils with copper tubes and aluminum fins. Supply connections shall be in at the rear bottom and return out the rear top.

C. Provide double directional louvers on each. Remote heavy duty line voltage electric thermostat and strap-on aquastat provided by ATC Contractor.

D. Control valve, shut -off valve, balancing valve and drain with metal cap shall be provided with each unit.

E. Units shall be manufactured by Trane. Units by American Air Filter, McQuay or Sterling will be considered.

2.26 CENTRAL DEHUMIDIFICATION SYSTEMS

A. Provide and install variable refrigerant flow, split system, central dehumidification systems where indicated on drawings. All components and controls must be of the same manufacturer and intended to function together as a unified system. Capacities shall be as scheduled on sheet M14. The installing contractor must be certified by the equipment manufacturer to properly install the system as specified and be able to provide evidence of certification if requested.

B. The system (outdoor unit and air handling units) and equipment described herein are based on a Mitsubishi City-Multi system consisting of PKFY series indoor (air handling) units, PUHY outdoor (Compressor/Condenser) unit and M-NET DDC (Direct Digital Controls).

The outdoor Compressor/Condenser unit shall be a vertical discharge, 208/230 volt, three phase. Equivalent equipment meeting the features and performance requirements of this equipment will be considered.

C. Units shall be listed by Electrical Laboratories (ETL) and bear the ETL label. All wiring shall be in accordance with the National Electrical Code (N.E.C.). Units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

A full charge of R-410A for the condensing unit only shall be provided in the condensing unit.

Provide a full diagrammatic drawing of the dehumidification system showing all components (including equipment tags), refrigerant piping (including lengths and sizes) and control wiring with the shop drawings.

D. Outdoor (Compressor/Condenser) Unit

1. The outdoor unit shall be intended specifically for use with other system components. It shall have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Unit shall be run tested at the factory.

2. The PUHY outdoor unit shall consist of one unit, factory piped to a single field piping connection and factory wired to a single point field power connection. It shall be equipped with multiple circuit boards that interface to the Mitsubishi M-NET control system and shall perform all functions necessary for operation.

3. Unit electrical power shall be 208/230 volts, 3-phase, 60 hertz and shall be capable of satisfactory operation within voltage limits of 187-228 volts.

E. Air Handling Units

1. Units shall be models PKFY-P__NBMU-E, PKFY-P__NHMU-E and PKFY-P__NKMU-E, high-performance indoor fan coil for wall mounting and shall have a modulating linear expansion device. The PKFY shall support individual control using M-NET DDC controllers.

2. Units shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. Units shall have a self-diagnostic function and an auto restart function. Air handling units and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

3. Coil

a. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
b. The tubing shall have inner grooves for high efficiency heat exchange.
c. All tube joints shall be brazed with phos-copper or silver alloy.
d. The coils shall be pressure tested at the factory.
e. A condensate pan and drain shall be provided under the coil.
f. Each unit shall include a condensate lift mechanism that will be able to raise drain water not less than 12 inches above the condensate pan.
g. Both refrigerant lines to the PKFY indoor units shall be insulated.

4. Electrical

a. Unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
b. System shall be capable of satisfactory operation within voltage limits of 187-228.

5. Controls:

a. Air handling units shall cycle in response to their own electronic wall mounted thermostats. Controls shall be a product of this manufacturer and installed by the ATC Contractor.
b. In the dehumidification mode the air handler fans shall cycle on demand for cooling and signal the outdoor unit to activate. There shall be no heating associated with this system.

F. Warranty

All units shall be covered by the manufacturer's limited warranty for a period of one (1) year from date of installation. In addition the compressors shall have a manufacturer's limited warranty for a period of six (6) years from date of installation.

If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty shall not include labor.

2.27 HEAT RECOVERY UNIT

A. Provide and install a rooftop, curb mounted air to air heat recovery unit as shown on drawings. Capacities shall be as scheduled on drawings.

B. Unit shall be listed per ANSI/UL 1995, Heating and Cooling Equipment. Energy transfer ratings of the energy recovery wheel shall be ARI Certified. Unit shall bear the AMCA Certified Rating Seals for Air Performance. Performance shall be as scheduled on plans. Exhaust discharge and outside air intake shall not be located on the same side of unit casing.

C. Standard casing panels shall be 20 gauge galvanized steel, lined with not less than 1 inch thick fiberglass insulation with Foil-Scrim-Kraft facing. Housings shall be supported by a formed structural base forming a pan to ensure weather tight construction. Lifting holes

shall be provided at the unit base. Units shall have a weatherproof sheet metal roof. The outdoor air intake opening shall be protected by a galvanized steel sheet metal weather hood, moisture eliminators, and include an automatic shutoff damper with electric operator and time delay relay to give the damper an opportunity to open prior to the fan starting. The exhaust air discharge shall be covered with a gravity back draft damper and weather hood. The exterior of the unit shall be coated with an epoxy primer and a polyurethane enamel painting system for added protection. Painting system shall be rated to meet a 1500-hour salt spray test.

D. Access to components shall be provided through a large, tightly sealed and easily removable access panel. Access panels shall be constructed of the same materials as the unit casing. The wheel cassette shall be easily removable from the unit. The roof of the unit shall also be removable for access.

E. The supply air and exhaust air from the building shall be oriented for a vertical inlet and discharge.

F. Fans shall be double width double inlet design with forward curve type wheels. The blades shall be designed for maximum efficiency and quiet operation. Impellers shall be statically and dynamically balanced.

For belt driven fans V-belt drives shall be sized for a minimum 150% of driven horsepower. Sheaves shall be adjustable on fans with motors less than 10 HP to allow independent balancing of exhaust and supply airflows. Pulleys shall be of the fully machined cast type, keyed and securely attached to the fan wheel and motor shafts. Optional speed controllers on direct-drive fans shall allow independent balancing of exhaust and supply airflows.

Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds.

Motors shall be standard NEMA frame, energy efficient, complying with EPACT standards, for single speed ODP enclosures. Motors shall be permanently lubricated, heavy-duty type, matched to the fan load and furnished at the specified voltage and phase with thermal overload protection. Where 3-phase is indicated motors shall be VFD rated.

Fans and motors shall be mounted to a unit base with neoprene isolators as standard. Belt drive motors shall be factory mounted to an adjustable motor plate having two heavy-duty adjusting bolts for alignment and belt tension.

G. The rotor (energy wheel) shall be made of either a light weight polymer media in a stainless steel rotor or an aluminum media, coated to prohibit corrosion in a galvanized steel rotor. All surfaces shall be permanently bonded with a desiccant for both sensible and latent recovery and be designed to insure a laminar flow. Wheels with sprayed on desiccant coatings are not acceptable. The energy recovery wheel shall transfer moisture entirely in the vapor phase. Efficiencies shall match performance as scheduled, transfer ratings must be ARI certified to standard 1060 and bear the ARI certification symbol for ARI Air-to-Air Energy Recovery Equipment Certification Program based on ARI 1060. Ratings "in accordance with 1060" without certification are not acceptable. The media shall be cleanable with low temperature steam, hot water or light detergent, without

degrading the latent recovery. Wheel media shall be independently tested and shown to conform to the requirements of NFPA-90A, documenting a flame spread of less than 25 and a smoke generation rating of less than 50.

H. The rotor cassette shall be easily removable from the unit to facilitate rigging (if necessary) and ease of service. The wheel cassette design shall use pillow block bearings for long life. For rotors thicker than 3" an adjustable purge sector shall be included in the cassette.

I. Filters shall be not less than 1 inch thick permanent aluminum washable type mounted in the outside air hood and in the return air plenum. The filters shall be listed by Underwriters' Laboratories as Class 2.

J. Unit shall be equipped with a rotation sensor and controller such that should the energy recovery wheel not rotate during a signaled run period, the controller shall send a 24 volt AC signal suitable for operating a relay to be used as an alarm contact. In addition, this controller shall be equipped with an outdoor air temperature and discharge temperature sensors such that the energy recovery wheel can be modulated via a (VFD) during moderate temperature periods if desired.

K. Unit shall require a single point 60-cycle power connection. See equipment schedule on sheet M14 for voltage and phase requirements. The electrical panel shall consist of individual motor contactors, short circuit and overload protection, disconnect switch (for pre-heaters) and control power transformer. The NEMA 3R electrical panel shall be mounted on the unit exterior for ease of access or be a factory integral panel to the unit. A factory installed and wired 120 volt convenience outlet shall be provided inside the panel. Unit shall be ETL listed and labeled.

L. Manufacturer shall provide variable frequency drives (VFD's) for each fan. Division 16 shall mount each in the ceiling space below the unit and wire from unit controls to fans. Drives shall be for balancing purposes only.

M. Manufacturer shall warrant to Owner that for a period of not less than eighteen (18) months from the date of shipment the goods to be delivered to Owner will in all material respects be free from defects in material and workmanship when used in a proper and normal manner. Should any failure to conform to the above appear within eighteen months after the date of shipment, manufacturer agrees upon prompt notification thereof during the Warranty Period and confirmation to manufacturer's satisfaction that the goods have been stored, installed, operated and maintained properly and in accordance with standard industry practice, to correct the non-conformity at manufacturer's option either by repairing any defective part or parts or by making available at manufacturer's plant a repaired or replacement part.

Manufacturer shall warrant to the Owner for a period of not less than 60 months that the wheel contained in the energy recovery unit in all material respects to be free from defects in material and workmanship when used in a proper and normal manner. For warranty purposes the wheel includes, media, desiccant coating, wheel hub, wheel rim and spokes.

N. Provide a remote control panel for unit. Panel shall be located in Mechanical 08 adjacent to the ATC panel. Panel shall contain:

1. A contactor to permit start/stop operation with a signal from the building ATC system
2. Rotation detection
3. On-Off-Auto switch
4. Wheel Frost Protection

O. Provide factory authorized start-up and Owner training by a factory authorized representative.

P. Submittals must include performance data which incorporates total unit energy consumption (fan power, wheel operation, energy recovery, etc.) vs. energy savings.

Q. Unit shall be provided with factory insulated curb not less than 14 inches high. Contractor shall fill the curb with fiberglass batt insulation for added thermal and sound protection.

R. Unit shall be Semco FV series for vertical ducting. Equivalent units meeting the requirements of this specification will be considered but request for consideration must be made prior to bidding.

2.28 FANS

A. General

1. Fans with capacity and types shown on the drawings shall be provided and installed. In order to establish a standard, fan model numbers indicated below are based on Cook (unless noted otherwise) Equivalent units by Acme, Greenheck and Ilg ONLY will be considered.

2. Fan selection shall be based on sloping portion of curve with spare capacity of 20% of total CFM and static pressure without increasing motor size. **Provide full fan curves with submittals that shown the entire operating range of the fan - not just the operating point. Fans that are submitted without this data will not be accepted.**

3. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance and shall be listed by the Canadian Standards Association Testing Laboratory (CSA). Sones indicated on drawings are AMCA ratings and are the maximum allowable. HVI sound ratings are not acceptable. All three phase motors shall be quiet operating and high efficiency.

4. All fans shown with vibration isolators on drawings shall be provided with rubber-in-shear type unless otherwise indicated.

5. Motor operated dampers shall be furnished by ATC Contractor.

B. Types

1. EF-1 shall be Model XMWH series belt driven propeller fan.

Fan shall be manufactured at an ISO 9001 certified facility. Fan shall be listed by Underwriters Laboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. Motor shall be mounted on a heavy duty steel base. The propeller shall be of steel construction, statically and dynamically balanced. Wall panel and steel venturi shall be minimum 14 gauge with continuously welded corners. Unit shall bear an engraved aluminum nameplate and shall be shipped in ISTA certified transit tested packaging.

Bearings shall be regreasable, in a cast housing rated at 200,000 hours average life. Drives shall be adjustable pitch.

Motor shall be 208/3/60, premium efficiency.

Accessories shall include:

a. Motor side guard consisting of a 14 ga. steel frame, ½ inch x 1 inch x 16 ga. expanded metal screen with removable rear panel fastened with sheet metal screws at 6 inch centers around perimeter.
b. Epoxy powder finish throughout, including guard.

2. EF-2 and EF-3 shall be ceiling mounted, direct driven, centrifugal exhaust fan, GC Series. EF-2 shall be mounted in the ceiling and EF-3 shall be mounted below the ceiling.

Fans shall be manufactured at an ISO 9001 certified facility. Fans shall be listed by Underwriters Lboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

Housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on rubber-in-shear vibration isolators. Unit shall be supplied with integral wiring box and receptacle. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided. Units shall be shipped in ISTA certified transit tested packaging.

Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

Motors shall be open drip proof type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage and phase.

Accessories shall include:

a. Powder painted white steel grille
b. Fan speed controller, prewired, internally mounted.

3. SF-1 shall be in-line mounted, direct driven, centrifugal fan, GN Series. Unit shall be mounted below the ceiling.

Fans shall be manufactured at an ISO 9001 certified facility. Fans shall be listed by Underwriters Lboratories (UL 705) and UL listed for Canada (cUL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

Housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on rubber-in-shear vibration isolators. Unit shall be supplied with integral wiring box and receptacle. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different ceiling thickness, an adjustable prepunched mounting bracket shall be provided. Units shall be shipped in ISTA certified transit tested packaging.

Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans.*

Motors shall be open drip proof type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage and phase.

Accessories shall include:

a. In-line adapter plate
b. Fan speed controller, prewired, internally mounted.

4. SF-2 shall be a roof mounted, direct driven, hooded propeller fan, configured for supply air.

Fan shall be manufactured at an ISO 9001 certified facility and listed by Underwriters Laboratories (UL 705). Fan shall bear the AMCA certified ratings seal for sound and air performance.

Housing shall be aluminum, mounted on an insulated factory roof curb not less than 12 inches in height. Unit shall be supplied with integral wiring box and disconnect switch. Discharge position shall be downward.

Fan blade shall be an aluminum propeller balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

Motor shall be open drip proof type with permanently lubricated sealed bearings and built-in thermal overload protection. Motor shall be furnished at the specified voltage and phase.

Accessories shall include:

a. Insulated roof curb
b. Galvanized bird screen
c. Motorized damper with line voltage actuator
d. Solid state speed controller

Greenheck model AS-12-433-A4 or approved equal.

2.29 RANGE HOODS (RH)

Apartment kitchen range hoods shall be designed for under cabinet mounting, ducted operation. Hoods shall be provided from the factory with triple 4 pin PL 26 watt fluorescent lamps, 3 speed fan switch and separate light switch. Should the factory not provide lamps, they must be provided and installed by the Mechanical Contractor. Units to be 30 inches wide, 23 gauge cold rolled steel with baked-on white finish and washable aluminum mesh grease filter.

B. Units shall be Air King ESDQ Series or approved equal. Units shall be Energy Star compliant.

2.30 SHEETMETAL

A. General

The work under this section includes all the required sheetmetal and duct work, extensions for grilles, manual dampers, automatic counterbalanced (backdraft) dampers, deflectors, setting of control dampers, grilles, registers, diffusers, flexible connections, fire dampers, brick vents and louvers, as shown on the drawings or required to make the installation complete in accordance with the intent of the drawings and specifications.

B. Ducts

1. The size of ducts marked on the drawings will be adhered to as closely as possible. The right is reserved to vary duct sizes to accommodate structural conditions during the progress of the work without additional cost to the Owners. The duct layout is schematic to indicate size and general arrangement only. All ducts shall be arranged to adjust to "field conditions". The Sheet Metal Contractor shall coordinate his work with Division 16 and other trades.

2. Ducts shall be constructed of galvanized steel in accordance with the following table of duct sizes OR the latest SMACNA HVAC Duct Construction Standards for Metal and Flexible Duct unless otherwise shown on drawings.

Dimensions of Longest Side (inches)	Minimum Sheet Metal Gauge
Up thru 12	26
13 --> 30	24
31 --> 42	22
43 --> 60	20
61 --> inf.	18

Dryer exhaust: 0.050 inch Aluminum

3. Methods of fabrication and installation shall be in strict accordance with guidelines set forth in the latest SMACNA Guide and Data Book for Low and Medium Pressure Duct Construction unless otherwise shown on drawings. Cross break all ducts with largest dimension being 18 inches and larger. Beaded ducts are not acceptable except for ductwork less than 18 inches in either direction.

4. All dampers and deflectors shall be a minimum of #22 gauge and stiffened as required. Splitter dampers shall not be acceptable.

5. All joints in ducts shall be made air tight, and all branches and turns shall be made with long radius elbows and fittings. Long radius elbows are defined as having a centerline radius of 12 times the width of the duct. If long radius elbows are not used, elbows 18 inches wide and larger shall be provided with fixed double wall airfoil turning vanes designed to reduce the resistance of the elbow to the equivalent of a long radius elbow with a throat radius of not less than duct width. Square elbows less than 18 inches wide shall be provided with single wall turning vanes. Square elbows with outside corners cut at 45° or rounded are not acceptable.

6. All ducts shall be installed with necessary offsets, changes in cross sections, risers, and drops which may be required. They shall be constructed with approved joints and be supported in an approved manner.

7. Round ductwork shall be constructed in accordance with the latest SMACNA HVAC Duct Construction Standards for round and oval duct construction. Ductwork larger than 8 inches in diameter shall employ spiral seams. All turns shall be made with smooth (not segmented), long radius elbows and fittings. All seams shall be type RL-5, grooved seam pipe lock or better. *Lap seams are not permissible*. Gauge thicknesses shall be as outlined in SMACNA for galvanized steel round duct gauge selections for maximum 2 inches w.g. static pressure. Ductwork shall be supported with full wrap-around band and single hanger strap as indicated in Figure 4-4 of the 1985 edition of the SMACNA HVAC Duct Construction Standards handbook.

8. Furnish and install flexible connections on exhaust fans (where indicated), horizontal unit ventilators, horizontal cabinet unit heaters and all Mechanical units. Connections shall be made from Ventglas neoprene coated glass fabric as furnished by Ventfabrics, Inc., or approved equal.

9. Every precaution shall be taken to keep interior of duct system free from dirt and rubbish and to protect all ducts and equipment during construction. At completion, this Mechanical Contractor shall thoroughly clean all equipment to the satisfaction of the Architect.

10. Spaces between ducts and wall or floor construction shall be caulked to make smoke and water tight by this section. Sealant material shall be 3M brand fire barrier caulk CP25 or putty 303, Ciba-Geigy CS240 Firestop Sealant or approved equal.

11. Testing, Balancing and Leak Testing... See Part 3, EXECUTION

12. Requirements set forth in applicable codes (see part one) shall supercede SMACNA standards.

C. Grilles and Registers

Grilles and/or registers shall be installed at all air supply, relief, return and exhaust openings as shown. All units to be aluminum, except as noted, and provided with baked enamel finish to match color of grille or register and countersunk screw holes. Mounting screws shall be oval head type with head painted to match finish. Unless stated otherwise, the following list is based on model numbers of Anemostat to establish a standard of quality (if substituting, certified sound criteria shall be included with submittals indicating CFM and NC levels of each register and grille). Krueger, Metalaire, Titus and Price only will also be considered for review.

1. Supply Registers: Double deflection; X2HO with opposed blade damper and ¾ inch front blade spacing; front blades set horizontal.

2. Supply Grilles: Double deflection; X2H, ¾ inch blade spacing; front blades set horizontal.

3. Exhaust and Return Registers: X3HOD with opposed blade damper and 3/4 inch, 45° front blade spacing, front blades set horizontal.

4. Exhaust and Return Grilles: X3HD with ¾ inch, 45° front blade spacing, front blades set horizontal.

D. Louvers

1. All exterior louvers shall be extruded aluminum construction with interior bird screens and anodized finish in color to be selected by Architect. Provide not less than 2 *original* color chip cards with submittals for review (photocopies and e-mail copies are not acceptable). Frames and blades shall have not less than 55% minimum free area and no less than 0.081 inches thick. All louvers shall comply with Section 08400 of this specification. The following list is based on model numbers of Ruskin to establish a standard of quality; approved equal units by American Air Warming and Arrow are acceptable.

2. All louvers shall be stationary blade type. Units to be 6 inches deep with certified rating of zero water penetration at free area velocity of 900 FPM based on tests in accordance with AMCA Standard 500. Units 48 inches and less in width shall be Model ELF6375X. Units greater than 48 inches in width shall have drainable blades, Model ELF6375DX.

3. Frames of all louvers to be box type for mounting in masonry. Provide factory mounting flanges on head and side jambs with extended sill for units mounted in frame walls.

4. Louvers in doors shall be provided as a part of the door by the General Contractor.

E. Brick Vents

1. All brick vents to be extruded aluminum construction with inside bird screens and anodized finish in color to be selected by the Architect. Provide not less than 2 *original* color chip cards with submittals for review (photocopies and e-mail copies are not acceptable).

2. All units shall be 8 inches deep and modular in dimension to fit 4 inch standard brick sizes. Units shall be minimum 0.125 inch thick with integral water stop, weep holes and continuous drip edge. Units shall be structurally designed to eliminate need of wall lintels with ¼ inch ribs and full depth headers at 16 inch centers (minimum).

3. Units shall be BVC100 as manufactured by Ruskin or approved equal. Provide sample if substituting.

F. Wall caps shall be provided where indicated and shall include weather hoods extending to the bottom of the outlet. Units shall be 26 gauge (min) steel, primed for field painting and include a 0.020 inch damper with magnetic closure strips. Turn wall caps over to the General Contractor for finish painting prior to installation. All units for exhaust fans and range hoods shall be identical in appearance and shall be provided by Aldes Ventilation Corp. (http://www.americanaldes.com) 2000 Series or Artis Metals Company (http://www.artiscaps.com/exhaust.html). Wall caps provided with fans are not permissible unless they meet these design and construction standards.

G. Roof Vents

1. Furnish and install an aluminum roof curb mounted air vent hood where shown on drawings. Hood throat area shall be equal to size shown, and hood inlet shall be twice area of throat. Unit to be provided with aluminum birdscreen.

2. Unit shall include a 16 inch high insulated, self flashing curb.

3. Unit to be Skymaster Trimline Ventilator as manufactured by ACME Engineering and Manufacturing Company or approved equal.

H. Duct Sleeves

Provide aluminum duct sleeves through outside wall at all locations as shown on drawings.

I. Sealing of Ducts

All interior ductwork (except prefabricated grease ducts, welded duct and clothes dryer ducts) shall be sealed with low VOC water based duct mastic, either "MP" (Multi-Purpose), Hardcast "Iron-grip 601", Polymer Adhesive "Airseal #11", or United Duct Seal (United McGill Corp.) water base, latex or acrylic type sealant. All transverse joints to be continuously sealed. Note that, except as noted, oil or solvent based sealants are specifically prohibited for use on this project. Duct tape is prohibited except on clothes dryer ducts only, use Venture model 3520CW duct tape or approved equal. Ensure duct exterior is thoroughly cleaned prior to installing the tape. Use pop rivets in lieu of screws to fasten dryer duct fittings together.

For exterior applications, "Uni-Weather" (United McGill Corp.) neoprene based sealant shall be used. No other sealants may be used.

All seams and joints in shop and field fabricated ductwork shall be sealed by applying one layer of sealant, then immediately spanning the joint with a single layer of 3" wide open weave fiberglass tape. Sufficient additional sealant shall then be applied to completely imbed the cloth. All sealants shall be UL rated at no more than flame spread of 5 and smoke developed of 0. At contractor's option Hardcast 1602 sealant tape may be used in lap joints and flat seams.

J. Duct Access Doors

Hinged insulated access doors with seals shall be provided in ducts where indicated on drawings, or as required. Units shall be provided at each manual damper, motor operated damper, duct coil (both sides), duct mounted temperature control device and fire damper unless accessible through grilles and as shown on drawings. Units to be Ruskin Model ADH-22 for rectangular duct and Model ADR for round duct or approved equal by Elmdor.

K. Motor Operated Dampers

Motor operated control dampers mounted in ductwork shall be provided by ATC Contractor, but installed by this Contractor. Contractor shall seal dampers to ductwork to provide a completely waterproof and airtight seal between damper frames and ductwork.

L. Manual Dampers

1. See Part 3, EXECUTION for installation notes.

2. Manual dampers with smallest dimension 5 inches or less shall be shop fabricated, single 22 gauge blade, 3/8 inch rod, provided with position indicator and locking quadrant.

3. Manual dampers with smallest dimension larger than 5 inches but smaller than 11 inches shall be single blade steel, 16 gauge construction, provided with position indicator and locking quadrant. Unit shall be Ruskin Type MD35 or approved equal.

4. Manual dampers with smallest dimension larger than 11 inches shall be opposed blade steel, 16 gauge construction, linkage concealed in frame, provided with position indicator and locking quadrant. Unit shall be Ruskin Type MD35 or approved equal.

5. Dampers to be installed in aluminum ductwork shall be fabricated of aluminum or isolated from ductwork with rubber grommets between the damper and the duct to prevent oxidation between dissimilar metals.

6. Provide hand quadrants for all manual dampers, Ventline Model 560 or approved equal.

M. Fire Dampers

1. Fire dampers shall be installed to comply with NFPA Code No. 90A and shall bear a U.L. label. Provide fire rated access door at each fire damper not accessible through grille. All dampers shall comply with UL requirements for static testing and positive closure under air flow.

2. All fire dampers to be provided by damper manufacturer with integral sleeves and mounting angles. Sleeves shall be one piece, continuous with the dampers fitted inside to avoid openings which allow for air leakage. Sleeves provided "in-field" are not acceptable. Models indicated are by NCA to establish a standard:

   a. Wall and floor types for rectangular ductwork, Model FD-A-S; Type "A" for ducts greater than 12 inches in height and Model FD-B-S; Type "B" for ducts 12 inches in height and less.
   b. Wall and floor type for round ductwork, Model FD-C-S.
   c. Wall and Ceiling type behind registers and grilles; Model FD-A-SL

3. Provide factory mounted fusible links designed to melt at 165°F. and close the damper.

4. Installation shall be in accordance with damper manufacturer's instructions.

N. Dryer Box

Provide and install, at each clothes dryer, a fully recessed dryer vent box. Units to be upflow configuration, 3½ inches in depth and have a 3.1/8 inch by 4.7/8 oval top duct connection. A 4 inch diameter flexible dryer hose shall connect to interior port of the box and the box shall provide a place for the dryer hose to be stored when the dryer is pushed back to the wall.

In-O-Vate Technologies (http://www.dryerbox.com) Model 350 or approved equal.

2.31 FILTERS

Cabinet unit heaters with filter racks shall be provided with a minimum of three (3) sets of filters with pleated media. One set to be used during construction (and replaced by the Mechanical Contractor during construction if required as determined by the Clerk of the Works and/or the Mechanical Engineer). Second set to be installed a minimum of one (1) day and a maximum of three (3) days prior to testing and balancing and/or final inspection. The third set shall be turned over to the Owner in their original unopened shipping boxes for their future use.

Filters shall be Farr 30/30, Air Guard DP-40 or approved equal; 1 inch thick.

2.32 WALL AND CEILING ACCESS DOORS

Provide and install access doors in walls and ceilings where indicated to facilitate access to dampers, valves, duct access doors, etc. where indicated. Provide unit pricing with the bid for access panels.

2.33 EQUIPMENT IDENTIFICATION

Tag each boiler, fan, circulating pump, air handler, outdoor unit, heat recovery unit, unit heater, cabinet unit heater and switch with rectangular engraved nameplates with white letters on black, Brady Corp., Seton Name Plate Corp. or approved equals. Nameplates shall be mechanically fastened to equipment (adhesives are not acceptable). Embossed labels are not acceptable.

On Boilers, Heat Recovery Unit and Outdoor Unit nameplates shall be 4 inches by 1½ inches, Setonply Style No. M1774. On all other units nameplates shall be 2½ inches by ¾ inch, Setonply Style No. M1771. Install nameplates inside control access covers for air handlers and cabinet unit heaters.

Identify all heating hot water supply and return, snow melt supply and return, refrigerant liquid, refrigerant suction and drain piping with "Set Mark" full snap-around pipe markers by Seton Name Plate Corporation or approved equal by Brady Corp. Markers shall include both identification and direction of flow. Use yellow background with black letters for hot water supply & return, green background with black letters for refrigerant liquid & suction and green background with white letters for drain piping. Markers shall be no less than 10 feet apart except in mechanical room where they shall be not less than 20 feet apart. Identification shall read "Heating Water Supply", "Heating Water Return", "Snow Melt Supply", "Snow Melt Return", "Refrigerant Suction" and "Refrigerant Liquid" as applicable. Domestic hot and cold water piping shall be labeled differently from heating water piping.

Tag all valves (if not tagged by valve manufacturer) with 1½ inch round brass tags and #6 bead chains, Seton #M4506. Tag shall be consecutively numbered. Provide valve charts identifying valve number, valve identification and service. Mount charts in Mechanical Room in 8½ inch x 10 inch and 8½ inch x 11 inch document frames with either glass or plastic windows. Identify ducts and fire dampers with ventmark HVAC markers.

2.34 INSULATION AND CONDENSATE PROTECTION

A. General

1. Insulation shall be provided for all hot water supply and return piping, refrigerant piping, outside air intakes, exhaust and relief ducts and other insulation where shown on drawings.

2. All insulation products shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less per ASTM E 84, UL 723 and NFPA 255.

B. Hot Water Supply & Return Piping

1. All metallic hot water supply and return piping shall be insulated with heavy density fiberglass pipe insulation with 850°F. temperature rating and factory applied self sealing ASJ jacket. Cut insulation to include pipe hangers. Maximum "k" factor of 0.23 at 75°F. mean temperature difference per ASTM C 518. Owens Corning SSL II, Johns Manville Micro-Lok HP or approved equal.

Insulation thickness for hot water shall be as follows:

Pipe Size	Insulation Thickness
½" – 1½ "	1½"
2" - 8"	2"

Insulation thickness for hot water run-outs in partitions shall be as follows:

Pipe Size	Insulation Thickness
½" - 1"	½"

2. All fittings shall be wrapped with fiberglass insulation and covered with a one piece PVC insulated fitting cover secured with flare type stainless steel staples.

3. The ends of insulation on exposed pipes at valves, flanges, unions, etc., shall be finished with covering to match jacket and secured with mastic.

4. All valves 2½ inches and larger shall be wrapped with fiberglass insulation, covered and finished neat with covering material to match ASJ jacket on pipe insulation and secured with mastic.

5. Valves less than 2½ inches in size, flanges and unions shall not be insulated. Exception: All valves for cold water application shall be insulated.

C. PEX Tubing and Refrigerant Piping

1. PEX Tubing (not buried) and all refrigerant piping (not pre-insulated by equipment manufacturer) shall be insulated with flexible, closed cell elastomeric thermal insulation. Material shall be 25/50 rated (flame spread rating of 25 or less and smoke developed rating of 50 or less) when tested in accordance with

ASTM E84, latest revision. Thickness shall be 2 inches on refrigerant piping and ½ inch on PEX tubing.

2. Piping and fittings exposed to the elements shall have the insulation covered with ultraviolet resistant vinyl outdoor PVC jacket, JohnsManville Zeston 300 or approved equal.

3. Materials shall have a maximum thermal conductivity of 0.27 Btu-in./h-ft2-°F at a 75°F mean temperature when tested in accordance with ASTM C177 or ASTM C 518, latest revisions.

4. Materials shall have a maximum water vapor transmission of 0.08 perminches when tested in accordance with ASTM E 96, Procedure A, latest revision.

5. Adhesive shall be the insulation manufacturer's recommended contact adhesive: Armaflex 520, Armaflex 520 BLV.

6. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall not detract from any of the system ratings as specified above.

D. Duct and Equipment Insulation

1. Interior duct insulation shall be a ¾ pound density, all-service fiberglass duct wrap with factory applied foil faced FRK vapor barrier facing meeting the requirements of ASTM C 1136, Type II. Insulation material shall meet the requirements of NFPA 90A, NFPA 90B, ASTM C 1290 and ASTM C 553. Operating temperature range shall be from 40°F. to 250°F. Maximum "k" factor of 0.30 at 75°F. mean temperature difference. Owens Corning Type 75, Johns Manville Microlite XG or approved equal.

2. Insulate the following ducts with 3 inches installed thickness fiberglass duct wrap:

   a. Rooftop heat recovery unit supply and exhaust air ducts starting at the point of entry into the building (at the roof deck) to the motorized dampers.
   b. All kitchen range hood ducts from the exterior wall to 10 feet into the building.

3. Insulation materials to carry U. L. label. All laps to be sealed and held in place with adhesive and flare staples. All lap joints to be folded under before stapling so no raw insulation will be showing. On the bottom of ducts 24 inches or wider, mechanical fasteners shall be provided approximately 12 inches O.C.

E. Condensate Protection

Solder or weld bottom and sides of ducts connected to outdoors to prevent water leaks from rain and snow. Seal duct wrap and liner to minimize condensation.

F. Installation

All insulation work shall be executed by skilled insulation workmen regularly employed in the trade.

2.35 AUTOMATIC TEMPERATURE CONTROL (ATC)

A. General

1. Furnish and install a complete system of electric/electronic temperature controls.

2. The control systems shall be provided and installed by trained control mechanics regularly employed in installation and calibration of ATC equipment by the manufacturer or manufacturer's franchised dealer of temperature control equipment.

NOTE: Control installation is not acceptable by wholesalers, contractors or by any firm whose principal business is not directly involved with the manufacture and installation of ATC systems.

Approved manufacturers and vendors are as follows (no other vendor will be accepted):

a. T.A.C.
Maine Controls
400 Presumpscot Street
Portland, Maine 04103
(207) 774-0220

b. Honeywell, Inc.
501 County Road
Westbrook, Maine 04092
(207) 775-3501

c. Johnson Controls
39 Salem Street
P.O. Box 840
Lynnfield, MA 01940
1-800-288-1028, ext. 4478

d. Siemens Building Technologies
66 Mussey Rd.
Scarborough, Me. 04074
(207) 885-4110

3. Shop drawings of entire control system shall be submitted for approval before work is started. ATC Contractor is required coordinate work with the Mechanical Contractor and Commissioning Agent along with a preliminary copy of the ATC shop drawings for the purpose of coordination.

4. Provide ATC technician to test the complete ATC systems sequences for specified cycles of operation with the Testing and Balancing Contractor.

5. ATC Contractor must, at the end of the warranty period, furnish the Owner with all access codes and passwords assigned to the ATC control systems. ATC Contractor shall also instruct the Owner in the use and operation of the entire control system, including any software all control software that may be utilized (including a backup copy of the final software package to the Owner on CD if applicable), see paragraph F, "Instruction and Adjustment".

6. See Part 4 – ALTERNATES for additional/alternative work.

B. Scope

Control system shall consist of all area thermostats, air stream thermostats, valves, dampers, damper operators, relays, transformers, labor, program clocks and other accessory equipment, and a complete system of wiring to fulfill intent of ATC specification. Control shall be provided for, but not limited to the following:

1. Direct radiation
2. Fans operated by automatic temperature control system
3. Cabinet and horizontal unit heaters
4. Control of circulating Pumps
5. Control of domestic hot water
6. Control of heat recovery ventilation system
7. Control of snow melt system (see Part 4, "ALTERNATES")

C. Incidental Work by Others

1. The following incidental work shall be furnished by the designated contractor under the supervision of the Control Contractor.

   a. Mechanical Contractor shall:

      (1) Install automatic valves and separable wells that are specified to be supplied by the Control Contractor.
      (2) Furnish and install all necessary valved pressure taps, water, drain and overflow connections and piping.

   b. Sheet Metal Contractor shall:

      (1) Install all automatic dampers.
      (2) Provide necessary blank-off plates required to install dampers that are smaller than duct size.
      (3) Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
      (4) Provide access doors or other approved means of access through ducts for service to control equipment.

c. The General Contractor shall:

(1) Provide all necessary cutting, patching and painting.
(2) Provide access doors or other approved means of access through ceilings and walls for service to control equipment.

d. Division 16 shall:

(1) Provide wiring as described in Fan Schedule on sheet M14.
(2) Wire power to all motor operated dampers.
(3) Supply Fan 2 (SF-2): Div. 16 to provide and install smoke detectors outside each elevator door. Div. 16 shall also provide a manual override switch with a fire department access key at the elevator door in Lobby 03. Div, 16 shall also provide an interlock between the waterflow signal from the sprinkler system and the general fire alarm evacuation signal. Any one of these switches, detectors or interlocks shall activate the fan and open the motorized damper. All wiring by Div. 16

D. Electric Wiring

1. All low voltage and data wiring for installation of temperature controls shall be by ATC Contractor, except as noted. Power wiring for equipment shall be by Division 16, "ELECTRICAL".

2. ATC Contractor shall be responsible for coordinating installation of his wiring conduits with Division 16, "ELECTRICAL".

E. Submittal Brochure

The following shall be submitted for approval:

1. Control drawings with detailed wiring diagrams, including bill of material and description of operation for all systems.

2. Panel layouts and name plate lists for all local and central panels.

3. Valve and damper schedules showing size, configuration, capacity and location of all equipment.

4. Product data for all control system components.

F. Instruction and Adjustment

Upon completion of the project, the ATC Contractor shall:

1. Adjust for use by Owner, all thermostats, controllers, valves, damper operators, and relays provided under this section.

2. Furnish two (2) instruction manuals covering function and operation of control systems for use of the Owner's operating personnel. A competent technician shall be provided for instruction purposes.

3. Provide training in the setting, use and care of the ATC systems. Training shall commence after the Owner has taken possession of the building and shall not exceed two (2) hours. Cost of additional training shall be negotiated between the Owner and ATC Contractor.

G. Guarantee

Control system shall be guaranteed to be free from original defects in both material and workmanship for a period of not less than one (1) year of normal use and service. This guarantee shall become effective starting the date Architect agrees Owner has begun to receive beneficial use of the system.

H. Hazardous Materials

Mercury, asbestos or any other material deemed environmentally hazardous by the Federal Environmental Protection Agency or the State of Maine Department of Environmental Protection, shall not be used in any components of the ATC system.

I. Control Panel

Provide and install surface mounted control panel with dust tight gasketed, hinged door with enamel finish in Mechanical Room 08 where indicated on the drawings. All switches, relays and equipment necessary for system operation shall be provided in control panel including separate thermometers indicating outdoor air and re-set water temperature (on face of panel). Additionally, provide a readout indicating the discharge air temperature downstream of the duct heating coil associated with the HUR on the face of the panel.

All electric wiring within the panel shall be factory wired to terminal strips.

J. Thermostats

1. General

All thermostats shall be mounted according to current ADA requirements but not higher than 48 inches above finish floor to center.

2. All apartments, common areas and offices.

a. Direct Radiation: Thermostats shall be low voltage, digital, single temperature, with large backlit L.E.D. temperature display. Devices shall incorporate an internal heating temperature setpoint limit of 74°F. for use with senior housing. When user adjusts the setpoint, the display shall not be permitted to exceed the programmed maximum.
b. Devices shall have a battery backup for the display only.
c. Thermostats shall not contain mercury or any other toxic material.
d. Chicago Controls Model HC7445.

e. Provide clear, tamperproof covers in corridors and common areas.

3. Fans controlled by thermostats

Heavy duty, line voltage, all metal type. Reverse acting (cooling) for EF-2, EF-3 and SF-1.

4. Unit heaters

Thermostats shall be line voltage, single temperature.

5. Cabinet unit heaters

a. These thermostats shall be of the single temperature type intended for use in visible areas.
b. Devices may be either line voltage or low voltage.
c. Heavy duty with concealed adjustment and heavy duty clear plastic tamper proof covers.

6. Dehumidification system

Dehumidification systems shall be controlled by factory supplied thermostats and controllers, installed by factory authorized personnel. There shall be no interface between these devices and the heating system.

K. Automatic Control Valves

1. All control valves shall be suitable for the pressure conditions and shall close against the differential pressure involved. Valve operators shall be low voltage. Body pressure rating and connection type (screwed or sweat) shall conform to pipe schedule in this specification.

2. Direct radiation, unit heaters and cabinet unit heaters.

Valves shall be line size, two position and quiet in operation. Valves shall be guaranteed to meet the heating loads as specified.

3. Coils and snow melt system (see part 4, "ALTERNATES").

Valves shall be modulating and quiet in operation. Valves shall be sized by the ATC contractor to provide optimal performance and guaranteed to meet the heating loads as specified.

L. Miscellaneous Devices

Provide all the necessary relays, transformers, valves, positioners, switches, etc. to make a complete and operable system.

M. Motorized Dampers

1. Motorized dampers shall have 16 gauge galvanized frames not less than 2 inches in width with airfoil blades not less than 14 gauge galvanized steel, and shall be adequately braced to form a rigid assembly. No dampers shall have blades more than 6 inches wide. Dampers shall be painted with one coat of lacquer. Dampers shall be two position or proportioning as required by specific application, opposed blade type with linkage concealed within the frame. Oilite bronze bearings shall be provided at the ends of damper blades. ALL DAMPERS SHALL BE MOUNTED WITH BLADES ORIENTED HORIZONTALLY.

2. Damper operators shall be provided with bracket arrangement for location outside of air stream wherever possible. All damper motors shall be sufficient size to operate dampers, including slow opening and fast closing.

3. Dampers shall be provided with flexible metal edge and jamb seals and neoprene blade edge seals for tight closure. Leakage shall be certified to be no more than 2.0 CFM per square foot at 1 inch w.g. on units 24 inches wide and larger, 3.0 CFM per square foot at 1 inch w.g. on units less than 24 inches wide.

4. Control dampers furnished by the ATC Contractor shall include motor operated dampers installed in supply fan 1, heat recovery units and elevator shaft venting ducts. Damper operators shall be normally closed.

5. Dampers shall be Ruskin Model CD60 or approved equal by Air Balance, Arrow or Greenheck.

6. *Damper for SF-2 shall be provided with fan.*

N. Description of Operation

1. System shall be hot water with water supplied from the boilers at a maximum of 160°F, with 20°F drop through the heating system.

2. Occupied-unoccupied Control

There shall be no automatic occupied to unoccupied control sequencing.

3. A control sequence and hardware to maintain the water temperature to the system by modulating (resetting) boiler output temperature shall be provided within each boiler's internal controls. ATC Contractor shall adjust the reset schedule to provide 160°F water @ 20°F outdoors to 90°F water @ 65°F outdoors (and higher). As the outside temperature falls, the supply water temperature shall be increased. On a rise in outdoor air temperature, the temperature of the water shall be decreased.

Supply water temperature to the heating system shall be maintained by modulating each boiler output via reset water schedules programmed at the boilers. Additional control shall be provided (at each boiler) to give priority to

domestic hot water. Whenever pump P4 activates, the reset water controller shall increase boiler output temperature to 180°F water for as long as required.

Coordinate with boiler manufacturer's literature for required control components and sequences not provided with boilers.

4. Boiler Controls

   a. A true run time lead-lag control shall be supplied with the boiler controls.
   b. ATC Contractor shall provide interlock wiring between boiler controls and pump P4 for domestic hot water override control.
   c. Coordinate with boiler manufacturer for required control components (if any) and sequences not provided with boilers.
   d Boiler manufacturer shall be required to provide qualified personnel to install boiler related controls and wiring requiring field installation. Boiler installer shall also adjust boiler controls. Installer is required to work closely with the ATC Contractor and Commissioning Agent to be sure interlocks between boiler controls and building controls are installed and functioning properly. See par. 2.17, "BOILERS".
   e. Boilers shall go cold when there is no call for heat.

5. Control of Circulating pumps

   a. Boiler Pumps P1 and P2: Each pump shall be interlocked with its respective boiler. When boiler is activated the associated pump shall operate.
   b. Primary Circulation Pump P3: Pump shall operate continuously whenever either boiler is in operation.
   c. Domestic Water Heater Pump P4: Provide and install an immersion aquastat for the domestic water storage heater. On call for heat P4 shall activate and the boiler controls shall be signaled go into the internal domestic hot water over-ride sequence. Pump control shall have a high limit (off) of 140°F. and a low limit (on) of 120°F.
   d. Heat Exchanger Pump P5 (see part 4, "ALTERNATES"): Pump P5 supplies boiler water to the heat exchanger associated with the snow melt system. Whenever pump P8 is activated pump P5 shall run. When pump P8 is deactivated pump P5 shall stop.
   e. Heating Pumps P6 and P7: Pumps shall be provided with internal outdoor air control and lead/lag control. ATC Contractor shall provide and install interface wiring between pumps. Program pumps for lead/lag operation and pump on/off operation based on outdoor air temperature. Lead pump shall run continuously when outdoor temperature is below 62°F. and off above 65°F. (adjustable). Pressure sensors internal to the pump controls shall modulate pump speed in response to system pressure. As zone valves in the system close, the pumps shall reduce speed.
   f. Snow Melt System Pump P8 (see part 4, "ALTERNATES"): Pump P8 supplies water from the heat exchanger to the snow melt tubing under the sidewalk in front of the building. Locate a switch in the building Office on the first floor. When the switch is activate a timing sequence shall

start and operate the snow melt system for one hour. When activated, pumps P5 and P8 shall start and run continuously for the duration of the timing cycle. A three way valve shall regulate water temperature to the snow melt tubing as scheduled on sheet M14.

6. Direct radiation

All direct radiation shall be controlled by single temperature thermostats and two position zone valves. When a thermostat calls for heat the zone valve opens.

7. Cabinet Unit Heaters and Unit Heaters

Units to be supplied with remote thermostats, two position zone valves on the hot water supply and aquastats on the hot water supply to each unit furnished and installed by ATC Contractor. When the thermostat calls for heat the zone valve shall open and once supply water temperature of not less than 110°F. is proven the fan shall start.

8. Heat Recovery Unit

a. Heat recovery unit shall be provided with a factory control panel be mounted in the Mechanical Room 08 adjacent to the ATC panel. Label each panel to identify its purpose. ATC contractor shall be responsible to mount panel and provide ATC wiring.

b. Provide duct mounted motor operated dampers in the exhaust and outdoor air intake ducts between the unit and the roof. Dampers shall be closed when unit is not operating.

c. The energy recovery wheel shall be provided with a variable frequency drive at the factory. The ATC Contractor shall control the wheel as follows:

Provide an enthalpy sensor in the main return air duct, and enthalpy sensor in the outdoor air intake at the unit and a dry bulb discharge sensor in the supply air ductwork downstream of the duct heating coil. Provide an enthalpy controller with a setpoint switch. The condensation control setpoint shall be automatically calculated and set by the controller. If the outdoor enthalpy is less than the return enthalpy, the wheel shall modulate to maintain the supply temperature setpoint. If the outdoor enthalpy is greater than the return enthalpy, the wheel rotates at full speed (20 RPM) in summer cooling mode. If the outdoor enthalpy is less than the return enthalpy but the outdoor temperature is greater than the supply setpoint, the wheel will rotate at minimum speed (about 0.2 RPM) in economizer mode. The controller shall automatically calculate an exhaust temperature condensation control setpoint based on the space humidity. If the exhaust temperature drops below the condensation control setpoint, the wheel will modulate slower to maintain the exhaust setpoint. The wheel receives the minimum signal from the supply temperature and condensation control loops.

9. Duct Heating Coil

   a. The duct heating coil located in the supply air (discharge) ductwork from the heat recovery unit shall be controlled from a discharge sensor in the ductwork. Provide set points mounted adjacent to the heat recovery unit controls in Mechanical 08. In addition, provide a discharge temperature read out on the face of the ATC panel in Mechanical 08.
   b. Provide a modulating control valve on the hot water supply to the coil. Initially set discharge temperature at 72°F. Valve shall modulate to maintain setpoint.
   c. Provide a freeze protection sensing element across the entire face of each coil. Should the coil discharge temperature fall below 42°F. the fans in the heat recovery unit shall be stopped and the motorized dampers in the ducts shall close.
   d. When outdoor air temperature is below 40°F. the coil valve shall be opened 1/3 to permit constant flow of hot water.

10. Fans shall operate as indicated on "FAN SCHEDULE" on sheet M14. Provide 120 volt motor operated dampers to open when fans cycle (where indicated); power wiring by Division 16 unless noted otherwise.

    Exhaust Fan 1 shall operate from a smoke detector and carbon monoxide detector wired in parallel and centrally located at the ceiling of the parking area. Detectors shall be provided, installed and wired by ATC.

    Exhaust Fan 2, Exhaust Fan 3 & Supply Fan 1 shall operate from heavy duty, 120 volt reverse acting cooling thermostats. When fans operate associated motorized dampers shall open.

    Supply Fan 2 shall operate from the building fire alarm system. Div. 16 to provide and install smoke detectors outside each elevator door. Div. 16 shall also provide a manual override switch with a fire department access key at the elevator door in Lobby 03. Div, 16 shall also provide an interlock between the waterflow signal from the sprinkler system and the general fire alarm evacuation signal. Any one of these switches, detectors or interlocks shall activate the fan and open the motorized damper. All wiring by Div. 16

O. Low Temperature/Flow and Boiler Failure Alarms

1. Provide an immersion aquastat (normally open) with separable well in the heating hot water supply from the boilers. Also, provide a flow switch in the hot primary water supply line served by pump P3. The aquastat shall close an alarm circuit should the water temperature from the boilers drop below its temperature setpoint (110° F. - adjustable). The flow switch will also close this alarm circuit should the circulating pumps fail. This sequence shall be disabled when outdoor temperature is above 65°F.

2. Alarm circuit shall activate a warning light in the building Office labeled as heating system failure.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all work is complete to the point where this installation may properly commence.

2. Verify that Mechanical systems may be installed in strict accordance with all pertinent codes and regulations and the approved shop drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify Architect.

2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. All piping shall be installed within building insulation.

2. Size and general arrangements as well as methods of connecting all piping, valves, and equipment shall be as indicated, or to meet requirements for complete installation.

3. All piping shall be erected to provide for easy and noiseless passage of water and refrigerant under all working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size in the direction of flow. Tee fittings with reduction in the main direction of flow (run) are not acceptable.

4. All water mains shall be run level or pitch slightly upward so that no air pockets are formed in piping. Mains shall be set at elevations so runouts feeding heating equipment shall have no pockets where air can collect or automatic vents shall be provided.

5. Where balancing valves are used, it is critical that there not be two valves installed in series anywhere throughout the piping system.

6. Provide drains with hose threads and metal caps at all low points in the water piping system.

7. In erection of piping, care must be taken to make allowance for expansion and contraction; piping shall be anchored as necessary to control expansion.

8. Runouts to hot water radiation shall be size indicated on plans and shall come off the main downward (downfeed units) or off the side (upfeed units).

9. Install approved fittings at all points of dissimilar piping connections.

10. Install a sufficient number of unions or flanges to facilitate assembly and disassembly of piping and removal of equipment.

11. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.

12. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective materials from the job site.

13. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load carrying members without the approval of the Architect.

14. All risers and offsets shall be substantially supported.

15. Make all changes in pipe size with approved reducing fittings.

16. All low points in water piping shall be provided with an accessible plug tee or drain valve.

17. All high points in water piping shall be provided with an accessible automatic vent.

18. Maximum spacing of hangers for steel piping shall be as follows:

Pipe Size	Spacing
½", ¾" & 1"	6'-0"
1¼" & 1½"	8'-0"
2" & 3"	10'-0"

19. Maximum spacing of hangers for copper piping shall be as follows:

Pipe Size	Spacing
½", ¾" & 1"	6'-0"
1¼" & 1½"	6'-0"
2" & 3"	10'-0"

20. Maximum horizontal spacing for pipe supports for PEX shall be 18 inches.

21. Whenever possible valves shall be installed with the operating stems in the upright position, however when conditions dictate it is acceptable to position valves 90° to either side of vertical. Valves shall not be installed with the stems in the downward position.

22. Do not substitute one style of valve indicated on drawings for another unless authorized by the Architect. Example: If a gate valve is shown use ONLY a gate valve or if a ball valve is shown use ONLY a ball valve.

B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all plugs.

2. Make all joints in copper tube (water and drains) with 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations.

3. All joints in refrigerant tubing shall be brazed.

C. Fire Safety

Fire extinguishing equipment shall be kept within 25 feet of welding areas at all times. Contractor shall take additional measures when welding close to wood structures to protect the wood from igniting.

D. Thermometers

Install thermometers where indicated on drawings and thermometer wells on supply and return branch piping at all duct hot water heating coils and two (2) thermometers with storage cases for the Owner's use.

E. PEX tubing

1. Install PEX tubing where indicated on drawings.

2. Tubing shall be supported from building structure only, not from other piping or equipment.

3. Do not support other piping or equipment from PEX tubing.

4. PEX tubing may be threaded through structure with the structure acting as support so long as support is not provided in lengths greater than 32 inches on center. Use protective sleeves or bushings where tubing passes through metal studs. Tubing shall not have sags or low points that would prevent thorough drainage of the system.

5. Support devices shall be a product of the PEX manufacturer. Support devices shall be screwed, not nailed, into wood. Do not attach to the underside of floor decks. It is acceptable to support PEX tubing to the side of steel bar joists with "zip" strip draw bands at 16 inch centers (maximum). Leave adequate provision for pipe insulation (where used).

3.03 PIPING TEST AND ADJUST

A. During the installation, all hot water supply and return piping shall be tested with water to a pressure of not more than 125 psi and held for a period of not less than four (4) hours. Isolate boilers and any other piping or devices not designed for this pressure. Do not use compressed air on PEX tubing systems. Any leaks shall be repaired and another test applied to the piping. All piping shall be tested before it is insulated or otherwise concealed. Contractor shall be required to certify in writing that piping has been tested and conforms to these requirements.

B. Before operating the water systems, all piping shall be flushed out to remove oil and foreign materials. This shall be accomplished by circulating a solution of heavy duty detergent by use of Mechanical Contractor supplied pump.

C. After the installation is complete and ready for operation, the system shall be tested under normal operating conditions in the presence of the Architect and demonstrated that the system functions as designed.

D. It shall be demonstrated that all parts of heating systems have a free and noiseless circulation of water and that all parts are tight. It shall also be demonstrated that all units are functioning properly and that control system operates correctly.

E. Should any defects in operation develop during the test periods, the Mechanical Contractor will proceed to correct defects immediately. Additional tests will be conducted after correction.

3.04 INSTALLATION OF DUCTWORK AND EQUIPMENT

A. General

1. Size and general arrangements as well as methods of connecting all registers, grilles, duct coils and equipment shall be as indicated, or to meet requirements for complete installation.

2. Construction standards and sheet metal gauges shall be as outlined in the latest edition of the SMACNA HVAC Duct Construction Standards handbook for metal and flexible ducts unless specifically indicated otherwise.

3. Do not use segmented elbows or screws to connect fittings on clothes dryer ducts. Use smooth, long radius elbows and pop rivets instead.

4. Manual Dampers

   a. Manual dampers may be shop-fabricated on units 5 inches in height and less. All dampers larger than 5 inches MUST be pre-fabricated as previously outlined in this specification.
   b. All manual dampers located within 10 feet of a fan outlet shall have the blades oriented perpendicular to the fan shaft.
   c. Provide duct access door as large as possible up to 12 inches x 12 inches at each manual damper larger than 5 inches.

B. Protection and Cleaning

1. All open ends of ductwork which is to be unattended for 4 hours or more shall be temporarily protected with plastic sheeting and duct tape (or similar method) to reduce the collection of construction dust and debris.

2. Prior to testing and balancing and at the end of the construction, clean the interiors of all supply and return air ductwork before changing filters in air handling equipment. Careful coordination must be maintained between the time of testing and balancing and final delivery to avoid re-accumulation of dust and debris within the duct systems which will require additional cleaning by the Mechanical Contractor.

3.05 TESTING, ADJUSTING AND BALANCING (TAB)

A. General

1. TAB contractor shall be a subcontractor to the Mechanical Contractor.

2. TAB contractor shall perform functional performance test of all Division 15 equipment and entire ATC system for specified operation and control sequences.

3. The mechanical contractor shall startup all Division 15 equipment as required by the equipment specifications. Mechanical contractor shall verify that systems are complete and operable before TAB commencing work. Ensure the following conditions:
   a. Systems are started and operating in a safe and normal condition.
   b. Temperature control systems are installed complete and operable.
   c. Proper thermal overload protection is in place for electrical equipment.
   d. Final filters are clean and in place. If required, install temporary media in addition to final filters.
   e. Duct systems are clean of debris.
   f. Fans are rotating correctly.
   g. Fire and volume dampers are in place and open.
   h. Air coil fins are cleaned and combed.
   i. Access doors are closed and duct end caps are in place.
   j. Air outlets are installed and connected.
   k. Duct system leakage is minimized.
   l. Hydronic systems are flushed, filled, and vented.
   m. Pumps are rotating correctly.
   n. Proper strainer baskets are clean and in place. Service and balance valves are open.

4. TAB Contractor shall submit field reports to Mechanical Contractor who shall, in turn, submit them to the General Contractor. Report defects and deficiencies noted during performance of services which prevent system testing and balance.

5. TAB contractor shall submit all verification and functional performance checklists/results, signed by indicated personnel, organized by system and sub-system.

6. TAB contractor shall submit other reports described below.

B. Work Included

1. Test, adjust and balance all air and water systems, including components to conform to air and water flow rates shown on drawings.

2. Test complete automatic temperature control sequences for specified operations described under par. 2.35, "AUTOMATIC TEMPERATURE CONTROLS".

3. Complete and submit balance report. Report shall be submitted with information noted on one side of sheet only (i.e., backside of sheet shall be blank.).

4. Testing of air and water systems will be done by the same agency.

5. Mechanical Contractor SHALL PROVIDE copies of shop drawings indicating coil gpm's, air handling unit air volumes, etc. to the Testing and Balancing contractor at no cost to the contractor.

6. Careful coordination must be maintained between the time of testing and balancing and final delivery to avoid re-accumulation of dust and debris within the duct systems which will require additional cleaning by the Mechanical Contractor.

C. Quality of Compliance

1. Qualification: TAB Contractor must be independent test and balancing agency.

2. AABC Compliance: Comply with AABC Manual MN-1 "AABC National Standards" as applicable to mechanical and hydronic distribution systems and/or Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

3. Industry Standards: Comply with ASHRAE recommendations for measurements, instruments and testing and balancing.

4. Coordination: Work together with Automatic Temperature Control Contractor to adjust set points of various devices to balance system(s) and test ATC sequences of operation. Temperature Control Contractor shall be responsible for balancing return air, exhaust (relief) air and outdoor air dampers on Air Handling Units in order to achieve proper mixed air temperatures.

5. ASHRAE Guideline 1-1996, "The HVAC Commissioning Process".

D. Execution of TAB Work

1. TAB Contractor shall visit job site and determine that control devices, test devices and valves are correctly installed and ready for balancing.

2. Examine each air and hydronic distribution system to see that it is free from obstructions. Determine that all dampers, registers and valves are in a set or full open position; that moving equipment is lubricated, and that required filters are clean and functioning. Request that Installing Contractor perform any adjustments necessary for proper functioning of the system.

3. TAB Contractor shall use test instruments that have been calibrated within a time period recommended by the manufacturer, and have been checked for accuracy prior to start of testing, adjusting and balancing activity.

4. Verify that all equipment performs as specified. Adjust variable type drives, volume dampers, control dampers, balancing valves and control valves as required by TAB work.

5. Test pressure profile of systems by traverse as required.

6. Adjust each register and damper to handle and properly distribute design airflow within 5% of specified quantities. Mark all setpoints.

7. Adjust front and rear discharge louvers on each supply register to distribute air in an even pattern or as indicated on plans.

8. Take readings of all preset balancing valves to ensure they are providing the specified flow and record the results.

9. Document results of all testing on approved TAB report formats and submit 3 copies for approval and record within 15 days of completion of TAB work. Include a warranty period of 90 days, during which time the Architect/Engineer may request a re-check or re-adjustment of any part of the work.

10. Reports shall be compiled on a spreadsheet such as Excel, Quattro-Pro, Lotus, etc. and shall clearly indicate the following *minimum* information:

    a. Air (Rated and Actual)

        1) System/unit name
        2) HP, BHP, voltage, amperage and fan rpm
        3) Static pressures; suction, discharge and total
        4) Total system flow rate
        5) Individual terminal flow rates (Terminal readings must show location, make, model and size of register, grille or diffuser).
        6) Provide a static pressure profile of heat recovery unit components.
        7) Filter status report

b. Water

1) Pump full flow and no-flow suction and discharge pressures.
2) Rated and actual amperage, voltage and total discharge head (TDH).
3) Calibrated balancing device readings will indicate location, size, setting, differential pressure and rated and actual gpm.

Reports to have a minimum of color or must be compatible with monochrome printers. Reports must be submitted to the Architect electronically in addition to hard copies.

E. Duct Testing

1. Ductwork mains on 4th floor shall be tested for leakage prior to installation of insulation and concealment.

2. Leakage test procedures shall follow the outlines and classifications in the latest edition of the SMACNA HVAC Duct Leakage Test manual. See Section 4 of the SMACNA leakage test manual for normal duct classifications.

3. Leakage amount shall not exceed the allotted amount for the pressure class or the allotted amount for that portion of the system, whichever is applicable.

4. Any ductwork which fails to meet the allotted leakage level shall be modified to bring it into compliance and shall retest it until acceptable leakage is demonstrated.

5. At completion of construction, Contractor shall provide written certification, on his company letterhead, indicating that all ductwork has been tested according to specified requirements. Document shall include date of test, test pressures used, leakage class and construction class of each section of ductwork tested.

F. Supply Fan #2 (SF-2)

Fan is supplied with a speed control switch. TAB Contractor shall adjust fan to provide a positive pressure within the elevator shaft with all doors closed of 0.25 inches.

G. Drawings

Drawings in CAD format may be made available to the TAB Contractor after the contract for this work is awarded. Contact the Engineer via telephone or at mechsyst@maine.rr.com and request the drawings, indicating CAD format required and a return e-mail address. See par. 1.12, "ELECTRONIC DRAWINGS AND FILE SHARING" for additional information.

H. Acceptable TAB Contractors (listed alphabetically)

1. Central Air Balance
2. Maine Air Balance
3. Tab-Tech International
4. Tekon-Technical Consultants
5. Yankee Balancing

3.06 CLOSING IN UNINSPECTED WORK

A. General

Do not cover up or enclose work until it has been properly and completely inspected and approved.

B. Contractor is required to provide not less than 48 hours advance notice to the Architect of intent to cover non-inspected work to permit time for scheduling inspections.

C. Noncompliance

Should any work be covered up or enclosed prior to all required inspections and approvals, the Architect reserves the right to order the uninspected work to be uncovered for inspection at the Contractor's expense. After the work has been inspected completely and approved, make all repairs and replacements with materials necessary for approval by the Architect and at no additional cost to the Owner.

3.07 TEMPORARY HEATING

A. Mechanical Contractor shall install the new heating system and related equipment as soon as those portions of the building are ready and the work can be performed.

B. Mechanical Contractor will be required to permanently connect as many units as possible for temporary heat.

C. At the conclusion of the temporary heating period, the complete system shall be thoroughly cleaned.

D. General Contractor will be required to assume full responsibility for the care and operation of the new equipment during its temporary use and to return the equipment to the Mechanical Contractor in perfect order, normal wear and tear excepted.

E. Water, fuel and electric power required to operate the heating system for temporary heat shall be provided by the General Contractor.

3.08 CLEANING

Prior to acceptance of the buildings, thoroughly clean all exposed portions of the Heating, Ventilating and Dehumidification installation, including the removal all labels and all traces of foreign substance. Prior to testing and balancing vacuum and clean inside of all convectors, finned radiators (spackle droppings), unit ventilators, air handling units, VAV units, fans and cabinet unit heaters. Clean the interiors of ductwork as outlined in 3.04, "INSTALLATION OF DUCTWORK AND EQUIPMENT"; paragraph "B", "Protection and Cleaning".

3.09 INSTRUCTIONS

On completion of the job, the Mechanical Contractor shall provide a competent technician to thoroughly instruct the Owner's Representative in the care and operation of the system. The total period of instruction shall not exceed two (2) hours. (ATC system instruction and boiler training shall be in addition to this instruction period). The time of instruction shall be arranged with the Owner.

3.10 REFRIGERANT PIPING

Refrigerant piping shall be installed and tested in accordance to the conditions set forth herein and as required by the manufacturer of the refrigeration equipment by personnel with not less than 5 years experience in the installation of refrigerant piping.

The installation shall be inspected and certified by the manufacturer of the refrigeration equipment prior to charging with refrigerant.

Refrigerant piping shall be run in a approved manner, providing traps where necessary to maintain gas velocities to return oil to the compressor and to keep systems free of oil slugs at the compressor. Fittings shall be long radius and soldered with Sil-Fos or silver solder. The inside of all refrigerant piping shall be thoroughly cleaned using Virginia Solvent #10 or approved equal; followed by a wiping of compressor oil and then wiped dry with a clean, dry cloth. All refrigerant piping shall then be tested with nitrogen and all joints tapped with a rubber mallet to make sure they are tight. A soap solution shall then be applied to each joint. High side test shall be a minimum of 250 psi while the low side test shall be tested to a minimum of 100 psi. Any equipment that may be damaged by these pressures shall be removed. After pressure test, a freon test shall be applied using Halide torch. The interior of the piping system shall be thoroughly cleaned of all oil, dirt and foreign matter then evacuated and dehydrated. All copper tubing shall be supported by copper coated clevis type hangers, see Paragraph 2.03; "HANGERS AND SUPPORTS". The hangers on the suction piping shall be sized to include the insulation and metal shields 12 inches long shall be placed between hangers and insulation.

3.11 RECYCLING

Discarded materials, both new and removed, shall be recycled whenever practical through metal salvage dealers (ductwork, piping, etc.), paper salvage (cardboard shipping containers, etc.), wood & plastic products, etc. The Mechanical Contractor shall retain the salvage value of discarded materials and may use this value to offset his project bid price if so desired. Toxic materials such as adhesives, coolants, refrigerants, etc. SHALL be disposed of in a manner acceptable to the State of Maine Department of Environmental Protection.

3.12 HAZARDOUS MATERIALS

Mercury, asbestos or any other material deemed hazardous by the Federal Environmental Protection Agency or the State of Maine Department of Environmental Protection, shall not be used in any components of the mechanical systems or packaging.

PART 4 - ALTERNATES

4.01 GENERAL DESCRIPTION

A. Alternate No. 1 is an add alternate to include a snow melt system as show on drawings.

B. No other alternate applies to this section.

C. Snow melt system shall include the following items specified under Part 2, "PRODUCTS":

1. Pumps P5 and P8
2. All piping, pipe insulation, manifolds and PEX tubing associated with pumps P5 and P8.
3. Heat exchanger HE-1
4. Glycol
5. Snow melt system controls

END OF SECTION 15600

Addendum for Danforth on Hign, Portland, Maine

SECTION 15710 FIRE SPRINKLERS

Change paragraph 1.04 DESCRIPTION OF WORK., A to read as follows:

A. Work Included

Provide all design services, construction documents, labor, transportation, equipment, permits, materials, tools, inspections, incidentals, tests and perform all operations in connection with the installation of a complete new Hydraulically Designed Wet Pipe Sprinkler System in all heated areas of the buildings, with a dry system in the Parking Garage and in misc. unheated spaces and overhangs. Comply with requirements of all Authorities Having Jurisdiction, especially the City of Portland Fire Department. Available at: http://www.portlandmaine.gov/fireprevention/fdrulesandregulations.pdf Include aesthetic considerations into the design. Coordinate with interfacing trades. Submit equipment and components for review. Prepare Shop and Record Drawings and Owner's Manuals. Assure quality of workmanship. Provide guarantees and warranties.

1. Automatic Sprinkler System shall meet the standards of the most recent edition of the National Fire Protection Association's (NFPA) NFPA 13 Standard for the Installation of Sprinkler Systems , AND City of Portland Fire Department Rules and Regulations. Therefore the system shall have water flow and zone supervision for each story in addition to the requirements of NFPA 13.

2. A Manual Wet Class 1 Standpipe system shall be provided in the stairwells of the building and shall meet the requirements of the National Fire Protection Association's (NFPA) NFPA 14 Standard for the Installation of Standpipe, Private Hydrant and Hose Systems, AND City of Portland Fire Department Rules and Regulations.

Change paragraph 2.03 COMPONENTS, A to read as follows:

A. Fire Department Connection: 2-1/2 NH with caps with chains and wall plate with "Auto Sprinkler". Also UL listed check valve with automatic ball drip piped to drain. Bronze finish.

SECTION 15710
FIRE SPRINKLERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

General Provisions of Contract, including General and Supplementary conditions and General Requirements (if any) apply to work specified in this Section.

1.02 DEFINITIONS

A. Reviewed equal: Shall mean that the Engineer, not the contractor, shall make final determination whether materials are an equal to that which is specified.

B. Equal: Shall mean essentially the same as that product specified, but a model of a different manufacturer.

C. Concealed: Shall mean in walls, in chases, above ceilings, within enclosed cabinets, otherwise enclosed.

D. Exposed: Shall mean in finished spaces, in closets, under counters, behind and/or under equipment and/or otherwise visible.

E. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

F. Others: Shall mean provided by sections other than this section. If not purposely assumed by another section, shall be provided by the Contractor.

G. Materials: Shall mean any product used in the construction, including but not limited to: fixtures, equipment, piping and supplies.

H. Piping: Shall mean pipe, fittings, hangers and valves.

I. Provide: Shall mean the furnishing and installing of materials.

J. Substitution: Shall mean materials of significantly different physical, structural or electrical requirements, performance, dimensions, function, maintenance, quality or cost, than that specified.

1.03 ALTERNATES

There are NO alternates that apply to this section of the project.

1.04 DESCRIPTION OF WORK

A. Work Included

Provide all design services, construction documents, labor, transportation, equipment, permits, materials, tools, inspections, incidentals, tests and perform all operations in connection with the installation of a complete new Hydraulically Designed Wet Pipe Sprinkler System in all heated areas of the buildings, with a dry system in the Parking Garage and in misc. unheated spaces and overhangs. Comply with requirements of all Authorities Having Jurisdiction. Include aesthetic considerations into the design. Coordinate with interfacing trades. Submit equipment and components for review. Prepare Shop and Record Drawings and Owner's Manuals. Assure quality of workmanship. Provide guarantees and warranties.

1. Automatic Sprinkler System shall meet the standards of the most recent edition of the National Fire Protection Association's (NFPA) NFPA 13R Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height.

2. Attic Dry Automatic Sprinkler System shall meet the standards of the most recent edition of the National Fire Protection Association's (NFPA) NFPA 13 Standard for the Installation of Sprinkler Systems.

3. A Manual Wet Class 1 Standpipe system shall be provided in the stairwells of the building and shall meet the requirements of the National Fire Protection Association's (NFPA) NFPA 14 Standard for the Installation of Standpipe, Private Hydrant and Hose Systems.

1.05 SUBMITTALS

A. Shop Drawings:

1. Within 30 working days after the Contractor has received a fully executed contract, prepare and submit Plans / Shop Drawings in accordance with the requirements of NFPA and obtain the Engineer's approval and Owner's Insurance Underwriter approval before proceeding with the fabrication and work.

2. Drawings shall include, but not be limited to:
   a. Name of Owner and Occupant
   b. Name and address of Contractor.
   c. Physical Location
   d. Plan view of system
   e. Full height cross section or schematic diagram including ceiling construction and spray obstructions.
   f. Locations of all partitions, with fire partitions noted.
   g. Occupancy class for each area and minimum density of water application.
   h. Locations of concealed spaces
   i. Plan showing location and size of city water main, where private main attaches, all valves, distance and elevation between main and riser.

j. Recent hydrant test showing both static and residual pressures, and date and time taken. List any significant known daily or seasonal pressure fluctuations and the cause.
k. Make, model and nominal K factor of sprinkler heads.
l. Control valves, check valves, drain pipes and test connections.
m. Fire department connections
n. Details showing riser piping configurations.
o. Pipe sizes.
p. Switches and supervisory devices.
q. Interface with Fire Control Panel.

3. To obtain an electronic copy of the building plan and sections, contact the Engineer. Specify required CAD format when requesting the files.

4. Procedure

a. As soon as possible after award of Contract, before any material or equipment is purchased, this Contractor shall submit to the Engineer no less than six (6) copies for approval. Shop drawings shall be properly identified and shall describe in detail the material and equipment shall be provided, including all dimensional data, performance data, curves, computer selection print-outs, etc.

b. Corrections or comments made on the submittals do not relieve the contractor from compliance with requirements of the specification. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.

c. All related items shall be submitted as a package.

4. Submit data on the following items:
a. Piping, fittings and couplings.
b. Alarm check valves and trim.
c. Backflow preventer.
d. Valves and supervisory devices.
e. Sprinkler heads and escutcheon plates.
f. Supports, hangers and accessories.
g. Fire Department Connections.
h. Any other significant item valued over $100.00

5. Submit to the Owner's Insurance Underwriter sufficient copies for approval to allow one copy to be incorporated into each Owner's Manual in addition to the required As-Built Plans

1.06 HYDRAULIC DESIGN DATA

A. Building Occupancy: Apartments.

B. Water Density and Square Foot Requirements: Provide per NFPA.

C. Codes and Requirements:

1. Comply with the standards of most recent edition of the National Fire Protection Association.

2. Comply with the BOCA International Building Code, all Maine State laws as well as local codes and ordinances.

3. Comply with the requirements of the State Fire Marshals Office, Local Fire Chief, Owners Insurance Underwriter, Local Water District and other Authorities Having Jurisdiction

1.07 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner.

1.08 MAINTENANCE MANUAL

On completion of this portion of the work, and as a condition of its acceptance, submit for review two copies of a manual describing the system. Prepare manuals in durable 3-ring binders approximately 8.1/2" by 11" in size with at least the following:

A. Project name on the spine and front cover, and identification on the front cover stating the project name, general nature of the manual, and name, address and telephone number of the General and Sprinkler Contractors.

B. Neatly typewritten index.

C. Complete instructions regarding operation and maintenance of all equipment involved.

D. Complete nomenclature of all frequently replaceable parts and supplies, their part numbers, and name, address and telephone number of the vendor.

E. Copy of all guarantees and warranties issued, and dates of expiration.

F. Shop drawings and equipment/fixtures manufacturer's catalog pages.

PART 2 – PRODUCTS

All products shall be new and must be either Factory Mutual (FM) or Underwriters' Laboratory (U.L.) listed or both.

2.01 MANUFACTURERS

A. Equipment: Grinnell, Standard, Viking, Central Sprinkler Corp., Reliable, or equal.

B. Heads: Viking, or equal.

C. Flow Switch and Supervisory Device: Potter Electric Signal Company or equal.

D. Backflow preventer: Ames or equal.

2.02 MATERIALS

A. Piping:

1. Outside Building, Underground: Connect where the site piping ends. Match materials and methods until inside the building.

2. Inside building: Shall be schedule 40 black steel, standard weight welded, threaded or Victaulic fittings for sizes 2-1/2" and under. Install flanged fitting and flanges at valves and where required. Threadable light wall pipe (schedule 10) shall be permitted only for sizes 3" and over.

3. Where permitted by code, and based on the construction, the contractor may substitute CPVC sprinkler system piping in lieu of the above for the wet sprinkler system. Install according to manufacturer's requirements and restrictions. Piping and fittings shall be Harvel Blazemaster CPVC fire sprinkler piping. Piping shall be installed only by a factory trained and certified installer. Do not use where piping is exposed or where manufacturer's requirements cannot be met.

B. Sprinkler Heads:

1. Temperature Classification:
   a. Finished area shall be ordinary temperature rating.
   b. Boiler /mechanical room shall be Intermediate temperature rating 175° F to 225° .

2. All shall be Quick Response bulb type head.

3. Type:
   a. Generally shall be white, concealed pendant.
   b. Concealed spaces shall be the type best suited for the configuration of the individual space.
   c. Any minor unheated spaces shall be dry type.

4. Provide and install a spare head case per NFPA requirements. The case shall contain not less than 12 heads total, no less than two of each style of heads and one wrench for each style of head. Locate case in the sprinkler room near the check valve assemblies.

C. Hangers: Provide per NFPA. Provide seismic protection unless specifically exempt by the Authority Having Jurisdiction. Hang from building structure, not piping of other trades.

D. Sleeves:

1. Pipes Through Floors: Form with Schedule 40 (galvanized) steel pipe and extend 1" above surrounding floor.

2. Pipes Through Interior Fire-rated or Sound-rated Partitions: Form with steel pipe or 16 gauge galvanized steel.

3. Pipes through Exterior Building Walls, Concrete Walls or Footing: Form with Schedule 40 (galvanized) steel pipe.

4. Size: The minimum sleeve diameter shall be either 2 pipe sizes or 2" in diameter larger than the outside diameter of the pipe.

5. Fire caulk all penetrations through floors and fire rated partitions.

E. Valves:

1. Riser Control Valve: OS&Y cast iron construction.

2. Sectionalizing Valves: OS&Y cast iron body.

3. Drain and Test Valves: Bronze body, gate type or ball type, capable of being padlocked in either open or closed position.

F. Provide all miscellaneous items required for a complete system, such as: paint, signs, valve tags, pipe markers, chains and locks, relief valves, and water additives.

2.03 COMPONENTS

A. Fire Department Connection (Verify with local Fire Department). 4" Fire Department connection with, caps with chains and wall plate with "Auto Sprinkler". Thread Pattern shall match that of the local Fire Department equipment; also 4" UL listed check valve with automatic ball drip piped to drain. Bronze finish.

B. Flow Switch for Wet Systems: Model # VSR-F vane type water flow alarm switch with an adjustable retard setting from 10 seconds to 90 seconds having two sets of DPDT contacts for reporting to the building fire alarm system.

C. Electric Supervisory Switch: All valves shall have a Model # OSYSU-2 electric supervisory device with 2 sets of DPDT contacts to report to the building fire alarm system.

D. Backflow preventer: Double check, testable, replaceable seats.

E. Provide all shut-off valves with tamper switches. Lock or chain open valves with break-away padlocks.

F. Water pressure gauge: Provide one before the valve on each inspectors test connection. Range applicable to fire protection application.

SECTION 16721

FIRE ALARM AND SMOKE DETECTION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section of the specification includes the furnishing, installation, and connection of a "house" fire alarm system consisting of a microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel, auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. This section of the specification also includes furnishing, installation and connection of "local" fire alarm detection/notification means within individual living units. Local fire alarm means shall include, but not be limited to, alarm initiating devices, alarm notification appliances and wiring as shown on the Drawings and specified herein.

C. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for protected premises signaling systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.

D. This section also requires a connection to an off-site monitoring agency for reporting a "house" alarm condition.

1.2 RELATED SECTIONS

A. Section 16180 – Equipment Wiring Systems.

1.3 "HOUSE" FIRE ALARM SCOPE

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:
   1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on an NFPA Style 7 (Class A) Signaling Line Circuit (SLC).
   2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D).
   3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z).
   4. Digitized electronic signals shall employ check digits or multiple polling.

C. A single ground or open on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

D. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

E. Interlock the "House" fire alarm system with the elevator operation as described in Section 16180.

F. Interlock the "House" fire alarm system with the elevator shaft relief vent as described in Section 16180.

1.4 COORDINATION WITH CITY OF PORTLAND FIRE PREVENTION BUREAU

A. Fire Alarm Permit
   1. The Contractor shall be responsible for obtaining a fire alarm permit from the City of Portland. A city fire alarm permit application and permit fee shall be submitted by the Contractor prior to purchase of any fire alarm equipment.
   2. The following will be provided by the Engineer in support of the fire alarm permit:
      a. Electronic PDF files of floor plans showing fire alarm system components (11x17 and full-size copies).
      b. Input/output matrix.
      c. Designer qualifications.
   3. The following shall be provided by the Contractor in support of the fire alarm permit:
      a. Wiring diagram from the system manufacturer.
      b. Annunciator details from the system manufacturer.
      c. Equipment data sheets from the system manufacturer.
      d. Battery and voltage drop calculations.

B. Fundamentals
   1. All fire alarm system components, wiring, and operation shall conform to all requirements contained in the City of Portland Standard for Signaling Systems for the Protection of Life and Property 2010 Edition.
   2. All control equipment must have transient protection devices to comply with UL864 requirements.
   3. Knox Box(s) – number, make, and model shall be provided as determined by the Fire Prevention Bureau, and shall be located as required by the Fire Department. All keys required to operate the life safety signaling system shall be placed within the box.
   4. Personnel Qualifications
      a. System Installers and Service Personnel
         (1) Life safety signaling system installers and service personnel shall be Maine licensed electricians.
         (2) Life safety signaling system installers and service personnel shall have completed an approved training program in accordance with *NFPA 72*.
      b. Certificate of Fitness
         (1) Companies engaged in the installation or servicing of life safety signaling system shall have a Certificate of Fitness.
         (2) Certificates of Fitness shall comply with NFPA 1.
   5. A fire alarm records cabinet shall be provided next to the Signal System Interface Panel. The cabinet shall be keyed alike, and labeled "FIRE ALARM DOCUMENTS". With the exception of Section 14.6.3, it shall contain all records listed in Sections 10.18 and 14.6

of *NFPA 72* for the life of the signaling system. In addition, a Record of System Installation (#14 of the Fire Alarm Emergency Communication System Record of Completion) shall be laminated and affixed to the inside of the cabinet.

C. Control Equipment
1. The signal system interface panel or a full-function annunciator panel shall be placed at the primary point of entry as defined by the Fire Prevention Bureau.
2. Programmable systems shall be capable of being programmed onsite.
3. All control features shall be placed within the signal system interface panel or annunciator panel only.
4. All signal system controls shall be secured by a key. Locked room doors shall not be acceptable. Allen keys shall not be acceptable.
5. Drill switches when activated shall be programmed to prevent transmission of an alarm signal, but shall initiate a supervisory signal at the panel and transmit a supervisory signal when connected to a central station. Activation of a drill switch alone shall not cause the evacuation signals to silence.
6. Any signal system interface panel which is placed within a space shall have the door leading to that space labeled with the words "Fire Alarm Control Panel".
7. Where two-way telephone communication service for fire department use is required by Chapter 10 of City Code and the fire department radio system is approved as an equivalent system, the Fire Prevention Bureau may require an approved fixed repeater system that shall meet the interface requirements of the City of Portland's 800 mhz radio system. All such equipment shall be properly installed and regularly maintained, and the cost thereof borne by the property owner and shall be available for inspection and use of the City of Portland 24/7.
8. Where fire department radio equipment fails to penetrate a building, the Fire Chief reserves the right to require a fixed repeater system complying with 1.4.B.8.

D. Initiating Devices
1. The tripping of a duct detector or tamper switch shall activate a supervisory signal only and shall not sound the evacuation signals.
2. Detection devices located within concealed spaces or spaces deemed inaccessible by the Fire Prevention Bureau shall have an indicator visual to the firefighter from an adjacent normally occupied space approved by the Fire Prevention Bureau.
3. Manual pull stations shall be reset with the same key as the fire alarm panel.
4. All automatic extinguishing systems shall be supervised by the life safety signal system.
5. All detection devices shall be protected against radio frequency activation.
6. Initiation devices shall be labeled with a unique identity number visible from the floor for tracking of maintenance.

E. Master Box Connections
1. Master Box Alarm Connections shall be approved by the Fire Chief.
2. All new master boxes shall be connected to the City of Portland Public Safety Answering Point (PSAP) via an approved wireless master box. Those facilities requiring or desiring signaling system monitoring other than the master box connection shall be by approved central station or means approved by the Fire Chief.
3. Master box alarm systems shall have a drill switch complying with 1.4.B.6.
4. Master box equipment shall be of the type approved by the Fire Chief.

5. Installation shall be per manufacturer and City requirements.
6. Master box equipment shall be located next to the signal system interface panel and shall not be capable of operation apart from the building signal system.
7. Each master box alarm number shall not serve more than 100,000 square feet of building space, more than one building, more than one evacuation zone, or more than 6 stories.
8. All wiring on the municipal side of the signal system interface panel shall be rigid conduit.

F. Initiation Devices
1. Initiation devices shall be labeled with a unique identity number visible from the floor for tracking of maintenance. All such labeling shall be completed in the time frame established by *NFPA 72* for which each device of the given type must have been tested

1.5 "HOUSE" FIRE ALARM SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices located in common areas, the following functions shall immediately occur:
1. The system alarm LED shall flash.
2. A local piezo electric signal in the control panel shall sound.
3. A backlit 80-character LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed and the associated system outputs (alarm Notification appliances and/or relays) shall be activated.
6. Audible and visual alarm notification appliances throughout the facility (including those in Living Units) shall activate.

1.6 "LOCAL" FIRE ALARM SCOPE

A. Multiple-station, hard-wired unitary equipment conforming to NFPA 72 shall be provided for all living units and shall be installed in accordance with the project specifications and Drawings.

B. Basic Performance:
1. Living Units : Actuation of any automatic fire alarm initiating device causes all local audible and visual alarms to activate within the given unit.

1.7 SUBMITTALS

A. General:
1. Submit shop drawings and product data under provisions of Division 1 and Section 16010.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and

quality. Equivalent equipment (compatible UL Listed) from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
   3. Show annunciator layout, configurations, and terminations.

C. Manuals:
   1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
   2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
   3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications:
   1. Provide the services of a factory-trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
   2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

E. Certifications: Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.8 GUARANTY

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.9 POST CONTRACT MAINTENANCE

A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

1.10 POST CONTRACT EXPANSIONS

A. The contractor shall provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

1.11 APPLICABLE STANDARDS AND SPECIFICATIONS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards.

1. National Fire Protection Association (NFPA) - USA:
   a. No. 12 — CO2 Extinguishing Systems.
   b. No. 12A & 12B — Halon Extinguishing Systems.
   c. No. 15 — Water Spray Systems.
   d. No. 16 — Foam/Water Deluge and Spray Systems.
   e. No. 72-1993 — National Fire Alarm Code.
   f. No. 101 — Life Safety Code.
2. Underwriters Laboratories Inc. (UL) - USA:
   a. No. 268 — Smoke Detectors for Fire Protective Signaling Systems.
   b. No. 864 — Control Units for Fire Protective Signaling Systems.
   c. No. 268A — Smoke Detectors for Duct Applications.
   d. No. 521 — Heat Detectors for Fire Protective
   e. No. 464 — Audible Signaling Appliances.
   f. No. 38 — Manually Actuated Signaling Boxes.
   g. No. 346 — Waterflow Indicators for Fire Protective Signaling Systems.
   h. No. 1076 — Control Units for Burglar Alarm Proprietary Protective Signaling Systems.
   i. No. 1971 — Visual Notification Appliances.

B. Local and State Building Codes.

C. All requirements of the City of Biddeford Fire Department.

1.12 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

1. UL Underwriters Laboratories Inc.
2. FM Factory Mutual

B. The fire alarm control panel shall meet UL Standard 864, (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

C. The system shall be listed by the national agencies as suitable for extinguishing release applications.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.2 CONDUIT AND WIRE

A. Conduit:
1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements, and shall be as specified in Section 16111.
2. Where possible, all wiring shall be concealed within partitions or above ceilings. Where exposed wiring is necessary, it shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
4. Wiring for 24 volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduits shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4-inch (19.1 mm) minimum.

B. Wire:
1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
5. Wiring used for the multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. The system shall support up to 1,000 ft. of untwisted, unshielded wire. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop.
6. All field wiring shall be completely supervised.
7. The Fire Alarm Control panel shall be capable of T-Tapping Class B (NFPA Style 4) Signaling Line Circuits (SLC's). Systems that do not allow or have restrictions in, for example, the amount of T-Taps, length of T-Taps etc., are not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

D. Initiating circuits shall be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

E. The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the Main Power Distribution Panel as FIRE ALARM. Fire Alarm Control Panel Primary Power wiring shall be 12 AWG. The Control Panel Cabinet shall be grounded securely to either a cold water pipe or grounding rod.

2.3 "HOUSE" FIRE ALARM CONTROL PANEL:

A. The FACP shall be a *Notifier* Model FireWarden-100-2(E), or APPROVED EQUAL and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. System Capacity and General Operation:
1. The control panel shall provide, or be capable of expansion to 198 intelligent/addressable devices.
2. The system shall include Form-C alarm and trouble relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) programmable Notification Appliance Circuits.
3. The system shall support up to 99 programmable EIA-485 driven relays for an overall system capacity of 301 circuits.
4. The Fire Alarm Control Panel shall include a full-featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display, individual, color-coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.
5. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
6. The FACP shall provide the following features:

a. Drift Compensation to extend detector accuracy over life.
b. Sensitivity Test, meeting requirements of NFPA 72, Chapter 5.
c. Maintenance Alert to warn of excessive smoke detector dirt or dust accumulation.
d. System Status Reports to display or printer.
e. Alarm Verification, with verification counters.
f. PAS presignal, meeting NFPA 72 3-8.3 requirements.
g. Rapid manual station reporting (under 2 seconds).
h. Non-Alarm points for general (non-fire) control.
i. Periodic Detector Test, conducted automatically by software.
j. Pre-alarm for advanced fire warning.
k. Cross Zoning with the capability of: counting two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
l. March time and temporal coding options.
m. Walk Test, with check for two detectors set to same address.
n. UL 1076 Security Monitor Points.
o. Control-By-Time for non-fire operations, with holiday schedules.
p. Day/Night automatic adjustment of detector sensitivity.
q. Device Blink Control for sleeping areas.

7. The FACP shall be capable of coding Notification circuits in March Time (120 PPM), Temporal (NFPA 72 A.2.2.2.2), and California Code.

C. Central Microprocessor:

1. The Microprocessor shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory and shall not be lost even if system primary and secondary power failure occurs.
3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.

D. Display:

1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.
3. The display shall provide an 80-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide 5 Light-Emitting-Diodes (LEDs), that will indicate the status of the following system parameters: AC POWER, FIRE ALARM, SYSTEM TROUBLE, ALARM SILENCED, SUPERVISORY, MAINTENANCE/PRE-SIGNAL, DISABLED, BATTERY FAULT, and GROUND FAULT.
4. The Display shall provide a 16-key touch keypad with control capability to command all system functions, entry of alphabetic or numeric information, and field

programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

5. The Display shall include the following operator functions: ALARM SILENCE, SYSTEM RESET, DRILL, and ACKNOWLEDGE/STEP.

E. Signaling Line Circuit (SLC):

1. The SLC interface shall provide power to and communicate with up to 99 intelligent detectors (Ionization, Photoelectric, or Thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. This shall be accomplished over a single SLC loop and shall be capable of NFPA 72 Style 4, Style 6, or Style 7 wiring.
2. The loop interface shall receive analog information from all intelligent detectors that shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
3. The detector software shall meet NFPA 72, chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.
4. The detector software shall allow manual or automatic sensitivity adjustment.

F. Serial Interfaces:

1. An EIA-232 interface between the Fire Alarm Control Panel and UL Listed Electronic Data Processing (EDP) peripherals shall be provided.
2. The EIA-232 interface shall allow the use of printers, CRT monitors, and PC compatible computers.
3. The EIA-232 interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines. This ancillary capability shall allow remote readout of all status information, including analog values, and shall not interfere with or degrade FACP operations when used. It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode. It shall also allow adjustment of detector sensitivity and readout of the history file.
4. An EIA-485 interface shall be available for the serial connection of remote annunciators and LCD displays.
5. The EIA-485 interface may be used for network connection to a Proprietary Receiving Unit.

G. Enclosures:

1. The control panel shall be housed in a UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

H. All interfaces and associated equipment are to be protected so that voltage surges or line transients, consistent with UL standard 864, will not affect them.

I. Optional plug-in modules shall be provided for by NFPA 72, Chapter 4, Transmitters.

J. An optional module shall be available which provides 8 Form-C relays rated at 5.0. The relays shall track programmable software zones.

K. Power Supply:
1. The Power Supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
2. It shall provide 5.0 amps of usable Notification appliance power, using a switching 24 VDC regulator. A 3.0 amp Notification expansion power supply shall be available for the demanding requirements of UL 1971 and ADA devices, for a total system capacity of 8 amps.
3. It shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge.
4. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. It shall be power-limited per 1995 UL864 standards.
6. It shall provide optional meters to indicate battery voltage and charging current.

L. Field Charging Power Supply: The FCPS is a device designed for use as either a remote 24-volt power supply or used to power Notification Appliances.
1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24-volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60-hour standby.
2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
3. The FCPS shall include a surface mount backbox.
4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per 1993 NFPA requirements.
5. The FCPS include power limited circuitry, per 1995 UL standards.

M. Field Wiring Terminal Blocks: For ease of service all panel I/O wiring terminal blocks shall be a removable, plug-in type and have sufficient capacity for 18 to 12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

N. Operator's Controls:
1. Acknowledge/Step Switch: Activation of the control panel Acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and Trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.
   a. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
2. Alarm Silence Switch: Activation of the Signal silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field-programmable within the confines of

all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

3. System Reset Switch: The system reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
   a. Holding the system RESET switch shall perform a lamp test function.
4. Drill (Evacuate) Switch: The drill switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

O. Field Programming:
1. The system shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
2. All programming may be accomplished through the standard FACP keypad.
3. All field-defined programs shall be stored in non-volatile memory.
4. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for actual change of program information.
5. Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
6. A special program check function shall be provided to detect common operator errors.
7. An Auto-Program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
8. For flexibility, an off-line programming function, with batch upload/download, shall also be available.

P. Specific System Operations:
1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all-analog intelligent smoke detectors in the system from the control panel. Sensitivity range shall be within the allowed UL window.
2. Alarm Verification: Each intelligent addressable smoke detector in the system shall be independently selected and enabled to be alarm verified. The alarm verification delay shall be programmable from 5 to 30 seconds. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
3. Point Disable: Any device in the system may be enabled or disabled through the system keypad.
4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
   a. Device status.
   b. Device types.
   c. Custom device labels.
   d. View analog detector values.
   e. Device zone assignments.
   f. All program Parameters.

5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing system status.
6. System History Recording and Reporting: The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 650 system alarms/troubles/operator actions. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the History Buffer may be manually reviewed, one event at a time, or printed in its entirety.
   a. Although the foreground history buffer may be cleared for user convenience, a background, non-erasable buffer shall be maintained which provides the last 650 system events.
   b. The History Buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.
7. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each intelligent smoke detector and shall analyze the detector responses over a period of time.
   a. If any intelligent smoke detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. Pre-alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field-adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
9. Software Zones: The FACP shall provide 99 software zones. All addressable devices may be field-programmed to be grouped into software zones for control activation and annunciation purposes.

2.4 "HOUSE" FIRE ALARM COMPONENTS:

A. Programmable Electronic Sounders:
   1. Electronic sounders shall operate on 24 VDC nominal.
   2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, Temporal or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
   3. Shall be flush or surface mounted as shown on plans.

B. Strobe Lights:
   1. Shall operate on 24 VDC nominal.
   2. Shall meet the requirements of the ADA as defined in UL standard 1971 and shall meet the following criteria:
      a. The maximum pulse duration shall be 2/10ths of one second.
      b. The strobe intensity shall meet the requirements of UL 1971.
      c. The flash rate shall meet the requirements of UL 1971.

d. The appliance shall be placed 80 in (2,030 mm) above the highest floor level within the space, or 6 in (152 mm) below the ceiling, whichever is the lower.

e. Fire alarm notification appliances in sleeping areas within living units shall have a visual intensity of 110 candela where the appliance is mounted 24" or more below the ceiling, or 177 candela where the appliance is mounted less than 24" below the ceiling. Notification appliances shall be installed at 80" above finished floor. All other notification appliances located within living units shall have a visual intensity of 15 candela.

C. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of Section A listed above for audibility.
2. Shall meet the requirements of Section B listed above for visibility.

D. Addressable Devices – General:

1. Addressable Devices shall provide an address-setting means using rotary decimal switches.
2. Addressable Devices shall use simple to install and maintain decade (numbered 1 to 10) type address switches. Devices that use a binary address setting method, such as a dipswitch, are not an allowable substitute.
3. Detectors shall be intelligent and addressable, and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuits.
4. Addressable smoke and thermal detectors shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the flashing mode operation of the detector LEDs shall be optional through the system field program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. An optional base shall be available with a built-in (local) sounder rated at 85 DBA minimum.
8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

E. Addressable Pull Box (manual station):

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable

communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

F. Intelligent Photoelectric Smoke Detector

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
2. The detectors shall be ceiling-mounted and available in an alternate model with an integral fixed 135-degree heat-sensing element.
3. Each detector shall contain a remote LED output and a built-in test switch.
4. Detector shall be provided on a twist-lock base.
5. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.
6. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.
7. The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).
8. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.
9. All field wire connections shall be made to the base through the use of a clamping plate and screw.

G. Intelligent Thermal Detectors: Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

H. Addressable Dry Contact Monitor Module:

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLC loops.
2. The monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box.
3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch x 1-1/4 inch x 1/2 inch. This version need not include Style D or an LED.

I. Two-Wire Detector Monitor Module:
   1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
   2. The two-wire monitor module shall mount in a 4-inch square, 2-1/8 inch deep electrical box or with an optional surface backbox.
   3. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

J. Addressable Control Module:
   1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.
   2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
   3. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
   4. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.
   5. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

K. Isolator Module:
   1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
   2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
   3. The isolator module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
   4. The isolator module shall mount in a standard 4-inch deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

L. Waterflow Indicators:
   1. Flow switches shall be integral, mechanical, non-coded, non-accumulative retard type.
   2. Flow switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 Ä 45 seconds.

3. Flow switches shall be located a minimum of one (1) foot from a fitting that changes the direction of the flow and a minimum of three (3) feet from a valve.

M. Sprinkler and Standpipe Valve Supervisory Switches:
1. Each sprinkler system water supply control valve riser or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.
3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The mechanism shall be contained in a weatherproof aluminum housing that shall provide a 3/4-inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. Switch housing to be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

N. Remote Annunciators
1. The remote annunciator shall be as manufactured by *Notifier* Model LCD-80/ABF-1B, or approved equal. The annunciator shall include an 80 character LCD display and shall include control switches for system acknowledge, signal silence and system reset period. The annunciator cabinet shall be flush recessed type.

O. House Fire Alarm Control Panel Batteries
1. Shall be 12 volt, Gell-Cell type (two required).
2. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
3. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks refilling, spills and leakage shall not be required.

2.5 "LOCAL" FIRE ALARM COMPONENTS

A. Living Unit Combination Smoke Detector/Horn/Strobe: *Gentex* Model 7109CS. Wall or ceiling mounted station with integral photoelectric smoke detector, horn and strobe. Unit shall be equipped with status light and test switch. Provide a quantity of six (6) detectors for future installation by Owner.
1. Power: 120 VAC with integral 9 VDC battery.
2. Contacts: Form C
3. Horn: 90 dB.
4. Smoke Sensitivity: 3%.
5. Strobe: UL1971, 177 cd.

2.6 MUNICIPAL FIRE ALARM MASTER BOX

A. Provide municipal fire alarm master transmittal box as directed by the City Fire Department to match the City's standard.

B. Provide communications cable for fire alarm master box to be connected to the municipal fire alarm circuit at Elm Street.
   1. Description: IMSA Spec 20-2 shielded, 3-twisted-pair, 600 volt, #16 AWG conductor with black polyethylene jacket. Obtain approval from City Fire Department for cable prior to purchasing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All wiring shall be concealed in finished areas. Exposed wiring in conduit may be used in areas where concealed wiring is not possible; however, prior approval from the Architect must be obtained for any exposed work prior to installation.

C. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

D. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

E. Connect the remote annunciator to the main fire alarm control panel with one-pair EIA-485 cable and with two 24 VDC conductors, size #18 AWG.

F. Verify installation detail with Architect for door holders prior to installation.

3.2 TEST

A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.
   1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
   2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
   3. Verify activation of all flow switches.

4. Open initiating device circuits and verify that the trouble signal actuates.
5. Open and short signaling line circuits and verify that the trouble signal actuates.
6. Open and short Notification Appliance Circuits and verify that trouble signal actuates.
7. Ground all circuits and verify response of trouble signals.
8. Check presence and audibility of tone at all alarm notification devices.
9. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test.
10. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
11. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION

A. At the final inspection a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

3.4 INSTRUCTION

A. Provide instruction as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The Contractor and/or the Systems Manufacturer's representatives shall provide a typewritten "Sequence of Operation."

END OF SECTION

SECTION 16910

GAS ENGINE DRIVEN GENERATOR SETS

PART 1 – GENERAL

1.1 SCOPE

A. Provide complete factory assembled natural gas-fired generator set equipment with digital (microprocessor-based) electronic controls.

B. Provide factory test, startup by a supplier authorized by the manufacturer, and on-site testing of the system.

C. The generator set manufacturer shall warrant all equipment provided under this section, whether or not is manufactured by the generator set manufacturer, so that there is one source for warranty and product service. Technicians specifically trained and certified by the manufacturer to support the product and employed by the generator set supplier shall service the generator sets.

1.2 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards, as applicable. The generator set shall include necessary features to meet the requirements of these standards.
   1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings
   2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
   3. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
   4. NFPA99 – Essential Electrical Systems for Health Care Facilities
   5. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:
   1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
   2. UL1236 – Battery Chargers
   3. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. FCC Part 15, Subpart B.
5. IEC8528 part 4. Control Systems for Generator Sets
6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.3 SUBMITTALS

A. Within 10 days after award of contract, provide six sets of the following information for review:
1. Manufacturer's product literature and performance data, sufficient to verify compliance to specification requirements.
2. A paragraph by paragraph specification compliance statement, describing the differences between the specified and the proposed equipment.
3. Manufacturer's certification of prototype testing.
4. Manufacturer's published warranty documents.
5. Shop drawings showing plan and elevation views with certified overall dimensions, as well as wiring interconnection details.
6. Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.
7. Manufacturer's installation instructions.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on microprocessor-based generator sets manufactured by *Cummins Power Generation*. Equipment by the following other supplier that meets the requirement of this specification is acceptable. Proposals must include a line by line compliance statement based on this specification.
1. *Kohler*
2. *Caterpillar*
3. Substitutions: None permitted

2.2 GENERATOR SET

A. Model: The generator shall be *Cummins* Series GGPA, or approved equal.

B. Ratings
1. The generator set shall operate at 1800 rpm and at a voltage of: 208/120 Volts AC, three phase, 4-wire, 60 hertz.
2. The generator set shall be rated at 150 kW, 189 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 499 ft. (152 meters), ambient temperatures up to 77 degrees F (25 degrees C).
3. The generator set rating shall be based on emergency/standby service.

C. Performance
1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load for both parallel and non-parallel applications. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
3. The engine-generator set shall be capable of single step load pick up of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of ___ kVA. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic. Telephone influence factor shall be less than 40.

D. Construction
1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

E. Connections
1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a wall-mounted common distribution panel.
3. Generator set control interfaces to other system components shall be made on a common, permanently labeled terminal block assembly.

2.3 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be natural gas fueled, radiator and fan cooled. Minimum displacement shall be 305 cubic inches, with 8 cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Engine accessories and features shall include:

B. Complete engine fuel system, including all pressure regulators, strainers, and control valves. The fuel system shall be plumbed to the generator set skid for ease of site connections to the generator set. For dual fuel systems, changeover from primary to secondary fuel shall be automatic.

C. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous or parallel states.

D. Skid-mounted radiator and cooling system rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the generator air inlet, based on 0.5 in H_2O external static head. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture. Rotating parts shall be guarded against accidental contact.

E. Electric starter(s) capable of three complete cranking cycles without overheating.

F. Positive displacement, mechanical, full pressure, lubrication oil pump.

G. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

H. Replaceable dry element air cleaner with restriction indicator.

I. Flexible fuel lines.

J. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

K. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.
2. The coolant heater shall be installed on the engine with high temperature silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall be installed using quick disconnect couplers to isolate the heater for replacement of the heater element. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.
4. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

L. Provide vibration isolators, spring/pad type or as recommended by the manufacturer, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

M. Starting and Control Batteries shall be calcium/lead antimony type, 24 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors.

N. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed according to the engine manufacturer's recommendations and applicable codes and standards.

1. Provide a minimum 12 amp battery charger for each generator set battery bank. Generator sets incorporating two battery banks shall be provided with two chargers connected together and operating in parallel, with alarm output(s) connected in parallel. The charger(s) shall include the following capabilities:
2. Chargers shall be UL 1236-BBHH listed and CSA or CUL certified for use in emergency applications.

3. The charger shall be compliant with UL991 requirements for vibration resistance.
4. The charger shall comply with the requirements of EN61000-4-5 for voltage surge resistance; EN50082-2 for immunity; EN61000-4-2 for ESD; EN61000-4-3 for radiated immunity; ANSI/IEEE C62.41 category B and IN61000-4-4 for electrically fast transient; EN61000-4-6 for conducted emissions; and FCC Part 15 Class A for radiated emissions.
5. The charger shall be capable of charging a fully discharged battery without damage to the charger. It shall be capable of returning a fully discharged battery to fully charged condition within 24 hours. The charger shall be UL-labeled with the maximum battery amp-hour rating that can be recharged within 24 hours.
6. The charger shall incorporate a 4-state charging algorithm, to provide trickle charge rate to restore fully discharged batteries, a bulk charge rate to provide fastest possible recharge after normal discharge, an absorption state to return the battery to 100 percent of charge, and a float stage to maintain a fully charge battery and supply battery loads when the generator set is not operating. In addition, the charger shall include an equalization timer. Charge rates shall be temperature compensated based on the temperature directly sensed at the battery.
7. The DC output voltage regulation shall be within plus or minus 1%. The DC output ripple current shall not exceed 1 amp at rated output current level.
8. The charger shall include the following features:
   a. two line alphanumeric display with programming keys to allow display of DC output ammeter and voltmeters (5% accuracy or better), display alarm messages, and perform programming;
   b. LED indicating lamp(s) to indicating normal charging condition (green), equalize charge state (amber), and fault condition (red);
   c. AC input overcurrent, over voltage, and undervoltage protection;
   d. DC output overcurrent protection;
   e. Alarm output relay
   f. Corrosion resistant aluminum enclosure

2.4 AC GENERATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed 150 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single

phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

D. The sub-transient reactance of the alternator shall not exceed 15 percent, based on the standby rating of the generator set.

E. The alternator shall be capable of operation with reverse kVAR of 0.15 per unit.

2.5 GENERATOR SET CONTROL

A. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. The generator set mounted control shall include the following features and functions:

1. Control Switches
   a. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.
   b. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
   c. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
   d. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.
2. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:
   a. Digital metering set, 1% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line

and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

b. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.

c. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.

d. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

D. Generator Set Alarm and Status Display. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

1. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
2. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
3. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
4. The control shall include an amber common warning indication lamp.
5. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
   a. low oil pressure (warning)
   b. low oil pressure (shutdown)
   c. oil pressure sender failure (warning)
   d. low coolant temperature (warning)
   e. high coolant temperature (warning)
   f. high coolant temperature (shutdown)
   g. high oil temperature (warning)
   h. engine temperature sender failure (warning)
   i. low coolant level (warning)
   j. fail to crank (shutdown)
   k. fail to start/overcrank (shutdown)
   l. overspeed (shutdown)
   m. low DC voltage (warning)

n. high DC voltage (warning)
o. weak battery (warning)
p. low fuel-daytank (warning)
q. high AC voltage (shutdown)
r. low AC voltage (shutdown)
s. under frequency (shutdown)
t. over current (warning)
u. over current (shutdown)
v. short circuit (shutdown)
w. over load (warning)
x. emergency stop (shutdown)
y. (4) configurable conditions

6. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

E. Engine Status Monitoring.

4. The following information shall be available from a digital status panel on the generator set control :
   a. engine oil pressure (psi or kPA)
   b. engine coolant temperature (degrees F or C)
   c. engine oil temperature (degrees F or C)
   d. engine speed (rpm)
   e. number of hours of operation (hours)
   f. number of start attempts
   g. battery voltage (DC volts)
5. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

L. Engine Control Functions.

4. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
5. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
6. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

7. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
8. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

M. Alternator Control Functions:

1. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.
2. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445. The protection for this function shall be 3rd party certified to very performance.
3. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445. The protection for this function shall be 3rd party certified to very performance.
4. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
5. An line to neutral sensing AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown

shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

6. The generator set control shall include a 120VAC-control heater.

N. Control Interfaces for Remote Monitoring:

1. The control system shall provide four programmable output relays. These relay outputs shall be configurable for any alarm, shutdown, or status condition monitored by the control. The relays shall be configured to indicate: (1) generator set operating at rated voltage and frequency, (2) common warning, (3) common shutdown, (4) load shed command.
2. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.
3. A fused 10 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.
4. The control shall be provided with a direct serial communication link for the LonWorks communication network interface as described elsewhere in this specification and shown on the drawings.

2.5 OTHER EQUIPMENT TO BE PROVIDED WITH THE GENERATOR SET

A. The generator set shall be provided with two mounted main line circuit breakers, sized to carry the rated output current of the generator set. The circuit breakers shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

B. Outdoor Weather-Protective Sound Attenuated Enclosure

1. The generator set shall be provided with an outdoor enclosure, with the entire package listed under UL2200. The package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing. The total assembly of generator set, enclosure, and sub-base fuel tank (when used) shall be designed to be lifted into place using spreader bars. Housing shall provide ample airflow for generator set operation at rated load in an ambient temperature of 100F. The housing shall have hinged access doors as required to maintain easy access for all operating and service functions. All doors shall be lockable, and include retainers to hold the door open during service. Enclosure roof shall be cambered to prevent rainwater accumulation. Openings shall be screened to limit access of rodents into the enclosure. All electrical power and control interconnections shall be made within the perimeter of the enclosure.
2. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color using a two step electro-coating paint process, or equal meeting the performance requirements specified below. All surfaces of all metal parts shall be primed and painted. The painting process shall result in a coating that meets the following requirements:
   a. Primer thickness, 0.5-2.0 mils. Top coat thickness, 0.8-1.2 mils.
   b. Gloss, per ASTM D523-89, 80% plus or minus 5%. Gloss retention after one year shall exceed 50%.
   c. Crosshatch adhesion, per ASTM D3359-93, 4B-5B.
   d. Impact resistance, per ASTM D2794-93, 120-160 inch-pounds.
   e. Salt Spray, per ASTM B117-90, 1000+ hours.
   f. Humidity, per ASTM D2247-92, 1000+ hours.
   g. Water Soak, per ASTM D2247-92, 1000+ hours.
3. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.
4. Enclosure shall be constructed of minimum 12 gauge steel for framework and 14 gauge steel panels. All hardware and hinges shall be stainless steel.
5. A factory-mounted exhaust silencer shall be installed inside the enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with a rain cap. Exhaust connections to the generator set shall be through seamless flexible connections.
6. The enclosure shall include the following maintenance provisions:
   a. Flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure, with internal drain valves
   b. External radiator fill provision.

7. Provide an external emergency stop switch that is protected from accidental actuation.
   a. Inlet ducts shall include rain hoods.
8. The generator set shall be provided with a Level 2 sound-attenuated housing which allows the generator set to operate at full rated load in an ambient temperature of up to 100F. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 73 dBA at any location 7 meters from the generator set in a free field environment.
9. The enclosure shall be insulated with non-hydroscopic materials.

PART 3 – OPERATION

3.1 SEQUENCE OF OPERATION

A. Generator set shall start on receipt of a start signal from remote equipment. The start signal shall be via hardwired connection to the generator set control.

B. The generator set shall complete a time delay start period as programmed into the control.

C. The generator set control shall initiate the starting sequence for the generator set. The starting sequence shall include the following functions:
   1. The control system shall verify that the engine is rotating when the starter is signaled to operate. If the engine does not rotate after two attempts, the control system shall shut down and lock out the generator set, and indicate "fail to crank" shutdown.
   2. The engine shall fire and accelerate as quickly as practical to start disconnect speed. If the engine does not start, it shall complete a cycle cranking process as described elsewhere in this specification. If the engine has not started by the completion of the cycle cranking sequence, it shall be shut down and locked out, and the control system shall indicate "fail to start".
   3. The engine shall accelerate to rated speed and the alternator to rated voltage. Excitation shall be disabled until the engine has exceeded programmed idle speed, and regulated to prevent over voltage conditions and oscillation as the engine accelerates and the alternator builds to rated voltage.

D. On reaching rated speed and voltage, the generator set shall operate as dictated by the control system in isochronous, synchronize, load share, load demand, or load govern state.

E. When all start signals have been removed from the generator set, it shall complete a time delay stop sequence. The duration of the time delay stop period shall be adjustable by the operator.

F. On completion of the time delay stop period, the generator set control shall switch off the excitation system and shall shut down.

1. Any start signal received after the time stop sequence has begun shall immediately terminate the stopping sequence and return the generator set to isochronous operation.

3.2 FACTORY TESTING

A. The generator set supplier shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.

B. Generator set factory tests on the equipment shall be performed at rated load and rated power factor. Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.

3.3 INSTALLATION

A. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

B. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

C. Equipment shall be installed on concrete pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.

D. Equipment shall be initially started and operated by representatives of the manufacturer.

E. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

F. Provide a concrete foundation pad for the generator. Concrete pad shall conform to the detail for the transformer pad shown on Contract Drawing C-301.

3.4 ON-SITE ACCEPTANCE TEST

A. The complete installation shall be tested for compliance with the specification following completion of all site work. Testing shall be conducted by representatives of the

manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests.

B. Installation acceptance tests to be conducted on-site shall include a "cold start" test, a two hour full load test, and a one step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.

C. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

3.5 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.6 SERVICE AND SUPPORT

A. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.

B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

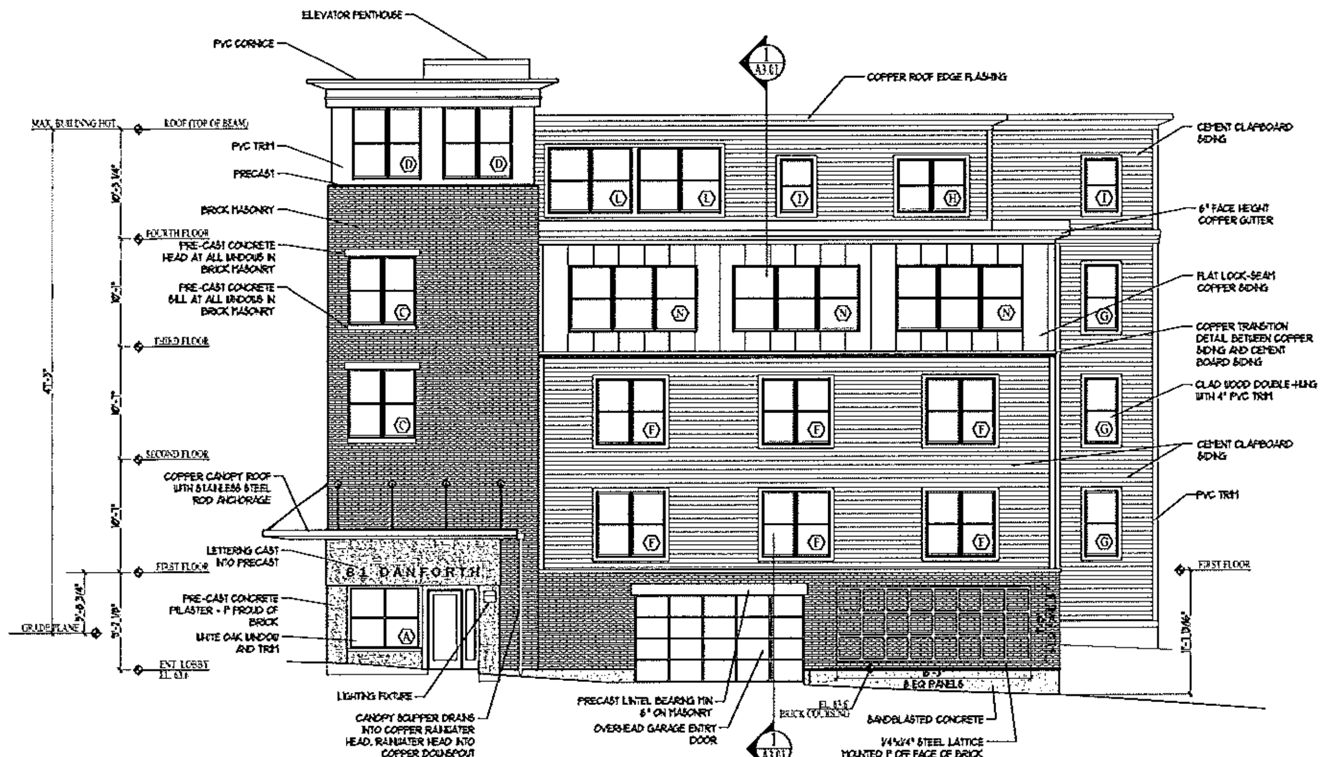
3.7 WARRANTY

A. The generator set and associated equipment shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.

B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

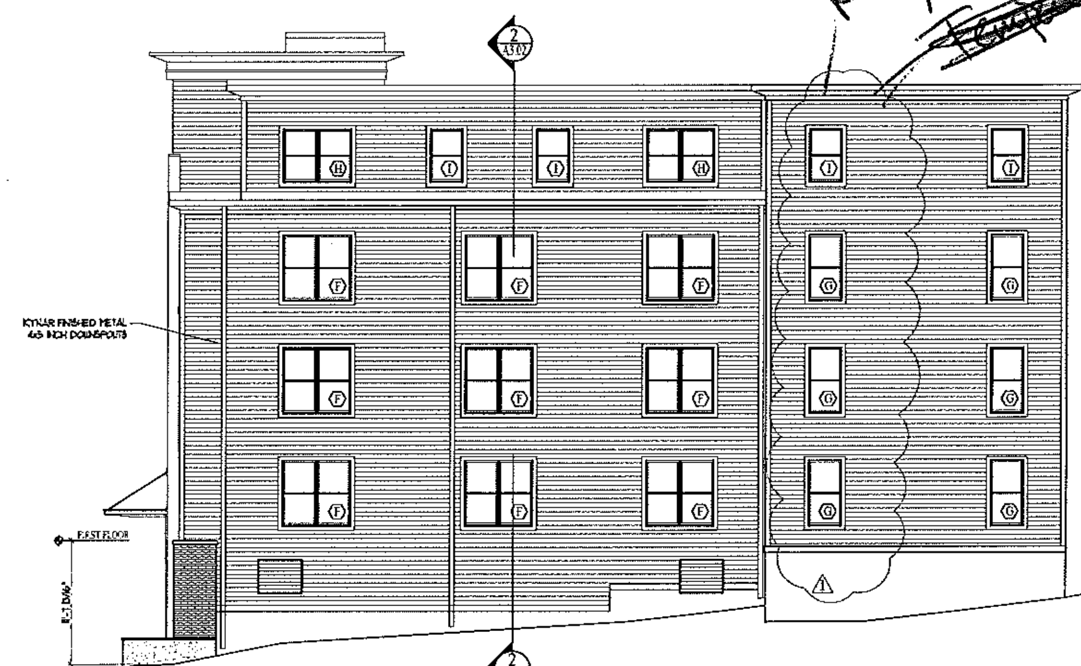
END OF SECTION

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

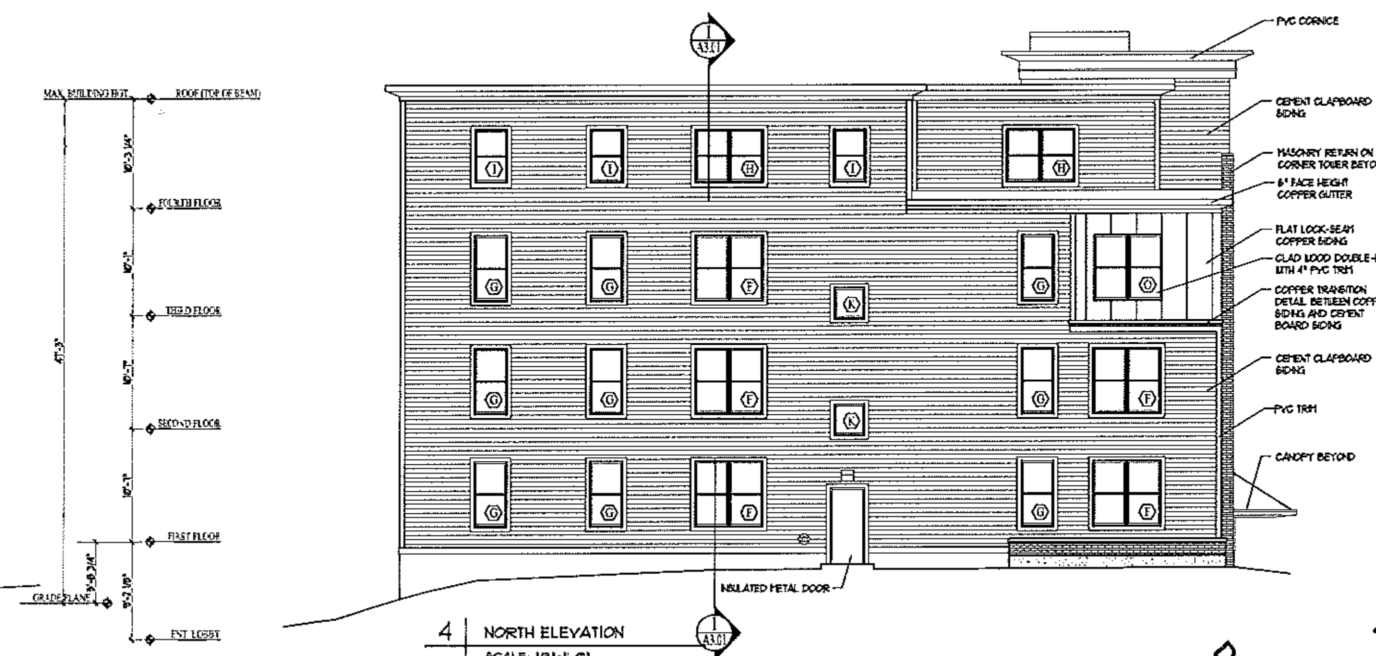


2 SOUTH ELEVATION
SCALE: 1/8"=1'-0"

Reduced % of glazing

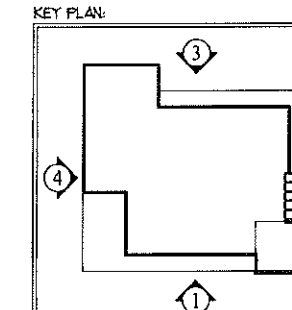


3 EAST ELEVATION
SCALE: 1/8"=1'-0"



4 NORTH ELEVATION
SCALE: 1/8"=1'-0"

KEY PLAN:



OWNER:
DANFORTH ON HIGH, LP
309 CUMBERLAND AVE., SUITE 203
PORTLAND, ME 04101

ARCHETYPE, P.A.
ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-4056

Project:
DANFORTH ON HIGH CONDOMINIUMS
81 DANFORTH STREET
PORTLAND, MAINE

Revisions:
MSHA 50% Review
Issued for Bid - 29 June 2012
1 8.7.12 Windows Revised

Scale 1/8" = 1'-0"

Date 4 June 2012

BUILDING ELEVATIONS

A2.01

2 BUILDING SECTION

SCALE: 1/4"=1'-0"

RECEIVED
AUG - 8 2012
Dept. of Building Inspections
City of Portland Maine

KEY PLAN:

OWNER:
DANFORTH ON HIGH, LP
309 CUMBERLAND AVE., SUITE 203
PORTLAND, ME 04101

ARCHETYPE, P.A.
ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-6056

Project:
DANFORTH ON HIGH
81 DANFORTH STREET
PORTLAND, MAINE

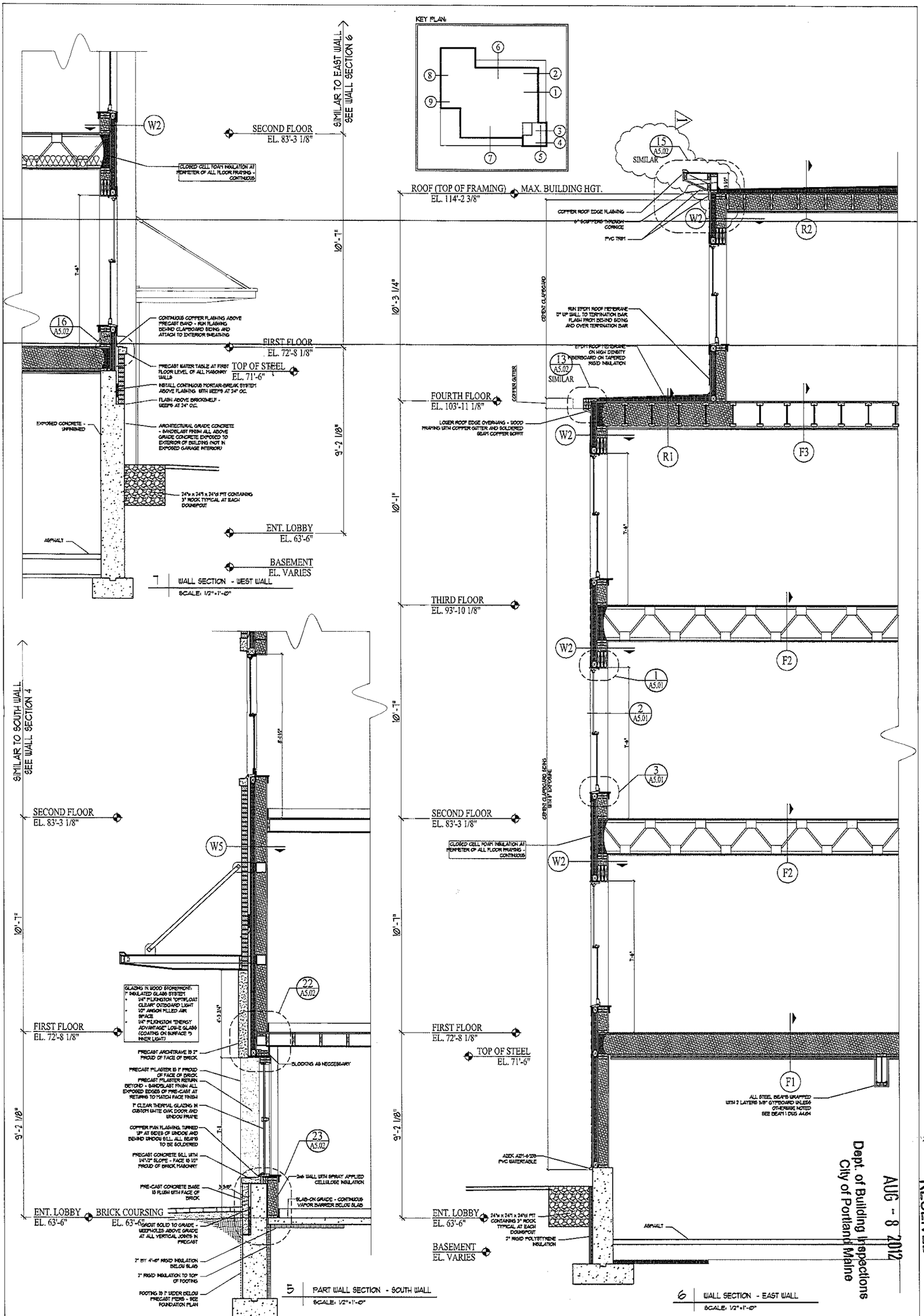
Revisions:
Issued for Bid - 29 June 2012
Δ1 8.7.12 Windows Revised

Scale 1/4" = 1'-0"

Date 4 June 2012

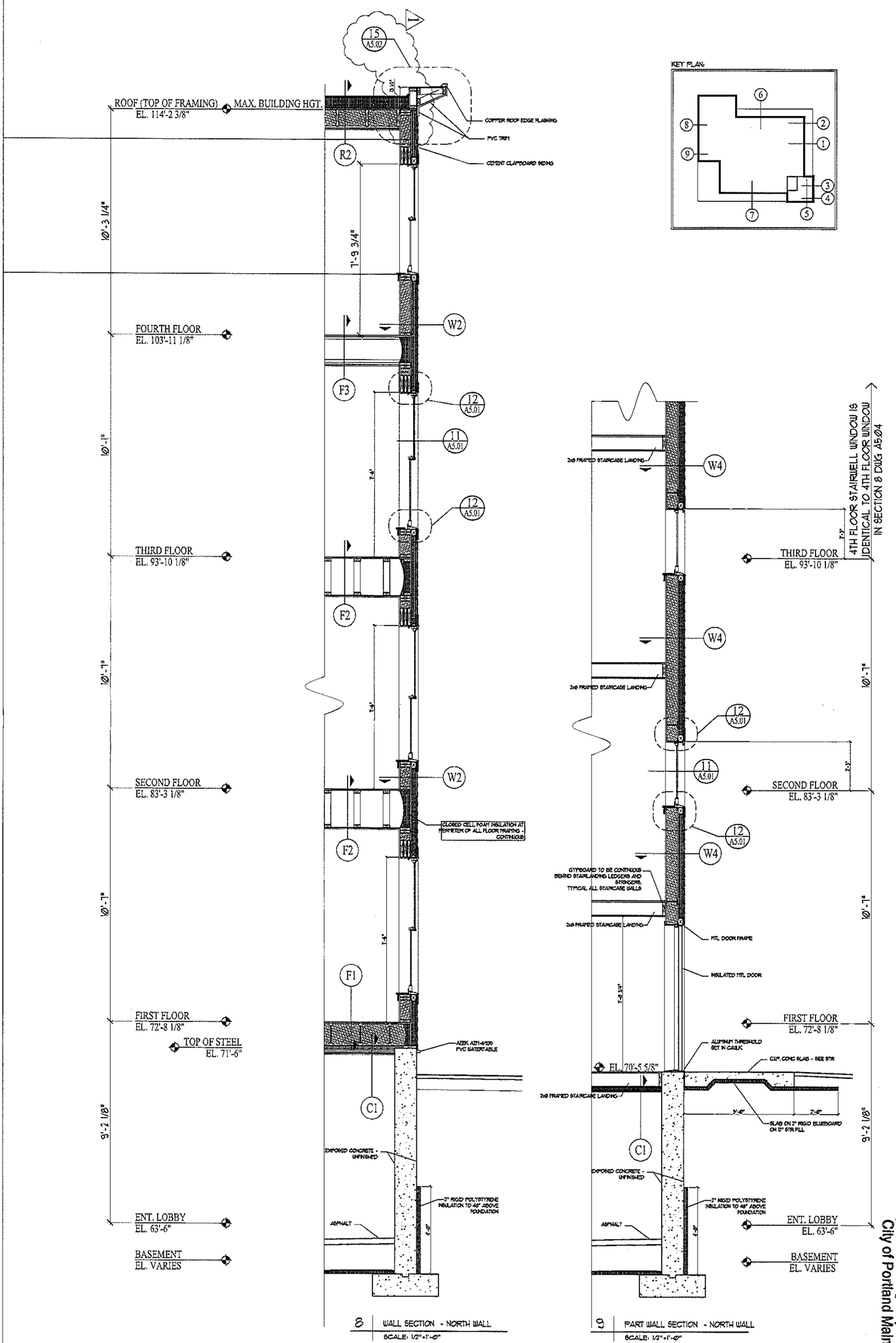
BUILDING SECTION

A3.02



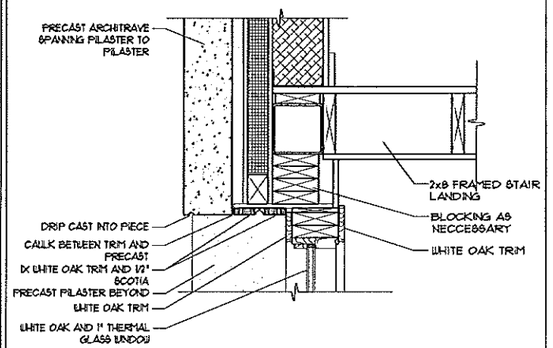
RECEIVED
AUG - 8 2012
Dept. of Building Inspections
City of Portland, Maine

A3.12	Date: 4 June 2012	Scale: 1/2" = 1'-0"	Revisions: Issued for Bid - 29 June 2012; 8.7.12 Wall/Roof Detail revised	Project: DANFORTH ON HIGH, 81 DANFORTH STREET PORTLAND, MAINE	ARCHETYPE, P.A. ARCHITECTS, 48 Union Wharf Portland, Maine 04101, (207) 772-6022 Fax (207) 772-4056	OWNER: DANFORTH ON HIGH, LP, 309 CUMBERLAND AVE., SUITE 203 PORTLAND, ME 04101
	WALL SECTIONS					



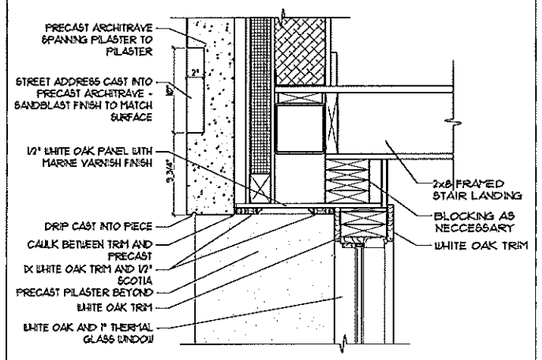
RECEIVED
AUG - 8 2012
Dept. of Building Inspections
City of Portland Maine

A3.13	Date: 4 June 2012	Scale: 1/2" = 1'-0"	Revisions: Issued for Bid - 29 June 2012; 1 8.7.12 Wall/Roof detail revised	Project: DANFORTH ON HIGH, 81 DANFORTH STREET PORTLAND, MAINE	ARCHETYPE, P.A. ARCHITECTS, 48 Union Wharf Portland, Maine 04101, (207) 772-6022 Fax (207) 772-4056	OWNER: DANFORTH ON HIGH, LP, 309 CUMBERLAND AVE., SUITE 203 PORTLAND, ME 04101
	WALL SECTIONS					



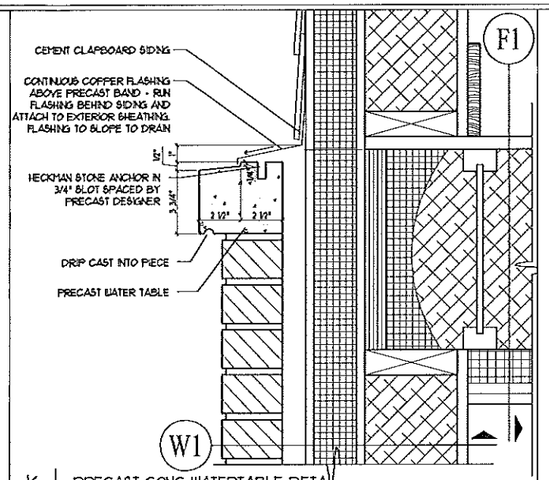
22 LOBBY WINDOW HEAD DETAIL

SCALE: 1 1/2"=1'-0"



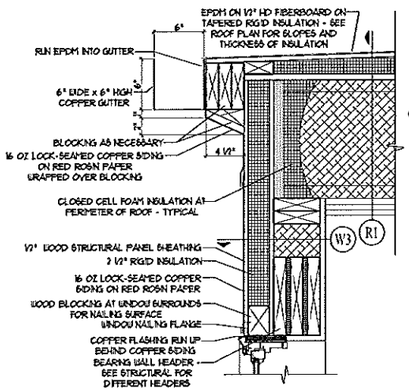
19 LOBBY WINDOW HEAD DETAIL

SCALE: 1 1/2"=1'-0"



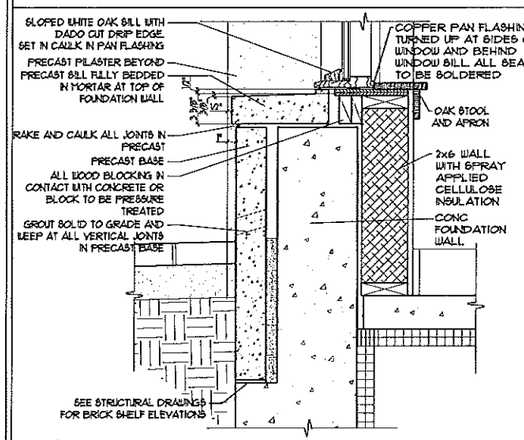
16 PRECAST CONC WATERTABLE DETAIL

SCALE: 3"=1'-0"



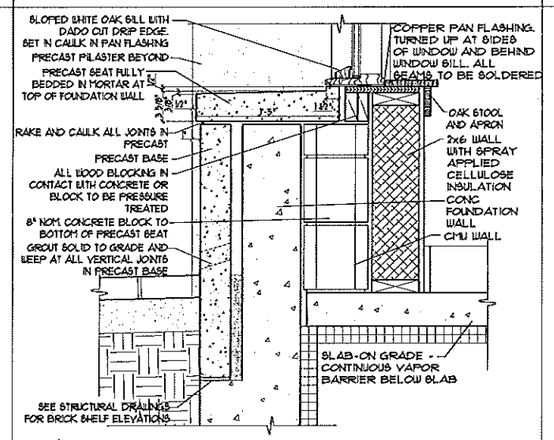
13 GUTTER DETAIL AT 4TH FLOOR/LOW ROOF

SCALE: 1 1/2"=1'-0"



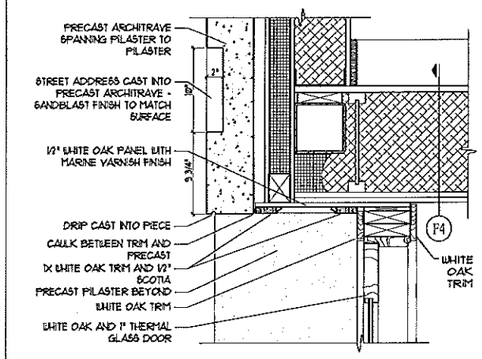
23 LOBBY WINDOW SILL DETAIL

SCALE: 1 1/2"=1'-0"



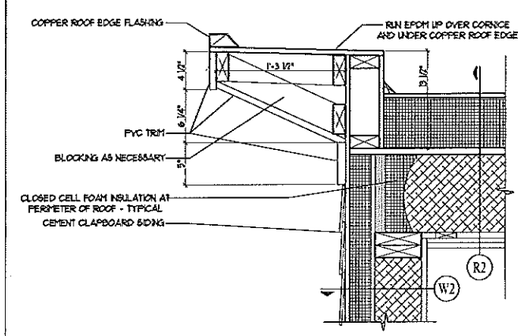
20 LOBBY WINDOW SILL/PRECAST SEAT DETAIL

SCALE: 1 1/2"=1'-0"



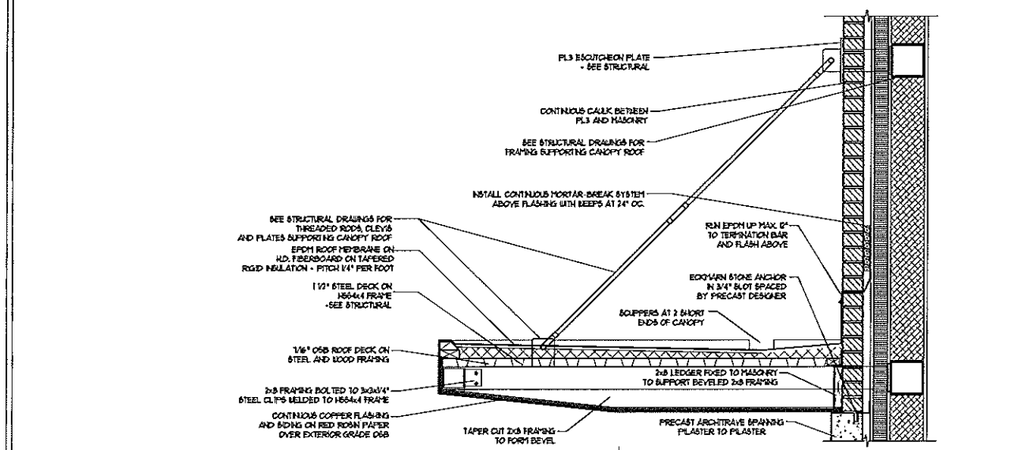
17 LOBBY ENTRANCE DOOR HEAD DETAIL

SCALE: 1 1/2"=1'-0"



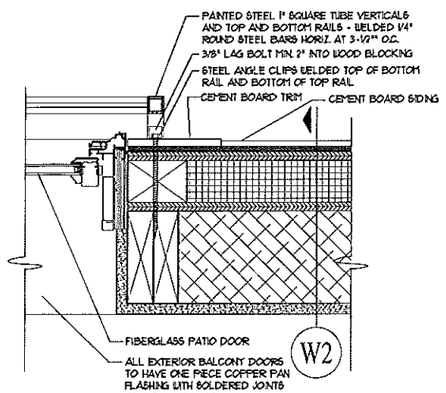
14 4TH FLOOR ROOF CORNICE DETAIL

SCALE: 1 1/2"=1'-0"



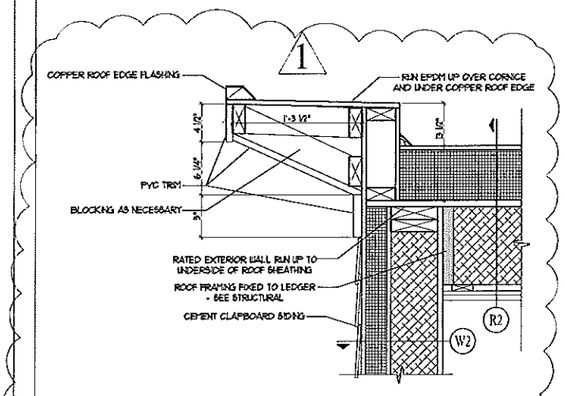
21 ENTRANCE CANOPY DETAIL

SCALE: 1"=1'-0"



18 FRENCH BALCONY RAILING DETAIL

SCALE: 3"=1'-0"



15 4TH FLOOR ROOF CORNICE DETAIL ON NORTH AND EAST

SCALE: 1 1/2"=1'-0"

RECEIVED
AUG - 8 2012
Dept. of Building Inspections
City of Portland Maine

OWNER:

ARCHETYPE, P.A.
ARCHITECTS
48 Union Wharf Portland, Maine 04101
(207) 772-6022 Fax (207) 772-6056

Project:
DANFORTH ON HIGH
81 DANFORTH STREET
PORTLAND, MAINE

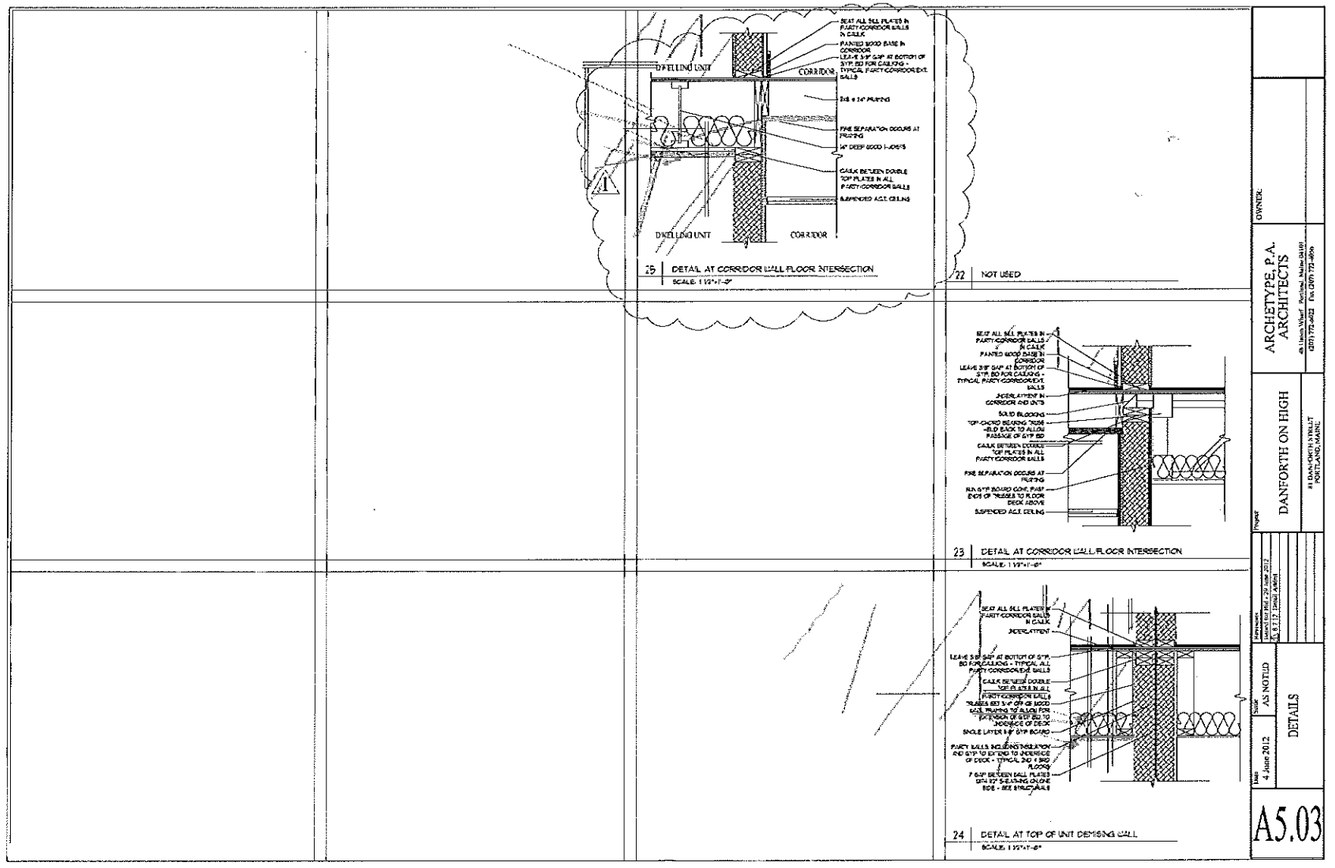
Revisions:
Issued for Bid - 29 June 2012
8.7.12 Roof/Wall Detail revised

Scale: AS NOTED

Date: 4 June 2012

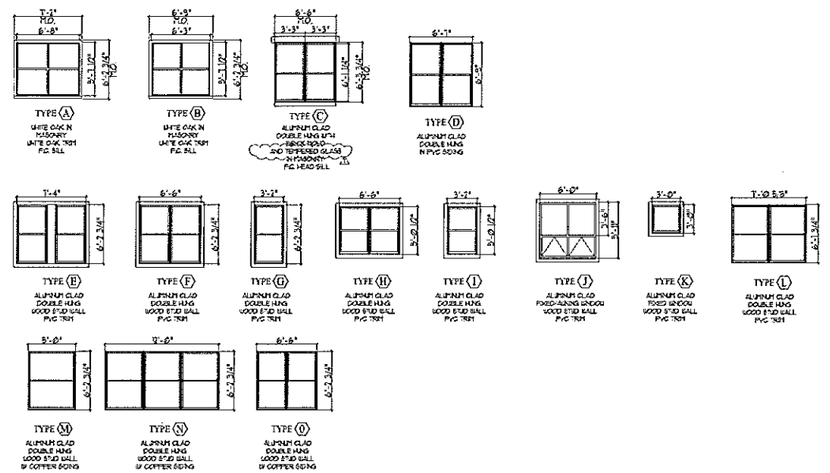
DETAILS

A5.02

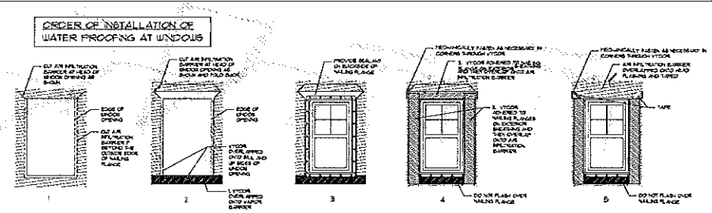


WINDOW SCHEDULE

REFER TO WALL SECTIONS FOR HEAD HEIGHT AND OAK WINDOW DETAILS



ORDER OF INSTALLATION OF WATER PROOFING AT WINDOWS



NOTES:
1. INSTALL GRACE VYCOR PLUS® IN ORDER AS SHOWN BY NUMBERS.
2. IF APPLICABLE, PEEL AND RELEASE PAPER ON LOWER HALF OF SILL.
EMBED AND SEAL VYCOR PLUS® AND AIR INFILTRATION BARRIER TO FORM WATER SHEDDING LAPS.
4. COORDINATE WITH FLASHING REQUIREMENTS OF WINDOW MANUFACTURER.
5. FOLLOW MANUFACTURERS RECOMMENDATIONS FOR INSTALLATION.

NOTE: MOCK-UP FIRST WINDOW TO BE APPROVED BY OWNER AND ARCHITECT PRIOR TO ANY INSTALLATION.

OWNER: DANFORTH ON HIGH, LP
ARCHETYPE, P.A. ARCHITECTS
DANFORTH ON HIGH CONDOMINIUMS
DRAWN
DOCUMENTS
SCALE: VARIES
DATE: 3 March 2012
WINDOW SCHEDULE
A8.04