

P r o j e c t M a n u a l

Munjoy Commons Apartments

Renovation of Shailer and Emerson Buildings
Portland, Maine

August 28, 2009

BOOK 2 – SPECIFICATION MANUAL

Issued: **Bidding and Permitting**



Development Team

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c/o Avesta Housing
307 Cumberland Avenue
Portland, ME 04101

Owner _____

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MaineHousing
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Augusta ME 04330-4633

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CWS Architects
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Portland ME 04101-2325

Architect _____

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Landscape Architect

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Becker Structural Engineers
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Mechanical and Electrical Engineer

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Freeport ME 04032
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Allied/Cook Construction
PO Box 1396
Portland, ME 04104

Construction Manager _____

Phone: 207.772.2888 Fax: 207.885.5135

INDEX OF CONTRACT DOCUMENTS

ISSUED FOR: BIDDING AND PERMITTING

AUGUST 28, 2009

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CWS Architects	1-4	Instructions to CM and Bidding Subcontractors
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AIA Document A312 - 1984	1-7	Performance/Payment Bond (for CM)
AIA Document A701 - 1997	1-6	Instructions to Bidders
Allied/Cook	1-1	CM's Instructions to Bidders
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AIA Document A201 - 2007	1-44	General Conditions of the Contract for Construction
SGC 2007	1-8	Supplemental General Conditions
AIA Document G701 – 2001	1	Change Order Form
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MaineHousing	1-4	Program Affirmative Action Plan
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BOOK 2 – SPECIFICATIONS MANUAL

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| | b. | Munjoy Commons – Shaler Building, April 8, 2009, 3 pages. |
| | a. | Munjoy Commons – Emerson Building, April 8, 2009, 3 pages. |
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AVAILABLE BY REQUEST

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| | 2.2 | Maine Housing – Construction Services Manuals |
| | 2.3 | Phase I Environment Site Assessment – Complete Report |
| | b. | Munjoy Commons – Shaler Building, April 8, 2009. |
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Munjoy Commons Apartments

Renovation of Shailer and Emerson Schools

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MECHANICAL: PREPARED BY BENNETT ENGINEERING

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DATED: AUGUST 14, 2009

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Part II
Division 0

Supplemental Information

SECTION 00 30 00

INFORMATION AVAILABLE TO BIDDERS

PART 1 - ATTACHEMENTS

- 1.1 Davis Bacon Act – Minimum Wage Rates
 - a. See Attached USDOL wage determination: General Decision ME20080013 07/24/2009 ME13 Residential Wage Determination

- 1.2 Sample Construction Signs - (1) 48x96 Construction Signs on Luster Board. See specification 10 14 00.
 - a. Munjoy Commons Shailer Building
 - b. Munjoy Commons Emerson Building

- 1.3 Subsurface Investigation Report – (Prepared by S.W. Cole Engineering)
 - a. Slab Coring and Geotechnical Consulting Services, Proposed Basement Renovations, Munjoy Commons (former Shailer School) 56 North Street, Portland, ME, pages 1-10

 - b. Slab Coring and Geotechnical Consulting Services, Proposed Basement Renovations, Munjoy Commons (former Emerson School) 13 Emerson Street, Portland, ME, pages 1-9

 - c. These reports identifies properties of below grade conditions, prepared primarily for the use of the Architect/Engineer and Contractors.

 - d. These reports, by their nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations may be considered so as to address any concerns, with resulting credits or expenditures to the Contract Price/Sum accruing to the Owner. The contractor shall work with the Owner toward expeditious resolution of any unforeseen site issues.

- 1.4 Phase I Environmental Site Assessment – Executive Summaries
 - b. Munjoy Commons – Shaler Building, April 8, 2009, 3 pages.
 - a. Munjoy Commons – Emerson Building, April 8, 2009, 3 pages.

- 1.5 STATEMENT OF SPECIAL INSPECTIONS
 - a. Munjoy Commons Apartments, Portland, Maine, August 26, 2009, prepared by Becker Structural Engineers, 12 pages.

- 1.6 HAZARDOUS MATERIALS SURVEY
 - a. Targeted Asbestos and Lead-Based Paint Survey for Munjoy Commons published by RANSOM Environmental Consultants, Inc. dated July 7, 2009, 94 sheets.

PART 2 - AVAILABLE BY REQUEST

- 2.1 NATIONAL PARK SERVICE – PRESERVATION BRIEFS – Excluded from publication. Available at the internet sites listed below or upon written request of the architect.
 - a. Preservation Brief 1 – Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings

- b. [\(http://www.cr.nps.gov/hps/tps/briefs/brief01.htm\)](http://www.cr.nps.gov/hps/tps/briefs/brief01.htm)
Preservation Brief 2 – Repointing Mortar Joints in Historic Masonry Buildings
 [\(http://www.cr.nps.gov/hps/tps/briefs/brief02.htm\)](http://www.cr.nps.gov/hps/tps/briefs/brief02.htm)
- c. Preservation Brief 10 - Exterior Paint Problems on Historic Woodwork
 [\(http://www.cr.nps.gov/hps/tps/briefs/brief10.htm\)](http://www.cr.nps.gov/hps/tps/briefs/brief10.htm)

2.2 MAINE HOUSING - CONSTRUCTION SERVICES MANUALS

- a. Design and Construction Manual:
 [\(http://www.mainehousing.org/Documents/HousingDevelopments/2009ConstructionServicesManual.pdf\)](http://www.mainehousing.org/Documents/HousingDevelopments/2009ConstructionServicesManual.pdf)
- b. Green Building Standards:
 [\(http://www.mainehousing.org/Documents/HousingDevelopments/2008GreenBuildingStandards.pdf\)](http://www.mainehousing.org/Documents/HousingDevelopments/2008GreenBuildingStandards.pdf)

2.3 Phase I Environmental Site Assessment – Complete Report

- b. Munjoy Commons – Shaler Building, April 8, 2009.
- a. Munjoy Commons – Emerson Building, April 8, 2009.

... END OF SECTION 00 30 00

GENERAL DECISION: ME20080013 07/24/2009 ME13

Date: July 24, 2009

General Decision Number: ME20080013 07/24/2009

Superseded General Decision Number: ME20070013

State: Maine

Construction Type: Residential

Counties: Androscoggin, Cumberland and Penobscot Counties in Maine.

ANDROSCOGGIN, CUMBERLAND, PENOBSCOT

RESIDENTIAL CONSTRUCTION PROJECTS (consisting of single family homes and apartments up to and including 4 stories).

Modification Number	Publication Date
0	02/08/2008
1	07/25/2008
2	07/24/2009

* SUME1994-001 09/06/1994

ANDROSCOGGIN, CUMBERLAND, PENOBSCOT

	Rates	Fringes
Asbestos Remover.....	\$ 10.25	.36
Brick mason tender.....	\$ 8.00	
BRICKLAYER.....	\$ 11.63	.47
Carpenters: (Acoustical Only)....	\$ 10.75	.54
Carpenters: (Excluding Drywall Hanging).....	\$ 9.54	.59
ELECTRICIAN.....	\$ 13.78	2.26
Laborers:		
LANDSCAPE WORKERS.....	\$ 7.25	
UNSKILLED.....	\$ 7.32	
PLUMBER.....	\$ 7.83	
SPRINKLER FITTER.....	\$ 10.00	
TILE SETTER.....	\$ 9.04	
Truck drivers: (2 AXLE).....	\$ 7.92	3.40
Truck drivers: (3 AXLE).....	\$ 8.00	1.39

WELDERS - Receive rate prescribed for craft performing

operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material,

etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

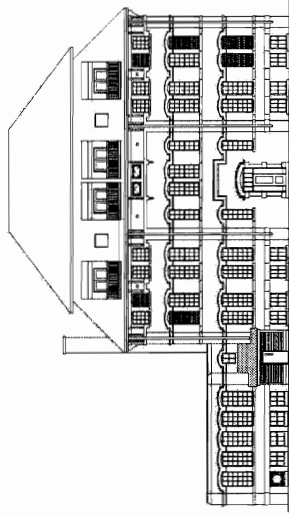
=====

END OF GENERAL DECISION

48" x 96" Construction Signs on Luster Board

(See Specification 10 14 00)

Munjoy Commons Shailer Building Renovations



CWS Architects
Architecture • Planning
Construction Services
Portland, Maine
Tel: (207) 774-4441
www.CWSarch.com

**ALLIED/COOK
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P.O. Box 1396
Portland, ME 04104
(207) 772-2888

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353 Water Street
Augusta, ME 04330
(800) 452-6668
www.mainehousing.org



**BENNETT
ENGINEERING**
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Freeport, ME 04032
(207) 865-9475

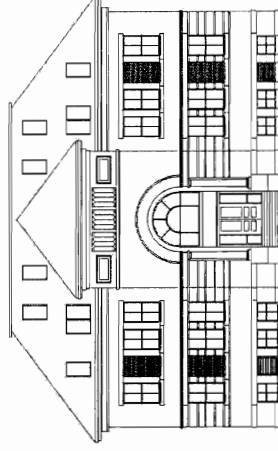
**Mitchell
& Associates**
LANDSCAPE ARCHITECTS
70 Center Street
Portland, ME 04101
(207) 774-4427

BECKER
MECHANICAL ENGINEERS, INC.
715 York Street
Portland, ME 04101
(207) 879-1838

For Rental Information call 207-553-7777 (www.avestahousing.org)

48" x 96" Construction Signs on Luster Board (See Specification 10 14 00)

Munjoy Commons Emerson Building Renovations



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• Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

09-0361

June 12, 2009

AVESTA Housing
Attn: Ethan Boxer-Macomber
307 Cumberland Avenue
Portland, Maine 04101

Subject: Slab Coring and Geotechnical Consulting Services
Proposed Basement Renovations
Munjoy Commons (former Shailer School)
56 North Street
Portland, Maine

Dear Ethan:

In accordance with our Proposal dated May 22, 2009, we have completed slab coring and geotechnical consulting services for the basement renovations proposed at the former Shailer School in Portland, Maine. The purpose of our work was to obtain shallow subsurface information beneath the existing basement slabs in order to provide recommendations on the need for subslab drainage associated with the proposed basement renovations. Our scope of work included four slab cores with shallow hand borings, soils laboratory gradation testing and preparation of this letter. The contents of this letter are subject to the limitations set forth in Attachment A.

PROPOSED CONSTRUCTION

Based on information provided, we understand improvement plans call for renovation and conversion of the building basement into living and community space. We understand there is concern relative to the potential for moisture from beneath the slab that could damage the proposed improvements.

EXPLORATION AND TESTING

We cored the existing basement slab and advanced borings B-1 through B-4 using a hand auger. The borings were made to depths of 12 to 18 inches below the slab surface. The exploration locations were selected by S.W. COLE ENGINEERING, INC and AVESTA based on proposed renovations and access limitations. The approximate locations of the explorations are shown on Sheet 1. Logs of the explorations are

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Other Offices in Bangor, Caribou, Augusta and Gray, Maine & Keene and Somersworth, New Hampshire

attached as Sheets 2 and 3. A key to the notes and symbols used on the logs is attached as Sheet 4.

We obtained samples of the base material below the slab and completed gradation tests on two composite samples. Gradation test results are attached as Sheets 5 and 6.

SITE AND SUBSURFACE CONDITIONS

The basement walls of Shailer consisted of mortared stone and brick with areas of cast concrete. We understand the western third of the building is an addition built after the original construction.

Below a concrete slab varying from 2 to 4 inches thick, test borings B-1 through B-4 encountered a soil profile consisting of brown silty gravelly sand (slab base) overlying native deposits of brown silty sand with varying fractions of gravel. A vapor retarder was not observed below the slab. The slab base material appeared to be about 3 inches thick. Ash and slag debris were encountered in B-4. Groundwater was not observed within the depth explored. Refer to the attached logs for more detailed descriptions of the subsurface findings.

EVALUATION AND RECOMMENDATIONS

Based on the subsurface findings and our observations of the basement walls, we anticipate that precipitation infiltrates the basement wall backfill and would likely seep through and below the basement walls. Therefore, we recommend that basement walls be waterproofed from the exterior side with an underdrain provided at the base of the waterproofing below the elevation of the basement slab. If it is not feasible to install the exterior underdrain below the basement slab elevation, we recommend installing an additional underdrain on the interior perimeter of the basement walls. We recommend a layer of foundation insulation be installed against the exterior side of the basement walls to reduce moisture potential from thermal condensation. The underdrain may consist of 4-inch diameter slotted underdrain pipe enveloped in at least 12 inches of underdrain sand and backfilled with Structural Fill. Basement wall backfill should be capped with clayey loam in areas that are not paved in order to further limit the infiltration of runoff. Exterior grades should be sloped down and away from the building in order to provide positive drainage away from the building.

Groundwater was not observed within the depth explored below the slab; however, the slab did not have a vapor barrier. Therefore, moisture sensitive floor coverings and adhesives may experience damage due to moisture vapor penetrating the slab concrete. Consequently, we recommend installation of a moisture vapor barrier system over the existing slab prior to installing moisture sensitive floor coverings or the use of non-moisture sensitive floorings. Moisture vapor barrier systems must meet the flooring manufacturers requirements.

CLOSURE

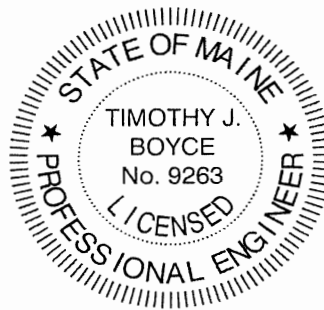
It has been a pleasure to be of assistance to you with this phase of your project. If you have any questions, please do not hesitate to contact us.

Sincerely,

S. W. COLE ENGINEERING, INC.



Timothy J. Boyce, P.E.
Senior Geotechnical Engineer



TJB:rec

Enc (7)

Attachment A - Limitations

This report has been prepared for the exclusive use of AVESTA Housing for specific application to the proposed Basement Renovations at Munjoy Commons Apartments (former Shailer School) at 56 North Street in Portland, Maine. S.W.COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

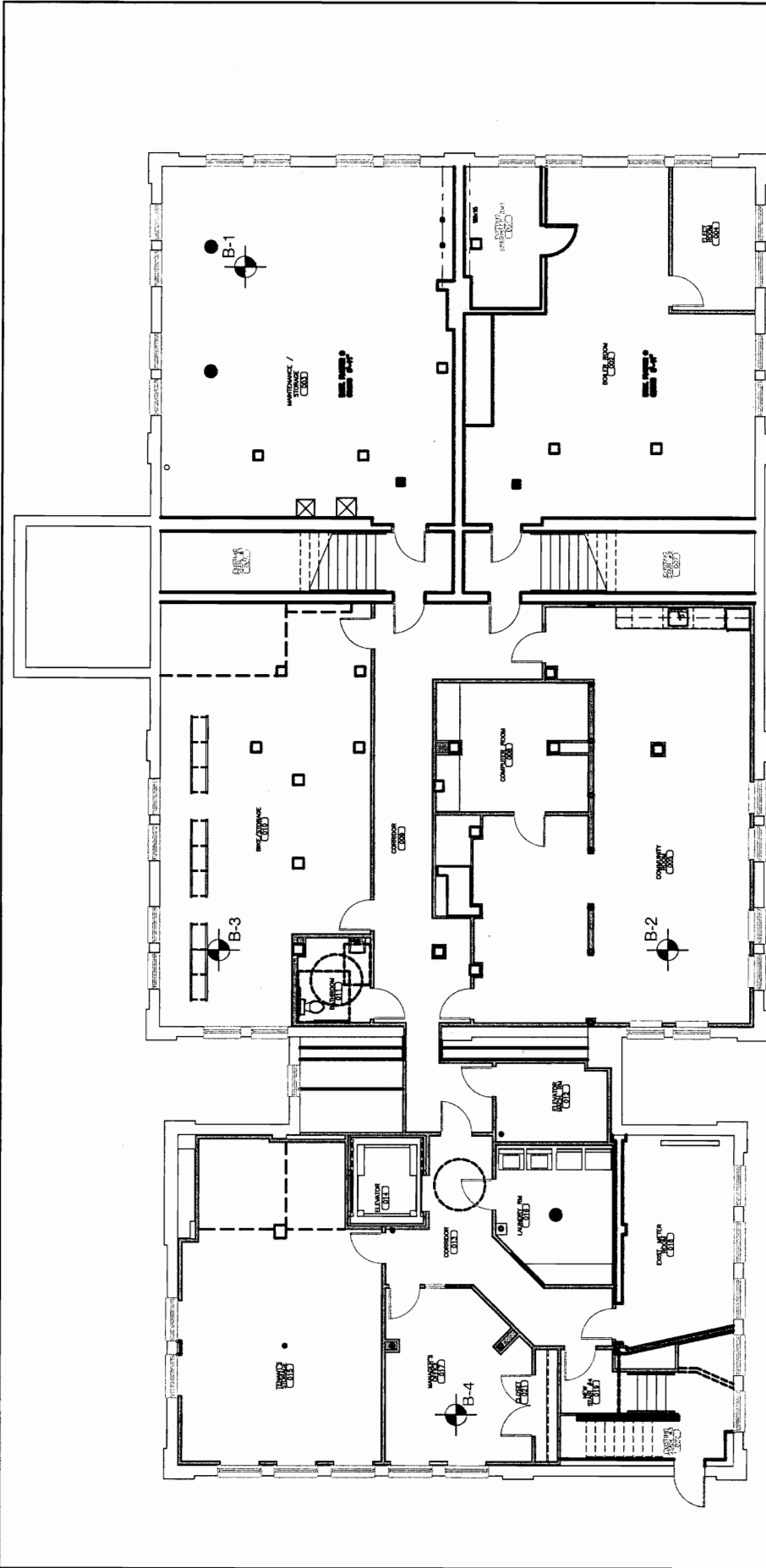
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE ENGINEERING, INC.'s scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE ENGINEERING, INC. should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE ENGINEERING, INC.



LEGEND:



APPROXIMATE BORING LOCATION

NOTES:

- EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALED PLAN OF THE BUILDING, PREPARED BY CWS ARCHITECTURE, RECEIVED VIA E-MAIL ON JUNE 2, 2009.

NOTES:

- THE CORES WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
- THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT.
- THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.



S.W. COLE
ENGINEERING, INC.
AVESTA HOUSING

EXPLORATION LOCATION PLAN
PROPOSED BASEMENT RENOVATIONS
MUNJOY COMMONS APARTMENTS
(FORMER SHAILER SCHOOL)
56 NORTH STREET, PORTLAND, MAINE

Job No. 09-0361
Date: 06/12/09
Scale 1"=10'
Sheet 1



BORING LOG

PROJECT NO.: 09-0361
 SWC REP.: K. GIMPEL

PROJECT / CLIENT: SHAILER SCHOOL / AVESTA HOUSING
 LOCATION: 56 NORTH STREET PORTLAND MAINE

CASING: TYPE CORE HOLE SIZE 6" O.D.
 SAMPLER: HAND AUGER 2" O.D.

BORING NO.: <u>B-1</u>											
DATE: <u>5/28/09</u>				SURFACE ELEVATION: <u>BSMT SLAB</u>				DEPTH TO WATER: <u>NO FREE WATER OBSERVED</u>			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									3"	3-INCHES CONCRETE (STONE MIX WITH WIRE MESH NOTED IN BOTTOM 1-INCH)	
										BROWN SAND AND GRAVEL SOME SILT (FILL)	
	S-1	3"	3"	6"	COMPOSITE SAMPLE FOR BORINGS 1 AND 4						
										BOTTOM OF EXPLORATION AT 12" (MATERIAL TOO GRAVELLY TO PENETRATE WITH HAND AUGER)	
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE			SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input checked="" type="checkbox"/> LABORATORY TEST			REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.			BORING NO.: B-1		

BORING NO.: <u>B-2</u>											
DATE: <u>5/28/09</u>				SURFACE ELEVATION: <u>BSMT SLAB</u>				DEPTH TO WATER: <u>NO FREE WATER OBSERVED</u>			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									2-3/4"	2-3/4 INCH CONCRETE (3/4-INCH TOPPING OVERLYING 2-INCHES OF STONE MIX)	
									4"	BROWN GRAVELLY SILTY SAND (FILL)	
										BROWN SILTY SAND TRACE GRAVEL	
	S-2	4"	4"	8"	COMPOSITE SAMPLE FOR BORINGS 2 AND 3						
										BOTTOM OF EXPLORATION AT 18" +/-	
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE			SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input checked="" type="checkbox"/> LABORATORY TEST			REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.			BORING NO.: B-2		



BORING LOG

PROJECT NO.: 09-0361
 SWC REP.: K. GIMPEL

PROJECT / CLIENT: SHAILER SCHOOL / AVESTA HOUSING
 LOCATION: 56 NORTH STREET PORTLAND MAINE

CASING: TYPE CORE HOLE SIZE 6" O.D.
 SAMPLER: HAND AUGER 2" O.D.

BORING NO.: B-3											
DATE: 5/28/09				SURFACE ELEVATION: BSMT SLAB				DEPTH TO WATER: NO FREE WATER OBSERVED			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									2"	2-INCHES CONCRETE (SAND MIX)	
									5"	BROWN GRAVELLY SILTY SAND (FILL)	
	S-2	5"	5"	8"	COMPOSITE SAMPLE FOR BORINGS 2 AND 3					BROWN SILTY SAND TRACE GRAVEL	
										BOTTOM OF EXPLORATION AT 18" +/-	
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE				SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input checked="" type="checkbox"/> LABORATORY TEST				REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.		BORING NO.: B-3	

BORING NO.: B-4											
DATE: 5/28/09				SURFACE ELEVATION: BSMT SLAB				DEPTH TO WATER: NO FREE WATER OBSERVED			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									4"	4-INCHES CONCRETE (2-INCHES SAND MIX OVER 2-INCHES STONE MIX)	
	S-1	4"	4"	7"	COMPOSITE SAMPLE FOR BORINGS 1 AND 4					BROWN SAND AND GRAVEL SOME SILT WITH ASH AND SLAG DEBRIS (FILL)	
										BOTTOM OF EXPLORATION AT 18"	
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE				SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input checked="" type="checkbox"/> LABORATORY TEST				REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.		<div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">3</div>	
								BORING NO.: B-4			



KEY TO THE NOTES & SYMBOLS **Test Boring and Test Pit Explorations**

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q _u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S _v	-	field vane shear strength, kips/sq. ft.
L _v	-	lab vane shear strength, kips/sq. ft.
q _p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W _L	-	liquid limit - Atterberg test
W _P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ _T	-	total soil weight
γ _B	-	buoyant soil weight

Description of Proportions:

0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.



Report of Gradation

ASTM C-117 & C-136

Project Name PORTLAND ME - SHAILER SCHOOL - GEOTECHNICAL
ENGINEERING SERVICES

Project Number 09-0361

Client AVESTA HOUSING

Lab ID 10884G

Date Received 5/28/2009

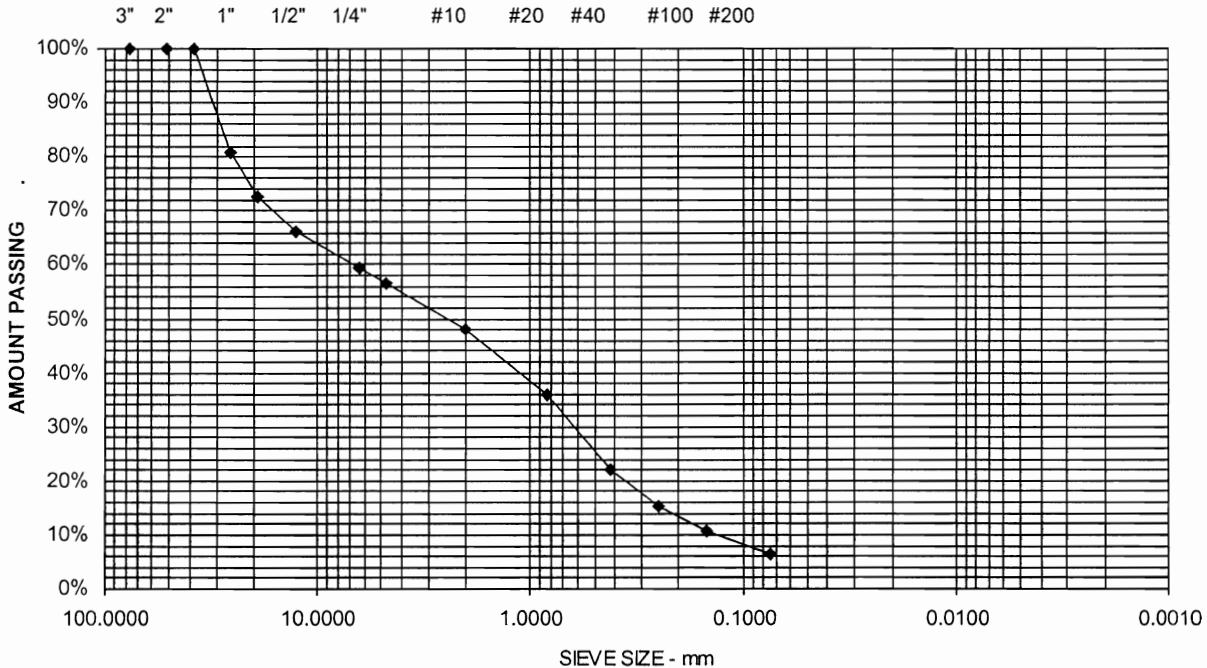
Date Complete 6/1/2009

Material Source COMPOSITE SAMPLE B-1 & B-4

Tested By

<u>STANDARD</u> <u>DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
150 mm	6"	100	
125 mm	5"	100	
100 mm	4"	100	
75 mm	3"	100	
50 mm	2"	100	
38.1 mm	1-1/2"	100	
25.0 mm	1"	81	
19.0 mm	3/4"	73	
12.5 mm	1/2"	66	
6.3 mm	1/4"	59	
4.75 mm	No. 4	57	43.5% Gravel
2.00 mm	No. 10	48	
850 μm	No. 20	36	
425 μm	No. 40	22	50.2% Sand
250 μm	No. 60	15	
150 μm	No. 100	11	
75 μm	No. 200	6.3	6.3% Fines

BROWN SAND AND GRAVEL SOME SILT



Comments:



Report of Gradation

ASTM C-117 & C-136

Project Name PORTLAND ME - SHAILER SCHOOL - GEOTECHNICAL
ENGINEERING SERVICES

Project Number 09-0361

Client AVESTA HOUSING

Lab ID 10885G

Date Received 5/28/2009

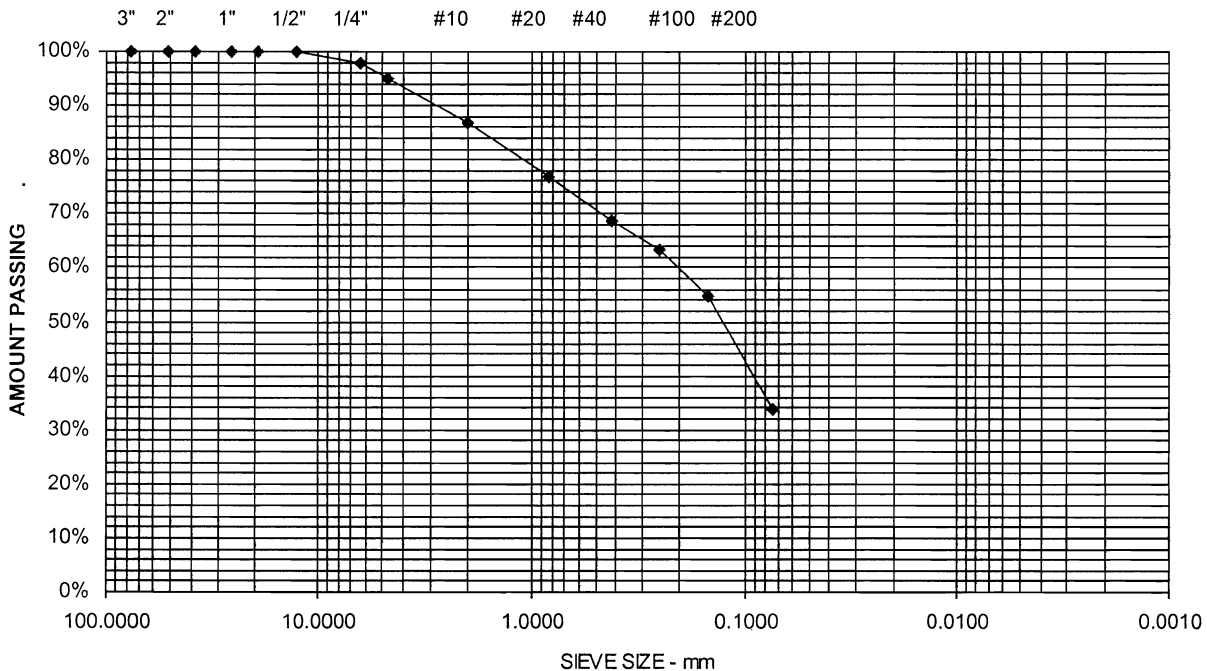
Date Complete 6/1/2009

Material Source COMPOSITE SAMPLE B-2 & B-3

Tested By TIMOTHY POULIN

<u>STANDARD DESIGNATION (mm/um)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
150 mm	6"	100	
125 mm	5"	100	
100 mm	4"	100	
75 mm	3"	100	
50 mm	2"	100	
38.1 mm	1-1/2"	100	
25.0 mm	1"	100	
19.0 mm	3/4"	100	
12.5 mm	1/2"	100	
6.3 mm	1/4"	98	
4.75 mm	No. 4	95	4.9% Gravel
2.00 mm	No. 10	87	
850 um	No. 20	77	
425 um	No. 40	69	61.3% Sand
250 um	No. 60	63	
150 um	No. 100	55	
75 um	No. 200	33.8	33.8% Fines

BROWN SILTY SAND TRACE GRAVEL



Comments:



• Geotechnical Engineering • Field & Lab Testing • Scientific & Environmental Consulting

09-0362

June 12, 2009

AVESTA Housing
Attn: Ethan Boxer-Macomber
307 Cumberland Avenue
Portland, Maine 04101

Subject: Slab Coring and Geotechnical Consulting Services
Proposed Basement Renovations
Munjoy Commons (former Emerson School)
13 Emerson Street
Portland, Maine

Dear Ethan:

In accordance with our Proposal dated May 22, 2009, we have completed slab coring and geotechnical consulting services for the basement renovations proposed at the former Emerson School in Portland, Maine. The purpose of our work was to obtain shallow subsurface information beneath the existing basement slabs in order to provide recommendations on the need for subslab drainage associated with the proposed basement renovations. Our scope of work included four slab cores with shallow hand borings, soils laboratory gradation testing and preparation of this letter. The contents of this letter are subject to the limitations set forth in Attachment A.

PROPOSED CONSTRUCTION

Based on information provided, we understand improvement plans call for renovation and conversion of the building basement into living and community space. We understand there is concern relative to the potential for moisture from beneath the slab that could damage the proposed improvements.

EXPLORATION AND TESTING

We cored the existing basement slab and advanced borings B-1 through B-4 using a hand auger. The borings were made to depths of about 18 inches below the slab surface. The exploration locations were selected by S.W. COLE ENGINEERING, INC and AVESTA based on proposed renovations and access limitations. The approximate locations of the explorations are shown on Sheet 1. Logs of the explorations are

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Other Offices in Bangor, Caribou, Augusta and Gray, Maine & Keene and Somersworth, New Hampshire

attached as Sheets 2 and 3. A key to the notes and symbols used on the logs is attached as Sheet 4.

We obtained samples of the base material below the slab and completed a gradation test on a composite sample. Gradation test results are attached as Sheet 5.

SITE AND SUBSURFACE CONDITIONS

The basement walls of the former Emerson School generally consisted of mortared brick and stone. Below a concrete slab varying from 1½ to 3½ inches thick, test borings B-1 through B-4 encountered a soil profile generally consisting of brown silty gravelly sand (slab base) overlying native deposits of brown sand and silt with gravel. A vapor retarder was not observed below the slab. The slab base material appeared to be about 3 inches thick. Debris was encountered in B-2. Groundwater was observed at a depth of about 5 inches below the slab in B-1 which was several feet below the basement slab elevation. Refer to the attached logs for more detailed descriptions of the subsurface findings.

EVALUATION AND RECOMMENDATIONS

Based on the subsurface findings and our observations of the basement walls, we anticipate that precipitation infiltrates the basement wall backfill and would likely seep through and below the basement walls. Therefore, we recommend that basement walls be waterproofed from the exterior side with an underdrain provided at the base of the waterproofing below the elevation of the basement slab. If it is not feasible to install the exterior underdrain below the basement slab elevation, we recommend installing an additional underdrain on the interior perimeter of the basement walls. We recommend a layer of foundation insulation be installed against the exterior side of the basement walls to reduce moisture potential from thermal condensation. The underdrain may consist of 4-inch diameter slotted underdrain pipe enveloped in at least 12 inches of underdrain sand and backfilled with Structural Fill. Basement wall backfill should be capped with clayey loam in areas that are not paved in order to further limit the infiltration of runoff. Exterior grades should be sloped down and away from the building in order to provide positive drainage away from the building.

Groundwater was observed in B-1 at a depth of about 5 inches. Consequently, we anticipate perched groundwater may exist at about the level of the B-1, which is completed in a relic evaporation pit several feet below the basement slab elevation.

The basement slab did not have a vapor barrier; therefore, moisture sensitive floor coverings and adhesives may experience damage due to moisture vapor penetrating the slab concrete. Consequently, we recommend installation of a moisture vapor barrier system over the existing slab prior to installing moisture sensitive floor coverings. Moisture vapor barrier systems must meet the flooring manufacturer's requirements.

CLOSURE

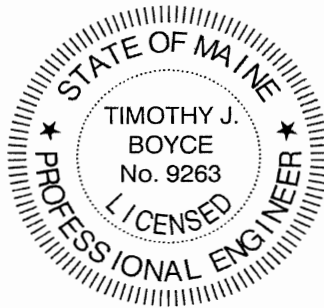
It has been a pleasure to be of assistance to you with this phase of your project. If you have any questions, please do not hesitate to contact us.

Sincerely,

S. W. COLE ENGINEERING, INC.



Timothy J. Boyce, P.E.
Senior Geotechnical Engineer



TJB:rec

Enc (6)

Attachment A - Limitations

This report has been prepared for the exclusive use of AVESTA Housing for specific application to the proposed Basement Renovations at Munjoy Commons Apartments (former Emerson School) at 13 Emerson Street in Portland, Maine. S.W.COLE ENGINEERING, INC. has endeavored to conduct the work in accordance with generally accepted soil and foundation engineering practices. No warranty, expressed or implied, is made.

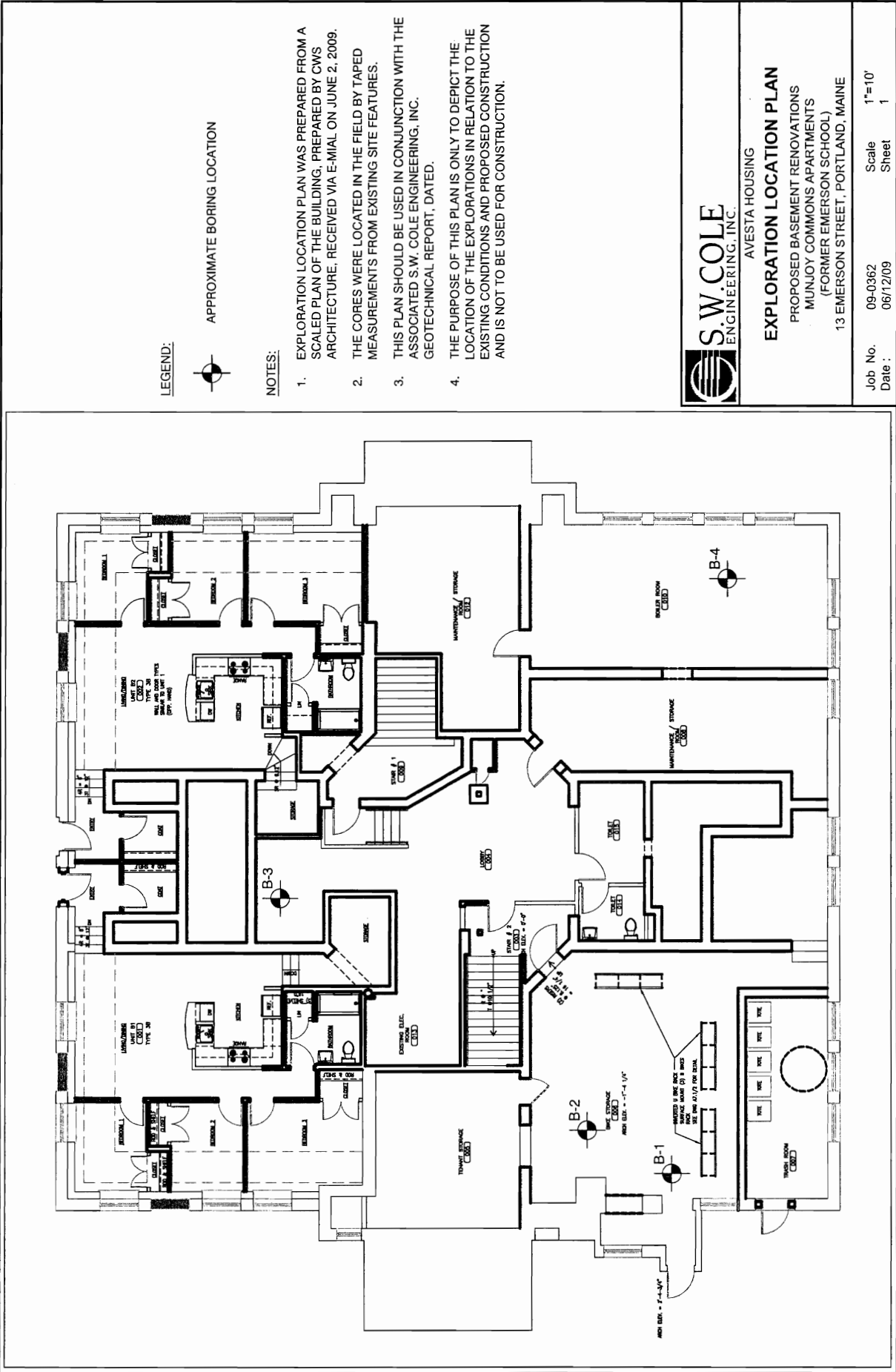
The soil profiles described in the report are intended to convey general trends in subsurface conditions. The boundaries between strata are approximate and are based upon interpretation of exploration data and samples.

The analyses performed during this investigation and recommendations presented in this report are based in part upon the data obtained from subsurface explorations made at the site. Variations in subsurface conditions may occur between explorations and may not become evident until construction. If variations in subsurface conditions become evident after submission of this report, it will be necessary to evaluate their nature and to review the recommendations of this report.

Observations have been made during exploration work to assess site groundwater levels. Fluctuations in water levels will occur due to variations in rainfall, temperature, and other factors.

S.W.COLE ENGINEERING, INC.'s scope of work has not included the investigation, detection, or prevention of any Biological Pollutants at the project site or in any existing or proposed structure at the site. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and the byproducts of any such biological organisms.

Recommendations contained in this report are based substantially upon information provided by others regarding the proposed project. In the event that any changes are made in the design, nature, or location of the proposed project, S.W.COLE ENGINEERING, INC. should review such changes as they relate to analyses associated with this report. Recommendations contained in this report shall not be considered valid unless the changes are reviewed by S.W.COLE ENGINEERING, INC.



LEGEND:



APPROXIMATE BORING LOCATION

NOTES:

1. EXPLORATION LOCATION PLAN WAS PREPARED FROM A SCALED PLAN OF THE BUILDING, PREPARED BY CWS ARCHITECTURE, RECEIVED VIA E-MAIL ON JUNE 2, 2009.
2. THE CORES WERE LOCATED IN THE FIELD BY TAPED MEASUREMENTS FROM EXISTING SITE FEATURES.
3. THIS PLAN SHOULD BE USED IN CONJUNCTION WITH THE ASSOCIATED S.W. COLE ENGINEERING, INC. GEOTECHNICAL REPORT, DATED.
4. THE PURPOSE OF THIS PLAN IS ONLY TO DEPICT THE LOCATION OF THE EXPLORATIONS IN RELATION TO THE EXISTING CONDITIONS AND PROPOSED CONSTRUCTION AND IS NOT TO BE USED FOR CONSTRUCTION.



S.W. COLE
ENGINEERING, INC.

AVESTA HOUSING

EXPLORATION LOCATION PLAN

PROPOSED BASEMENT RENOVATIONS
MUNJOY COMMONS APARTMENTS
(FORMER EMERSON SCHOOL)
13 EMERSON STREET, PORTLAND, MAINE

Job No. 09-0362 Scale 1"=10'
Date: 06/12/09 Sheet 1



BORING LOG

PROJECT NO.: 09-0362
 SWC REP.: K. GIMPEL

PROJECT / CLIENT: EMERSON SCHOOL / AVESTA HOUSING
 LOCATION: 13 EMERSON STREET PORTLAND MAINE

CASING: TYPE CORE HOLE SIZE 6" O.D.
 SAMPLER: HAND AUGER 2" O.D.

BORING NO.: B-1											
DATE: 5/28/09				SURFACE ELEVATION: EVAPORATION PIT				DEPTH TO WATER: 5" BELOW TOP OF SLAB			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									1.5"	1 1/2-INCHES CONCRETE (SAND MIX) BROWN SILTY GRAVELLY SAND (FILL)	
	S-1	3"	3"	5"	COMPOSITE SAMPLE FOR BORINGS 1 - 4				5"	BROWN SAND AND SILT TRACE GRAVEL	
BOTTOM OF EXPLORATION AT 18" +/-											
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE		SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input checked="" type="checkbox"/> LABORATORY TEST			REMARKS: HOLE NOT PATCHED TO ALLOW FOR FUTURE WATER OBSERVATIONS STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.					BORING NO.: B-1	

BORING NO.: B-2											
DATE: 5/28/09				SURFACE ELEVATION: BOILER ROOM				DEPTH TO WATER: NO FREE WATER OBSERVED			
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA	
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24			
									2-3/4"	2 3/4-INCHES CONCRETE (SAND MIX) BROWN SAND AND SILT TRACE GRAVEL WITH DEBRIS (BACKFILL)	
BOTTOM OF EXPLORATION AT 18" +/-											
SAMPLES: S=SPLIT SPOON C=3" SHELBY TUBE U=3.5" SHELBY TUBE		SOIL CLASSIFIED BY: <input type="checkbox"/> DRILLER - VISUALLY <input checked="" type="checkbox"/> SOIL TECH. - VISUALLY <input type="checkbox"/> LABORATORY TEST			REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.					<div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">2</div>	
										BORING NO.: B-2	



BORING LOG

PROJECT NO.: 09-0362
 SWC REP.: K. GIMPEL

PROJECT / CLIENT: EMERSON SCHOOL / AVESTA HOUSING
 LOCATION: 13 EMERSON STREET PORTLAND MAINE

CASING: TYPE CORE HOLE SIZE 6" O.D.
 SAMPLER: HAND AUGER 2" O.D.

BORING NO.: <u>B-3</u>										
DATE: <u>5/28/09</u>				SURFACE ELEVATION: <u>BSMT SLAB</u>				DEPTH TO WATER: <u>NO FREE WATER OBSERVED</u>		
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24		
									2.5"	2 1/2-INCHES CONCRETE (SAND MIX)
									6"	BROWN SILTY GRAVELLY SAND (FILL)
										BROWN SAND AND SILT TRACE FINE GRAVEL
BOTTOM OF EXPLORATION AT 18" +/-										
SAMPLES:		SOIL CLASSIFIED BY:			REMARKS:					
S=SPLIT SPOON		<input type="checkbox"/>			DRILLER - VISUALLY					
C=3" SHELBY TUBE		<input checked="" type="checkbox"/>			SOIL TECH. - VISUALLY					
U=3.5" SHELBY TUBE		<input type="checkbox"/>			LABORATORY TEST					
REMARKS: ROOT HAIRS ENCOUNTERED DIRECTLY BELOW SLAB STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.										
									BORING NO.: B-3	

BORING NO.: <u>B-4</u>										
DATE: <u>5/28/09</u>				SURFACE ELEVATION: <u>BSMT SLAB</u>				DEPTH TO WATER: <u>NO FREE WATER OBSERVED</u>		
SOLID STEM AUGER	SAMPLE				SAMPLER BLOWS PER 6"				DEPTH	STRATA & TEST DATA
	NO.	PEN.	REC.	DEPTH @ BOT	0-6	6-12	12-18	18-24		
									3.5"	3 1/2-INCHES CONCRETE (SAND MIX)
										BROWN SILTY GRAVELLY SAND (FILL)
	S-1	2.5"	2.5"	6"	COMPOSITE SAMPLE FOR BORINGS 1 - 4				6"	BROWN SAND AND SILT TRACE FINE GRAVEL ...WITH TRACE CLAY
BOTTOM OF EXPLORATION AT 18" +/-										
SAMPLES:		SOIL CLASSIFIED BY:			REMARKS:					
S=SPLIT SPOON		<input type="checkbox"/>			DRILLER - VISUALLY					
C=3" SHELBY TUBE		<input checked="" type="checkbox"/>			SOIL TECH. - VISUALLY					
U=3.5" SHELBY TUBE		<input checked="" type="checkbox"/>			LABORATORY TEST					
REMARKS: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.										
									3	
									BORING NO.: B-4	



KEY TO THE NOTES & SYMBOLS **Test Boring and Test Pit Explorations**

All stratification lines represent the approximate boundary between soil types and the transition may be gradual.

Key to Symbols Used:

w	-	water content, percent (dry weight basis)
q_u	-	unconfined compressive strength, kips/sq. ft. - based on laboratory unconfined compressive test
S_v	-	field vane shear strength, kips/sq. ft.
L_v	-	lab vane shear strength, kips/sq. ft.
q_p	-	unconfined compressive strength, kips/sq. ft. based on pocket penetrometer test
O	-	organic content, percent (dry weight basis)
W_L	-	liquid limit - Atterberg test
W_P	-	plastic limit - Atterberg test
WOH	-	advance by weight of hammer
WOM	-	advance by weight of man
WOR	-	advance by weight of rods
HYD	-	advance by force of hydraulic piston on drill
RQD	-	Rock Quality Designator - an index of the quality of a rock mass. RQD is computed from recovered core samples.
γ_T	-	total soil weight
γ_B	-	buoyant soil weight

Description of Proportions:

0 to 5% TRACE
5 to 12% SOME
12 to 35% "Y"
35+% AND

REFUSAL: Test Boring Explorations - Refusal depth indicates that depth at which, in the drill foreman's opinion, sufficient resistance to the advance of the casing, auger, probe rod or sampler was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

REFUSAL: Test Pit Explorations - Refusal depth indicates that depth at which sufficient resistance to the advance of the backhoe bucket was encountered to render further advance impossible or impracticable by the procedures and equipment being used.

Although refusal may indicate the encountering of the bedrock surface, it may indicate the striking of large cobbles, boulders, very dense or cemented soil, or other buried natural or man-made objects or it may indicate the encountering of a harder zone after penetrating a considerable depth through a weathered or disintegrated zone of the bedrock.



Report of Gradation

ASTM C-117 & C-136

Project Name PORTLAND ME - EMERSON SCHOOL - GEOTECHNICAL
ENGINEERING SERVICES

Project Number 09-0362

Client AVESTA HOUSING

Lab ID 10886G

Date Received 5/28/2009

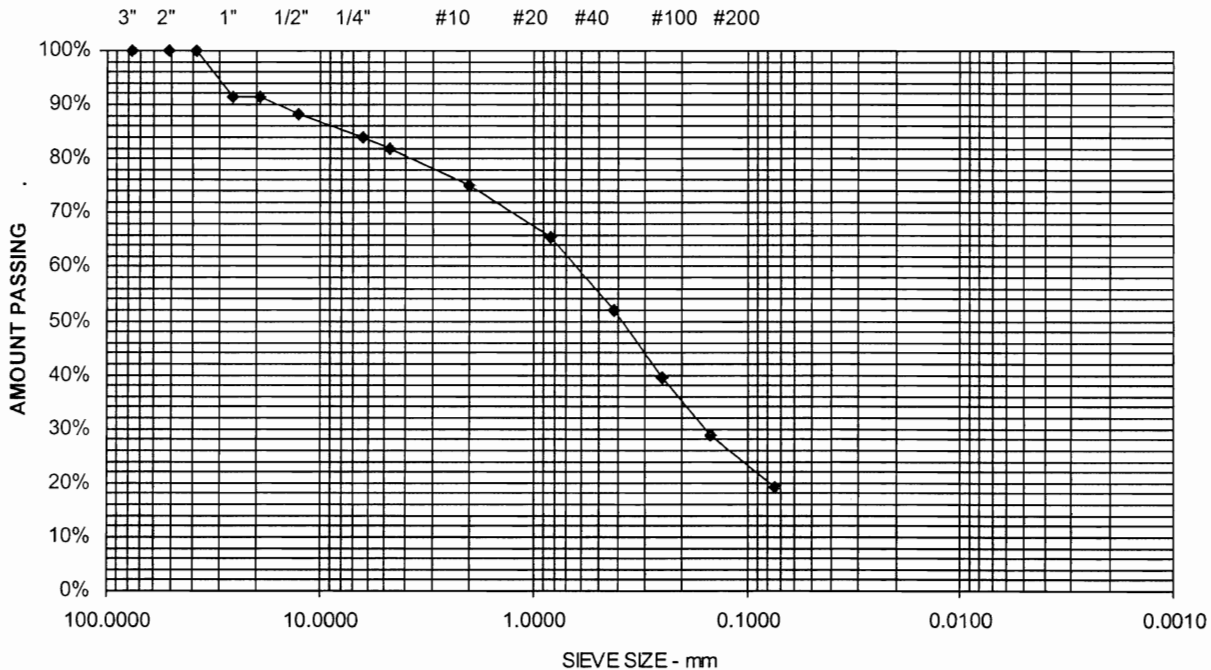
Date Complete 6/1/2009

Material Source COMPOSITE SAMPLE B-1 - B-4

Tested By

<u>STANDARD DESIGNATION (mm/μm)</u>	<u>SIEVE SIZE</u>	<u>AMOUNT PASSING (%)</u>	
150 mm	6"	100	
125 mm	5"	100	
100 mm	4"	100	
75 mm	3"	100	
50 mm	2"	100	
38.1 mm	1-1/2"	100	
25.0 mm	1"	91	
19.0 mm	3/4"	91	
12.5 mm	1/2"	88	
6.3 mm	1/4"	84	
4.75 mm	No. 4	82	18.3% Gravel
2.00 mm	No. 10	75	
850 μm	No. 20	65	
425 μm	No. 40	52	62.4% Sand
250 μm	No. 60	40	
150 μm	No. 100	29	
75 μm	No. 200	19.3	19.3% Fines

BROWN GRAVELLY SILTY SAND



Comments:



ENVIRONMENTAL CONSULTING • GEOTECHNICAL ENGINEERING • CONSTRUCTION MATERIALS TESTING

**PHASE I
ENVIRONMENTAL SITE ASSESSMENT
MUNJOY COMMONS
58 NORTH STREET
PORTLAND, MAINE**

Prepared for:
**MAINE STATE HOUSING AUTHORITY
353 Water Street
Augusta, Maine 04330**

Prepared by:
**SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road
Augusta, Maine 04330**

**April 8, 2009
Project # 16792.1**

Lewiston:

640 Main Street • Lewiston, ME 04240
Tel: (207) 795-6009 • Fax: (207) 795-6128

Bangor:

8 Harlow St., Suite 4A • Bangor, ME 04401
Tel: (207) 262-9040 • Fax: (207) 262-9080

Augusta:

434 Cony Road • Augusta, ME 04330
Tel: (207) 621-8334 • Fax: (207) 626-9094

Portland:

1 Industrial Way Suite 7 • Portland, ME 04103
Tel: (207) 221-6360 • Fax: (207) 221-6146

**PHASE I
ENVIRONMENTAL SITE ASSESSMENT
MUNJOY COMMONS
58 NORTH STREET
PORTLAND, MAINE**

EXECUTIVE SUMMARY

Summit Environmental Consultants, Inc. (Summit) completed a Phase I Environmental Site Assessment (ESA) on a residential property located at 58 North Street in Portland, Maine (the Site) to determine whether the property has Recognized Environmental Conditions, as defined by the ASTM International (ASTM) Standard E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process and in compliance with the All Appropriate Inquiry (AAI) Rule. This Phase I ESA was completed by Mr. Joseph Siviski under the supervision of Mr. Dennis Kingman, an Environmental Professional as defined in §312.10 of 40 CFR 312.

The Site consists of approximately 0.46 acres of land located on the southwest side of North Street. The City of Portland Tax Assessor identifies the Site as Lot K-1 on Map 13. The Cumberland County Registry of Deeds has a legal description of the Site recorded in Book 6387 Page 188.

Summit conducted historical research, reviewed state records, completed a Site visit, and interviewed town officials and persons having knowledge of the Site in order to evaluate the property for evidence of past, existing, or material threat of future releases of hazardous substances and petroleum products.

A FirstSearch™ Environmental Database Search of state and federal records completed for the Site and vicinity, and review of Maine Department of Environmental Protection (MEDEP) records identified:

- One federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) NFRAP (no further remedial action planned) listing within a 0.5-mile radius of the Site;
- Four state listed hazardous waste locations within a 1.0-mile radius of the Site;
- Neither the Site nor any properties adjoining the Site as Resource Conservation and Recovery Act (RCRA) facilities;
- No spill incidents at the Site;
- 130 state spill incidents within a 0.5-mile radius of the Site;
- No registered underground storage tank locations at the Site; and
- One property within a 0.1-mile radius of the Site as a registered underground storage tank location.

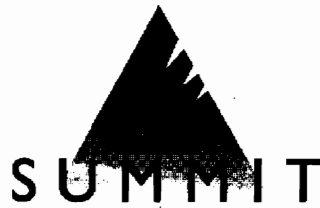
Historical documents and interviews with individuals knowledgeable about the Site suggest that the Site was initially developed with the Shaller School in 1880. An addition to the Site building was constructed in the 1930s, and the Site building was converted into residential apartment units in the mid-1980s. The Site building is currently occupied by seventeen residential apartment units and commercial space used to provide day services to adults with disabilities.

Neither aboveground storage tanks (ASTs) nor underground storage tanks (USTs) were observed at the Site. However, records reviewed at the City of Portland Code Enforcement Office indicate the presence of a 4,000-gallon UST associated with a former heating system at the Site. According to Site representative Mr. Ethan Boxer-Macomber, this UST is located adjacent to the western corner of the Site building and was pumped out and filled with sand in 1982. Additional information regarding this UST was not available, as it was never registered with the Maine Department of Environmental Protection (MEDEP).

Eight floor drains were observed in the basement of the Site building. According to Mr. Boxer-Macomber, these floor drains are connected to municipal sanitary sewer lines.

Hazardous substances were not observed on or around the subject property. However, based on the investigations conducted for this Phase I ESA, the following conditions indicative of releases or threatened releases of hazardous substances, pollutants, contaminants, petroleum or petroleum products and/or controlled substances on, at, in or to the subject property (Recognized Environmental Conditions) were identified:

1. An unregistered 4,000-gallon UST associated with a heating system formerly present at the Site is located adjacent to the western corner of the Site building. The UST was abandoned in place in 1982.



ENVIRONMENTAL CONSULTING • GEOTECHNICAL ENGINEERING • CONSTRUCTION MATERIALS TESTING

**PHASE I
ENVIRONMENTAL SITE ASSESSMENT
MUNJOY COMMONS
13 EMERSON STREET
PORTLAND, MAINE**

Prepared for:
**MAINE STATE HOUSING AUTHORITY
353 Water Street
Augusta, Maine 04330**

Prepared by:
**SUMMIT ENVIRONMENTAL CONSULTANTS, INC.
434 Cony Road
Augusta, Maine 04330**

**April 8, 2009
Project # 16792.2**

Lewiston:

640 Main Street • Lewiston, ME 04240
Tel: (207) 795-6009 • Fax: (207) 795-6128

Bangor:

8 Harlow St., Suite 4A • Bangor, ME 04401
Tel: (207) 262-9040 • Fax: (207) 262-9080

Augusta:

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Tel: (207) 621-8334 • Fax: (207) 626-9094

Portland:

1 Industrial Way, Suite 7 • Portland, ME 04103
Tel: (207) 221-6360 • Fax: (207) 221-6146

**PHASE I
ENVIRONMENTAL SITE ASSESSMENT
MUNJOY COMMONS
13 EMERSON STREET
PORTLAND, MAINE**

EXECUTIVE SUMMARY

Summit Environmental Consultants, Inc. (Summit) completed a Phase I Environmental Site Assessment (ESA) on a residential property located at 13 Emerson Street in Portland, Maine (the Site) to determine whether the property has Recognized Environmental Conditions, as defined by the ASTM International (ASTM) Standard E 1527-05, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process and in compliance with the All Appropriate Inquiry (AAI) Rule. This Phase I ESA was completed by Mr. Joseph Siviski under the supervision of Mr. Dennis Kingman, an Environmental Professional as defined in §312.10 of 40 CFR 312.

The Site consists of a 0.67-acre parcel located on the northeast side of Emerson Street. The City of Portland Tax Assessor identifies the Site as Lot K-8 on Map 14. The Cumberland County Registry of Deeds has a legal description of the Site recorded in Book 6405 Page 1.

Summit conducted historical research, reviewed state records, completed a Site visit, and interviewed town officials and persons having knowledge of the Site in order to evaluate the property for evidence of past, existing, or material threat of future releases of hazardous substances and petroleum products.

A FirstSearch™ Environmental Database Search of state and federal records completed for the Site and vicinity, and review of Maine Department of Environmental Protection (MEDEP) records identified:

- One federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) listing within a 0.5-mile radius of the Site;
- Four state listed hazardous waste locations within a 1.0-mile radius of the Site;
- Neither the Site nor any adjoining properties as Resource Conservation and Recovery Act (RCRA) facilities;
- No spill incidents at the Site;
- 81 state spill incidents within a 0.5-mile radius of the Site;
- No registered underground storage tank locations at the Site; and
- One property within a 0.1-mile radius as a registered underground storage tank location.

Historical documents and interviews with individuals knowledgeable about the Site suggest that the Site was first developed with the Emerson School in 1897. The Site building was converted into residential apartment units in the mid-1980s. The Site building currently contains twenty-two residential apartment units.

Neither aboveground storage tanks (ASTs) nor underground storage tanks (USTs) were observed at the Site. However, records reviewed at the City of Portland Code Enforcement Office indicate the presence of a 4,000-gallon UST associated with a former heating system at the Site. According to Site representative Mr. Ethan Boxer-Macomber, this UST is located

adjacent to the western corner of the Site building and was pumped out and filled with sand in 1982. Additional information regarding this UST was not available, as it was never registered with the MEDEP.

Three floor drains were observed in the basement of the Site building: two in the former bathroom and one in a storage room. According to Mr. Boxer-Macomber, these drains are connected to municipal sanitary sewer lines.

Hazardous substances were not observed on or around the subject property. However, based on the investigations conducted for this Phase I ESA, the following conditions indicative of releases or threatened releases of hazardous substances, pollutants, contaminants, petroleum or petroleum products and/or controlled substances on, at, in or to the subject property (Recognized Environmental Conditions) were identified:

1. An unregistered 4,000-gallon UST associated with a heating system formerly present at the Site is located adjacent to the northern corner of the Site building. The UST was abandoned in place in 1982.

Statement of Special Inspections

Munjoy Commons Apartments
Portland, Maine
August 26, 2009

Statement Prepared by
Structural Engineer of Record
Becker Structural Engineers, Inc.
75 York Street
Portland, ME 04101
207. 879. 1838

Owner
Avesta Munjoy Commons LP
c/o Avesta Housing
307 Cumberland Ave
Portland, ME 04101
207. 553. 7777

Architect of Record
CWS Architects
434 Cumberland Ave
Portland, ME 04101
207. 774. 4441

Contractor
Allied/Cook Construction
PO Box 1396
Portland, ME 04104
207. 772. 2888

Statement of Special Inspections - Exhibit A

Project: *Munjoy Commons Apartments*

Location: *Portland, Maine*

Owner: *Avesta Munjoy Commons, LP c/o Avesta Housing*

This *Statement of Special Inspections* encompass the following discipline:

- Structural
- Mechanical/Electrical/Plumbing
- Architectural
- Other: _____

Design Professional in Responsible Charge: *Daniel S. Burne, P.E.*

Firm Name: *Becker Structural Engineers, Portland, ME*

(Note: *Statement of Special Inspections* for other disciplines may be included under a separate cover)

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 Structural Special Inspection Coordinator (SSIC) and the identity of other approved agencies to be retained for conducting these inspections and tests.

The Structural Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Code Official (BCO) and the Structural Registered Design Professional in Responsible Charge (SRDP). 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 Structural 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 Structural Registered Design Professional in Responsible Charge at an interval determined by the SSIC and the BCO.

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 to the BCO 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: *Upon request of Building Official* _____ or per attached schedule.

Prepared by:

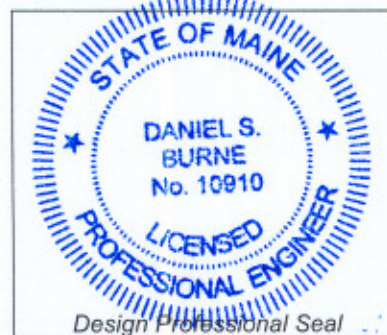
Daniel S. Burne, P.E.

(type or print name of the Structural Registered Design Professional in Responsible Charge)

Signature

8/26/09

Date



Owner's Authorization:

Building Code Official's Acceptance:

Signature

Date

Signature

Date

Statement of Special Inspections (Continued) - Exhibit A

List of Agents

Project: *Munjoy Commons Apartments*

Location: *Portland, Maine*

Owner: *Avesta Munjoy Commons, LP c/o Avesta Housing*

This *Statement of Special Inspections* encompass the following discipline:

- Structural Mechanical/Electrical/Plumbing
 Architectural Other: _____

(Note: *Statement of Special Inspections* for other disciplines may be included under a separate cover)

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

- | | |
|--|--|
| <input type="checkbox"/> Soils and Foundations | <input type="checkbox"/> Spray Fire Resistant Material |
| <input checked="" type="checkbox"/> Cast-in-Place Concrete | <input type="checkbox"/> Cold-Formed Steel Framing |
| <input type="checkbox"/> Precast Concrete | <input type="checkbox"/> Exterior Insulation and Finish System |
| <input type="checkbox"/> Masonry | <input type="checkbox"/> Mechanical & Electrical Systems |
| <input checked="" type="checkbox"/> Structural Steel | <input type="checkbox"/> Architectural Systems |
| <input type="checkbox"/> Wood Construction | <input type="checkbox"/> Special Cases |

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Structural Special Inspection Coordinator (SSIC)	<i>Becker Structural Engineers (BSE)</i>	<i>75 York Street Portland, ME 04107 (207) 879-1838 info@beckerstructural.com</i>
2. Special Inspector (SI 1)	<i>Becker Structural Engineers (BSE)</i>	<i>75 York Street Portland, ME 04107 (207) 879-1838 info@beckerstructural.com</i>
3. Special Inspector (SI 2)		
4. Testing Agency (TA 1)	<i>To Be Determined</i>	
5. Testing Agency (TA 2)	<i>To Be Determined</i>	
6. Other (O1)		

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.

Statement of Special Inspections (Continued) - Exhibit A

Final Report of Special Inspections (SSIC/SI 1)

[To be completed by the Structural Special Inspections Coordinator (SSIC/SI 1). Note that all Agent's Final Reports must be received prior to issuance.]

Project: Munjoy Commons Apartments
Location: Portland, Maine
Owner: Avesta Munjoy Commons, LP c/o Avesta Housing
Owner's Address: 307 Cumberland Ave
Portland, ME 04101

Architect of Record: Ben Walter (name) CWS Architects (firm)

Structural Registered Design
Professional in Responsible Charge: Daniel S. Burne (name) Becker Structural Engineers (firm)

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the Statement of Special Inspections submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Structural Special Inspection Coordinator

(Type or print name)

(Firm Name)

Signature Date



Statement of Special Inspections (Continued) - Exhibit A
Special Inspector's/Agent's Final Report

Project:
Special Inspector
or Agent:

(name)

(firm)

Designation: TA1

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Inspector/Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector or Agent:

(Type or print name)

Signature

Date

SEAL NOT REQUIRED FOR
TESTING AGENCY

Licensed Professional Seal
or
Certification Number

Statement of Special Inspections (Continued) - Exhibit A

Special Inspector's/Agent's Final Report

Project:
Special Inspector
or Agent:

(name)

(firm)

Designation: TA2

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Inspector/Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector or Agent:

(Type or print name)

Signature

Date

SEAL NOT REQUIRED FOR
TESTING AGENCY

Licensed Professional Seal
or
Certification Number

Special Inspections – Exhibit B

Qualifications of Inspectors and Test Agency
List of Minimum Qualifications
Schedule of Structural Inspections

Schedule of Special Inspections - Exhibit B

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

Exterior Design Institute (EDI) Certification

EDI-EIFS	EIFS Third Party Inspector
----------	----------------------------

Other

Schedule of Special Inspections – Exhibit B

CONCRETE CONSTRUCTION

©Becker Structural Engineers, Inc. 2005

Project: Munjoy Commons Apartments, Portland, ME

Date Prepared: 08/26/09

VERIFICATION AND INSPECTION	Y/N	EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE	COMMENTS	AGENT	AGENT QUALIFICATION	DATE	INITIAL
IBC Section 1704.4							
1. Inspection of reinforcing steel, including prestressing tendons, and placement	Y	P	ACI 318: 3.5, 7.1-7.7	SI1	PE/SE or EIT		
2. Inspection of reinforcing steel welding in accordance with Table 1704.3, Item 5B	N		Welding of Reinf Not Allowed	TA1	AWS-CWI		
3. Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased	N	C	IBC 1912.5	SI1	PE/SE or EIT		
4. Verifying use of required design mix	Y	P	ACI 318: Ch 4, 5.2-5.4	SI1	PE/SE or EIT		
5. At time fresh concrete is sampled to fabricate specimens for strength test, perform slump and air content test and temperature	Y	C	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	TA1	ACI-CFTT or ACI-STT		
6. Inspection of concrete and shotcrete placement for proper application techniques	Y	C	ACI 318: 5.9, 5.10	SI1	PE/SE or EIT		
7. Inspection for maintenance of specified curing temperature and techniques	Y	P	ACI 318: 5.11-5.13	SI1	PE/SE or EIT		
8. Inspection of Prestressed Concrete							
a. Application of prestressing force.	N	C	ACI 318: 18.20	SI1	PE/SE or EIT		
b. Grouting of bonded prestressing tendons in seismic force resisting system	N	C	ACI 318: 18.18.4	SI1	PE/SE or EIT		
9. Erection of precast concrete members	N	P	ACI 318: Ch 16	SI1	PE/SE or EIT		
10. Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms beams and structural slabs	N	P	ACI 318: 6.2	TA1	ACI-STT		

Concrete Construction has been reviewed in accordance with section 1704.4 of the IBC Code

Special Inspector _____ Date _____

Page of _____

Schedule of Special Inspections – Exhibit B

STEEL CONSTRUCTION

Project: Munjoy Commons Apartments, Portland, ME

Date Prepared: 08/26/09

VERIFICATION AND INSPECTION	Y/N	EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE	COMMENTS	AGENT	AGENT QUALIFICATION	DATE	INITIAL
IBC Section 1704.3							
1. Material verification of high-strength bolts, nuts and washers:							
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	Y	S	Applicable ASTM material specifications; AISC 335, Section A3.4; AISC LRFD, Section A3.3	SI1	PE/SE or EIT		
b. Manufacturer's certificate of compliance required.	Y	S		SI1	PE/SE or EIT		
2. Inspection of high-strength bolting							
a. Bearing-type connections.	Y	P	AISC LRFD Section M2.5	TA2	AWS/AISC-SSI		
b. Slip-critical connections.	Y	C or P (method dependent)	IBC Sect 1704.3.3	TA2	AWS/AISC-SSI		
3. Material verification of structural steel (IBC Sect 1708.4):							
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	Y	S	ASTM A 6 or ASTM A 568 IBC Sect 1708.4	SI1	PE/SE or EIT		
b. Manufacturers' certified mill test reports.	Y	S	ASTM A 6 or ASTM A 568 IBC Sect 1708.4	SI1	PE/SE or EIT		
4. Material verification of weld filler materials:							
a. Identification markings to conform to AWS specification in the approved construction documents.	Y	S	AISC, ASD, Section A3.6; AISC LRFD, Section A3.5	SI1	PE/SE or EIT		
b. Manufacturer's certificate of compliance required.	Y	S		SI1	PE/SE or EIT		

Steel Construction has been reviewed in accordance with section 1704.3 of the IBC Code

Special Inspector _____ Date _____

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Schedule of Special Inspections – Exhibit B

STEEL CONSTRUCTION

Project: Munjoy Commons Apartments, Portland, ME

Date Prepared: 08/26/09

VERIFICATION AND INSPECTION	Y/N	EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE	COMMENTS	AGENT	AGENT QUALIFICATION	DATE	INITIAL
IBC Section 1704.3							
5. Submit current AWS D1.1 welder certificate for all field welders who will be welding on this project.	Y	S	AWS D1.1	SII	PE/SE or EIT		
6. Inspection of welding (IBC 1704.3.1):							
a. Structural steel:							
1) Complete and partial penetration groove welds.	Y	C	AWS D1.1	TA1	AWS-CWI		
2) Multipass fillet welds.	Y	C		TA1	AWS-CWI		
3) Single-pass fillet welds > 5/16"	Y	C		TA1	AWS-CWI		
4) Single-pass fillet welds < 5/16"	Y	P		TA1	AWS-CWI		
5) Floor and Roof deck welds.	N	P	AWS D1.3	TA1	AWS-CWI		
b. Reinforcing steel (IBC Sect 1903.5.2):							
1) Verification of weldability of reinforcing steel other than ASTM A706.	N		Welding of Reinforcement not permitted	N/A			
2) Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special reinforced concrete shear walls and shear reinforcement.	N	C	AWS D1.4 ACI 318: 3.5.2	TA1	AWS-CWI		
3) Shear reinforcement.	N	C		TA1	AWS-CWI		
4) Other reinforcing steel.	N	P		TA1	AWS-CWI		
7. Inspection of steel frame joint details for compliance (IBC Sect 1704.3.2) with approved construction documents:							
a. Details such as bracing and stiffening.	Y	P		SII	PE/SE or EIT		
b. Member locations.	Y	P		SII	PE/SE or EIT		
c. Application of joint details at each connection.	Y	P		SII	PE/SE or EIT		

Steel Construction has been reviewed in accordance with section 1704.3 of the IBC Code

Special Inspector _____ Date _____

Page of

Schedule of Special Inspection Services – Exhibit B
FABRICATION AND IMPLEMENTATION PROCEDURES – STRUCTURAL STEEL

Project: Munjoy Commons Apartments, Portland, ME

Date Prepared: 08/26/09

VERIFICATION AND INSPECTION IBC Section 1704.2	Y/N	EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE	COMMENTS	AGENT	AGENT QUALIFICATION	DATE	INITIAL
1. Fabrications Procedures: Review of fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At the completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building code official stating that the work was performed in accordance with the approved construction documents. -OR- 2. AISC Certification	Y	S	Fabricator shall submit one of the two qualifications	SI1	PE/SE or EIT		
3. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building code official stating that the work was performed in accordance with the approved construction documents.	Y	S	IBC 1704.2.2	SI1	PE/SE or EIT		

Fabricator Qualifications have been reviewed in accordance with section 1704.2 of the IBC Code

Special Inspector _____ Date _____

Page of

Special Inspections – Exhibit C

Quality Assurance for Seismic Resistance Seismic Checklist

Quality Assurance for Seismic Resistance Wind Checklist

Schedule of Inspections

NOT REQUIRED

Special Inspections – Exhibit D

Contractor's Statement of Responsibility

Fabricator's Certificate of Compliance – Exhibit D

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project: *Munjoy Commons Apartments*

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

Signature

Date

Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual

End of Statement of Special Inspections



July 7, 2009

Project R091.06027.001

Mr. Ethan Boxer-Macomber
Development Officer
Avesta Housing
307 Cumberland Avenue
Portland, Maine 04101

RE: Targeted Asbestos and Lead-Based Paint Survey
Munjoy Commons
56 North Street and 13 Emerson Street, Portland, Maine

Dear Mr. Boxer-Macomber:

Ransom Environmental Consultants, Inc. (Ransom) is pleased to provide to Avesta Housing (Avesta) a Targeted Asbestos and Lead-Based Paint Survey of the Munjoy Commons properties located at 56 North Street (former Shailer School) and 13 Emerson Street (former Emerson School) in Portland, Maine. The survey targeted the basements, common areas, roofs and windows of both buildings in preparation for the scheduled renovation project later this year. Ransom representatives Mr. Delano Leonard and Ms. Amy Borslien conducted the survey on June 4 and 5, 2009.

ASBESTOS-CONTAINING MATERIALS

Ransom conducted a targeted inspection of the buildings for the presence of asbestos-containing materials (ACM). The asbestos survey and sample collection was conducted on June 4, 2009 by Ransom's State of Maine and U.S. Environmental Protection Agency (EPA)-certified asbestos inspector, Amy Borslien. A copy of Ms. Borslien's State of Maine Asbestos certification and most recent training certificate is provided in Attachment A.

The scope of the ACM inspection included the identification and quantification of accessible suspect building materials within each of the buildings' basements, common areas, roofs and windows to be impacted by the up-coming renovations. The analytical method used for bulk sample determination of suspect ACM was polarized light microscopy (PLM) with dispersion staining. Samples were analyzed by Scientific Analytical Institute, Inc. (SAI) of Greensboro, North Carolina. SAI is certified to perform bulk sample analysis by the National Voluntary Laboratory Accreditation Program (NVLAP). SAI's certificates are also provided in Attachment A.

Table 1 attached to the end of this report presents the building materials sampled and submitted for laboratory analysis along with the analytical results and quantities of materials testing positive for asbestos. The analytical report from SAI is provided in Attachment B.

400 Commercial Street, Suite 404, Portland, Maine 04101, Tel (207) 772-2891, Fax (207) 772-3248

Pease International Tradeport, 112 Corporate Drive, Portsmouth, New Hampshire 03801, Tel (603) 436-1490

Brown's Wharf, Newburyport, Massachusetts 01950, Tel (978) 465-1822

2127 Hamilton Avenue, Hamilton, New Jersey 08619, Tel (609) 584-0090

60 Valley Street, Building F, Suite 106, Providence, Rhode Island 02909, Tel (401) 433-2160

www.ransomenv.com

Mr. Ethan Boxer-Macomber
Avesta Housing

The Maine Department of Environmental Protection (MEDEP) defines an asbestos-containing material as “any material containing asbestos in quantities greater than or equal to 1% by volume as determined by weight, visual evaluation, and/or point count analysis.” The following materials were determined to contain asbestos greater than 1 percent:

1. Roof Flashing (56 North Street);
2. Corner Patch: felt and tar (56 North Street);
3. Sheet Flooring Underlayment (56 North Street);
4. Pipe Fitting Insulation (56 North Street);
5. Boiler Insulation (56 North Street);
6. Thermal System Insulation (56 North Street);
7. Boiler Casing (13 Emerson Street);
8. Window Glaze (13 Emerson Street); and
9. Window Caulking (13 Emerson Street).

A photograph log of the ACM is provided as Attachment C. Locations of ACM and corresponding sample points are provided in the figures attached to this report.

Asbestos fibers present potential health hazards when they become airborne. ACM may be managed in-place as long as it remains intact, undamaged, and in good condition. Current regulations require that asbestos-containing building materials be removed if they will be disturbed by renovation, demolition, or other building maintenance activities. ACM identified inside and outside of 56 North Street and 13 Emerson Street that will be impacted by the proposed renovation will require removal prior to the initiation of these activities.

Table 2 attached to this report provides a budgetary cost estimate for the removal of the identified ACM by a State of Maine licensed asbestos abatement contractor. The cost estimate for the removal of ACM in Table 2 is for budgetary purposes only and is not an estimate for removal services. Ransom has not engaged an asbestos abatement contractor to provide a cost estimate. The attached estimate is based on abatement costs for similar asbestos abatement projects conducted in the State of Maine. If desired and requested, Ransom can assist Avesta Housing in obtaining a quote from a licensed asbestos abatement contractor for removal of the ACM.

Mr. Ethan Boxer-Macomber
Avesta Housing

LEAD-BASED PAINT

A lead paint inspection was conducted by Ransom representative and MEDEP-certified lead inspector Mr. Delano Leonard at the subject buildings. Mr. Leonard's certification is provided in Attachment A. The inspection was completed in accordance with the MEDEP Lead Management Regulations (Chapter 424, December 11, 2004) and the Department of Housing and Urban Housing (HUD) Chapter 7 Lead-Based Paint Inspection regulations using an Innov-X x-ray fluorescence (XRF) analyzer. Where results were inconclusive (e.g. inconsistent and/or slightly above or below 1.0 mg/cm²), bulk samples were collected and sent to SAI for analysis. SAI's laboratory report is contained in Attachment B.

Ransom collected three hundred thirty-eight (338) XRF readings and eleven (11) paint chip samples for lead content from various building components and surfaces at the Site. XRF readings ranged from below the instrument detection limit (BDL) to greater than 5.0 milligrams per square centimeter (mg/cm²). Readings above the HUD standard of 1.0 mg/cm² are summarized in Table 3. The complete lead inspection report is provided in Attachment D. The analytical report from SAI is provided in Attachment B.

CONCLUSIONS AND RECOMMENDATIONS

Asbestos-Containing Materials

ACM abatement should be performed using approved methods in accordance with applicable regulations established by the U.S EPA, Occupational Safety and Health Administration (OSHA), and the State of Maine. ACM must be removed by a licensed asbestos abatement contractor and in accordance with a project design prepared by a certified Abatement Project Designer. The exception being asbestos-containing roof materials and exterior window caulking and glazing which are exempt from the MEDEP Asbestos Management Regulations provided that these materials are removed wholly intact and are not sawed, sanded, grinded, cut, or drilled during demolition or renovation. The asbestos-containing waste, however, would still be considered a "special waste" and would require disposal in a landfill permitted to accept asbestos. OSHA regulations pertaining to asbestos removal (29 CFR 1926.1101) would still apply. A cost savings may be achieved if the asbestos-containing roof materials and exterior window caulking and glazing are removed by a qualified demolition or roofing contractor, as opposed to a licensed abatement contractor.

Further cost savings are achievable if certain ACM are managed in place and not removed. These materials include the sheet flooring underlayment and thermal system insulation at the former Shailer School, and the interior window glaze associated with the large architectural windows at the former Emerson School. If managed in place, these materials must be repaired and labeled in accordance with OSHA regulations and placed on a monitoring program.

Asbestos-containing joint compound was detected in sample ASB-102B collected from the basement of the former Emerson School. The MEDEP does not regulate asbestos-containing joint compound if it is used to fill nail holes and tape seams in building component systems including walls and ceilings. OSHA, however, does regulate asbestos-containing joint compound.

Mr. Ethan Boxer-Macomber
Avesta Housing

Ransom recommends additional testing to determine the extent, quantity and location, as well as the intended use, of this asbestos-containing joint compound. This additional testing will determine if the joint compound is regulated by the MEDEP. In the case that the material is not regulated by the MEDEP, removal by a licensed abatement contractor would not be required; however, applicable OSHA regulations would apply, including (1) notifying demolition or renovation contractors of the presence and quantities of asbestos-containing joint compound, (2) using wet methods to remove drywall with asbestos-containing joint compound, and (3) promptly disposing of the asbestos-containing waste in leak-tight containers.

Lead-Based Paint

Lead-based paint was detected throughout both buildings inspected as part of this survey. Currently, the Maine Lead Management Regulations apply only to lead work performed on residential buildings and child occupied facilities. Standards have not been developed or adopted for commercial or industrial facilities, and steel structures such as bridges and water towers. Work at these types of facilities is regulated under the OSHA Lead Standard (29 CFR 126.62).

The type of lead work regulated under the Maine Lead Management Regulations includes abatement of lead hazards in residential and child-occupied facilities. Abatement is an activity in which the intent is to permanently eliminate lead hazards. Abatement may include removal, enclosure or encapsulation, or replacement of surfaces containing lead-based paint. According to the MEDEP, a renovation or remodeling project in which the primary intent is to repair, restore, or remodel is not considered an abatement project, even if the project results in the reduction of lead hazards. Since the intent of the renovation projects in both the former Shailer School and the Former Emerson School is to renovate the basements to usable space and upgrade the efficiency of the windows, and is not designed to remove lead hazards, then the Maine Lead Management Rules would not apply (i.e., abatement of the paint containing lead is not required).

Although not regulated under the MEDEP regulations, workers performing demolition or renovation in buildings containing lead-based paint or lead-containing coatings should adhere to the OSHA Lead Standard (29 CFR 126.62). To minimize exposure to airborne dust or fumes containing lead and the requirement to implement a lead exposure assessment, torch burning, cutting, grinding, or similar high impact work on components covered by lead-containing paint should be avoided. Such work would need to be conducted by properly trained workers using appropriate worker protection and engineering controls. For work activities that may generate airborne lead, the employer should perform an initial exposure assessment (personal air monitoring) for each individual task (e.g., demolition, abrasive blasting, and painting) that has the potential for causing worker exposure to be at or above the OSHA Action Level (30 micrograms of lead per cubic meter of air). In lieu of monitoring, recent historical data from similar operations may be used to comply with OSHA requirements.

Lead waste, including lead based paint waste with the exception of household waste, may be subject to the hazardous waste requirements of EPA's Resource Conservation and Recovery Act (RCRA). The generator of the waste (or the owner of the facility, for construction waste) is responsible for determining whether or not the solid waste is hazardous.

Mr. Ethan Boxer-Macomber
Avesta Housing

The MEDEP (Chapter 850 – Identification of Hazardous Wastes) requires representative samples of building materials from commercial buildings scheduled to be landfilled be collected for Toxicity Characteristic Leaching Procedure (TCLP) testing to determine if leachable lead concentrations are greater than five parts per million (ppm). If less than five ppm, materials may be disposed of as general construction debris; otherwise, the material would have to be transported to a hazardous waste disposal site.

LIMITATIONS

This survey and hazardous materials inventory is subject to certain limitations, which must be considered in interpreting the results. These limitations are as follows:

1. No survey will be able to identify all potentially hazardous materials throughout a facility.
2. Furnaces may contain interior asbestos-based insulating components and gaskets that are not accessible during sample collection activities. Ransom presumes that furnaces, if removed or otherwise impacted by the proposed renovation projects, will be removed and disposed by the demolition contractor as a whole component. If the boilers require dismantling, additional costs may be incurred since ACM may be disturbed during disassembly.

The information and conclusions contained in this report are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the professional judgment of Ransom based on the data obtained from the work and the site conditions encountered at the time the work was performed. This survey does not cover concealed areas or items not inspected.

This survey was not a building code inspection or an assessment of renovation activities. Code-related issues must be addressed prior to work in the buildings.

Mr. Ethan Boxer-Macomber
Avesta Housing

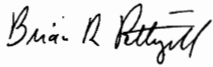
If there are any questions regarding the information in this report, please contact the undersigned.

Sincerely,
RANSOM ENVIRONMENTAL CONSULTANTS, INC.



Nicholas Sabatine
2009.07.07
15:09:57 -04'00'

Todd C. Young
Project Manager



Brian Pettingill
2009.07.07
15:14:40 -04'00'

Brian R. Pettingill, P.G., R.E.A.
Senior Project Manager

TCY/BRP:jsl
Attachments

TABLE 1: ASBESTOS SAMPLING SUMMARY

Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons

56 North Street and 13 Emerson Street, Portland, Maine

MATERIAL	LOCATION	SAMPLE IDENTIFICATION	PERCENTAGE AND TYPE	QUANTITY OF ACM ¹
Tar and Gravel Built-Up Roof	56 North Street: Roof	ASB-01A and ASB-01B	NAD ²	---
Roof Flashing	56 North Street: Roof	ASB-02A and ASB-02B	15% Chrysotile	180 LF
Duct Sealant	56 North Street: Roof	ASB-03A and ASB-03B	NAD	---
Corner Patch – Tar	56 North Street: Roof	ASB-04A and ASB-04B	20% Chrysotile	20 SF
Corner Patch - Felt	56 North Street: Roof	ASB-05A and ASB-05B	5% Chrysotile	
Window Glaze	56 North Street: Exterior	ASB-06A and ASB-06B	NAD	---
Shingle	56 North Street: Upper Roof	ASB-07A and ASB-07B	NAD	---
Plaster	56 North Street: Throughout	ASB-08A through ASB-08E	NAD	---
Plaster Skim Coat	56 North Street: Throughout	ASB-09A through ASB-09C	NAD	---
Pastel Sheet Flooring	56 North Street: Second Floor Alcove	ASB-10A and ASB-10B	NAD	---
Sheet Flooring Underlayment	56 North Street: Second Floor Alcove	ASB-11A and ASB-11B	3% Chrysotile	210 SF
Drywall	56 North Street: Throughout	ASB-12A through ASB-12C	NAD	---
Joint Compound	56 North Street: Throughout	ASB-13A through ASB-13C	NAD	---
Tan Covebase	56 North Street: Second Floor Alcove	ASB-14A and ASB-14B	NAD	---
Covebase Adhesive	56 North Street: Second Floor Alcove	ASB-15A and ASB-15B	NAD	---
12-inch Green Floor Tile	56 North Street: Ground Floor	ASB-16A and ASB-16B	NAD	---

TABLE I: ASBESTOS SAMPLING SUMMARY
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

MATERIAL	LOCATION	SAMPLE IDENTIFICATION	PERCENTAGE AND TYPE	QUANTITY OF ACM ¹
Floor Tile Adhesive	56 North Street: Ground Floor	ASB-17A and ASB-17B	NAD	---
12-inch Tan Floor Tile	56 North Street: Ground Floor	ASB-18A and ASB-18B	NAD	---
Underlayment	56 North Street: Ground Floor	ASB-19A and ASB-19B	NAD	---
2-foot by 4-foot Ceiling Tile	56 North Street: Basement	ASB-20A and ASB-20B	NAD	---
Tan Covebase	56 North Street: Basement	ASB-21A and ASB-21B	NAD	---
Covebase Adhesive	56 North Street: Basement	ASB-22A and ASB-22B	NAD	---
Vapor Paper	56 North Street: Basement	ASB-23A and ASB-23B	NAD	---
Small Boiler Insulation	56 North Street: Basement	ASB-24A and ASB-24B	NAD	---
Pipe Fitting Insulation	56 North Street: Basement	ASB-25A through ASB-25C	30% Chrysotile	20 Each
Breaching Cement	56 North Street: Basement	ASB-26A and ASB-26B	NAD	---
Large Boiler Insulation	56 North Street: Basement	ASB-27A and ASB-27B	30% Chrysotile	1 Each
Thermal System Insulation	56 North Street: Basement	ASB-28A through ASB-28C	50% Chrysotile	450 LF
Small Boiler Brick	56 North Street: Basement	ASB-29A and ASB-29B	NAD	---
Large Boiler Brick	56 North Street: Basement	ASB-30A and ASB-30B	NAD	---
Plaster	13 Emerson Street: Throughout	ASB-100A through ASB-100C	NAD	---
Joint Compound	13 Emerson Street: Throughout	ASB-101A through ASB-101C	NAD	---

TABLE 1: ASBESTOS SAMPLING SUMMARY

Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

MATERIAL	LOCATION	SAMPLE IDENTIFICATION	PERCENTAGE AND TYPE	QUANTITY OF ACM ¹
Drywall	13 Emerson Street: Throughout	ASB-102A through ASB-102C	NAD ³	---
Breaching Cement	13 Emerson Street: Basement	ASB-103A and ASB-103B	NAD	---
Thermal System Insulation	13 Emerson Street: Basement	ASB-104A through ASB-104C	NAD	---
Boiler 1 Casing	13 Emerson Street: Basement	ASB-105A and ASB-105B	30% Chrysotile	1 Each
Built Up Roof (tar)	13 Emerson Street: Roof	ASB-106A and ASB-106B	NAD	---
Roof Paper	13 Emerson Street: Roof	ASB-107A and ASB-107B	NAD	---
Asphalt Shingle	13 Emerson Street: Roof	ASB-108A and ASB-108B	NAD	---
Boiler 2 Casing	13 Emerson Street: Basement	ASB-109A and ASB-109B	60% Chrysotile (paper); 30% Chrysotile (mud)	1 Each
Boiler 1 Insulation	13 Emerson Street: Basement	ASB-110 A and ASB-110B	NAD	---
Boiler 1 Brick	13 Emerson Street: Basement	ASB-111A and ASB-111B	NAD	---
Boiler 2 Insulation	13 Emerson Street: Basement	ASB-112A and ASB-112B	NAD	---
Boiler 2 Brick	13 Emerson Street: Basement	ASB-113A and ASB-113B	NAD	---
12-inch Gray Floor Tile	13 Emerson Street: Entrance	ASB-114A and ASB-114B	NAD	---
Floor Tile Mastic	13 Emerson Street: Entrance	ASB-115A and ASB-115B	NAD	---
12-inch Green Floor Tile	13 Emerson Street: Entrance	ASB-116A and ASB-116B	NAD	---

TABLE 1: ASBESTOS SAMPLING SUMMARY

Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons

56 North Street and 13 Emerson Street, Portland, Maine

MATERIAL	LOCATION	SAMPLE IDENTIFICATION	PERCENTAGE AND TYPE	QUANTITY OF ACM ¹
Floor Tile Mastic	13 Emerson Street: Entrance	ASB-117A and ASB-117B	NAD	---
Underlayment	13 Emerson Street: Entrance	ASB-118A and ASB-118B	NAD	---
Sheet Flooring (Battleship)	13 Emerson Street: Second Floor	ASB-119A and ASB-119B	NAD	---
Window Glaze (Interior)	13 Emerson Street: Second Floor Large Architectural Window	ASB-120A and ASB-120B	3% Chrysotile	2 Each
Window Glaze (Exterior)	13 Emerson Street: Exterior	ASB-121A and ASB-121B	3% Chrysotile	84 Each (Glaze and Caulk)
Window Caulking	13 Emerson Street: Exterior	ASB-122A and ASB-122B	3% Chrysotile	22 Each (Caulk Only)

NOTES:

- SF = square feet; LF = linear feet
- NAD: No Asbestos Detected
- Drywall sample had asbestos containing joint compound.

TABLE 2: ASBESTOS ABATEMENT COST ESTIMATE
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

MATERIAL	QUANTITY ¹	UNIT COST	TOTAL
<i>56 North Street</i>			
Roof Flashing	180 LF	N/A ²	N/A
Corner Patch	20 SF	N/A ²	N/A
Sheet Flooring Underlayment	210 SF	\$6.00 per SF	\$1,260.00
Pipe Fitting Insulation	20 Each	\$50.00 Each	\$1,000.00
Boiler Insulation and Demolition	1 Each	\$10,000.00 Each	\$10,000.00
Thermal System Insulation	450 LF	\$12.00 per LF	\$5,400.00
<i>Sub-Total for 56 North Street:</i>			\$17,660.00
<i>13 Emerson Street</i>			
Boiler Insulation and Demolition	2 Each	\$10,000.00 Each	\$20,000.00
Interior Window Glaze: Architectural Windows	2 Each	N/A ³	N/A
Exterior Windows	106 Each	N/A	N/A
<i>Sub-Total for 13 Emerson Street:</i>			\$20,000.00
<i>Sub-Total for Asbestos Abatement at 56 North Street and 13 Emerson Street:</i>			\$37,660.00
Contingency ⁴			\$5,000.00
Estimated Consultant Fees ⁵			\$8,500.00
TOTAL ESTIMATED ASBESTOS ABATEMENT COST			\$51,160.00

NOTES:

- SF: Square Feet; LF: Linear Feet
- Cost estimates are not provided for asbestos-containing materials not regulated by the Maine Department of Environmental Protection; these include asphalt-based roofing materials and exterior and window caulk and glaze compounds.
- The architectural windows at 13 Emerson Street will remain in place and therefore a budget for their removal is not required.
- A \$5,000.00 contingency is added to cover potential additional hidden costs.
- Consultant fees include design services by an asbestos designer and full time asbestos abatement monitoring. This cost includes clearance air testing.

TABLE 3: LEAD-BASED PAINT
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

READING NUMBER ¹	LOCATION	COMPONENT	READING ²
<i>56 North Street (Shailer School)</i>			
7	2 nd Floor Apartment (# 201)	White wood exterior window sash	>5.00
8	2 nd Floor Apartment (# 201)	White wood exterior window vertical trim	1.80
13	2 nd Floor Apartment (# 201)	White wood exterior window vertical trim	>5.00
23	2 nd Floor Apartment (# 201)	White metal exterior window sill	>1.87
24	2 nd Floor Apartment (# 201)	White wood exterior window vertical trim	>5.00
30	2 nd Floor Apartment (# 201)	White wood exterior window vertical trim	>5.00
37	2 nd Floor Apartment (# 201)	White exterior wood vertical trim	1.07
3740	1 st Floor Common Area	Blue plaster wall	1.04
42	1 st Floor Common Area	Blue plaster wall	1.00
53	1 st Floor Common Area	Green plaster wall	1.00
63	Basement	Green brick wall	1.00
71	Basement	Green brick wall	>1.06
78	Basement	White drywall wall	>1.00
79	Basement	White drywall wall	>1.00
80	Basement	Green drywall wall	>1.00
86	Basement	Green metal door	>5.00
93	Basement	Green metal door	>5.00
94	Basement	Green metal door casing	2.45
96	Basement	Green brick pillar	1.00
104	Basement	White wood window trim	>5.00
105	Basement	White wood window sash	>5.00
106	Basement	White wood window trim	>5.00
107	Basement	White wood window trim	>5.00
115	Basement	White drywall wall	>1.00
116	Basement	White drywall wall	>1.00
117	Basement	Green drywall wall	>1.00
118	Basement	Green drywall wall	>1.00
126	Basement	Green metal door	>5.00
130	Basement	White wood exterior window sash	>5.00

TABLE 3: LEAD-BASED PAINT
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

READING NUMBER ¹	LOCATION	COMPONENT	READING ²
132	Basement	White wood exterior window sash	>5.00
133	Basement	White wood exterior window sash	>5.00
134	Basement	White wood exterior window trim	1.08
136	Basement	White wood exterior window sash	>5.00
139	Basement	White wood exterior window trim	>2.09
140	Basement	White wood exterior window trim	>3.03
142	Basement	White wood exterior window sash	>5.00
<i>13 Emerson Street (Emerson School)</i>			
1	Vestibule 100	White Plaster Ceiling	>5.00
3	Vestibule 100	White plaster wall	>5.00
5	Vestibule 100	White wood window	>1.00
7	Vestibule 100	White wood window trim	>1.00
12	Vestibule 100	White window sash	>5.00
13	Vestibule 100	White plaster wall	>4.32
17	Vestibule 100	Yellow plaster wall	>5.00
29	Vestibule 101	Blue wood window	>1.00
30	Vestibule 101	Blue plaster wall	>4.76
31	Vestibule 101	Blue plaster wall	>5.00
43	Vestibule 101	White wood window sash	>5.00
44	Vestibule 101	White wood window sash	>5.00
50	Vestibule 101	Green plaster wall	>5.00
52	Vestibule 101	Green plaster wall	>5.00
53	Vestibule 101	Black floor covering	0.46%
55	Vestibule 101	Yellow plaster wall	>5.00
56	Vestibule 101	Yellow plaster wall	>5.00
68	Basement	Yellow brick wall	>1.00
70	Basement	Yellow brick wall	>1.00
71	Basement	Blue brick wall	>1.00
72	Basement	Blue brick wall	>1.00
74	Basement	Blue brick wall	0.79%

TABLE 3: LEAD-BASED PAINT
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

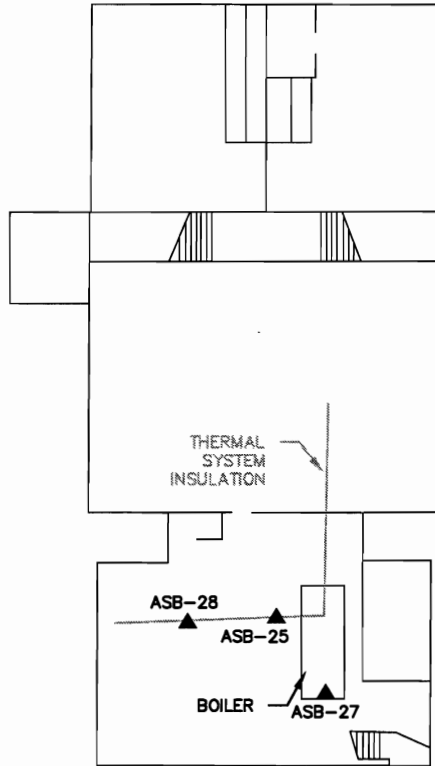
READING NUMBER ¹	LOCATION	COMPONENT	READING ²
77	Basement	Red wood door trim	1.17
78	Basement	Red wood window trim	>4.45
79	Basement	Yellow wood window trim	>3.90
80	Basement	Red wood door	>2.29
82	Basement	Red wood fire door trim	>5.0
86	Basement	Yellow metal air handler duct	3.90
89	Basement	Red wood window trim	>5.00
94	Basement	Yellow brick wall	>1.00
96	Basement	Blue brick wall	0.90%
98	Basement	Yellow brick wall	1.00
99	Basement	Blue brick wall	>1.00
101	Basement	White plaster ceiling	>1.00
108	Basement	Yellow metal I-beam	>1.00
109	Basement	Yellow metal I-beam	>1.00
110	Basement	Yellow drywall wall	>1.00
113	Basement	Yellow metal I-beam	>1.00
114	Basement	Yellow metal I-beam	>1.00
116	Basement	Blue brick wall	1.00
121	Basement	Yellow plaster wall	1.00
123	Basement	Blue plaster wall	>1.00
124	Basement	Blue plaster wall	>1.00
129	Basement	Yellow wood window trim	>5.00
130	Basement	Yellow wood window sash	>5.00
131	Basement	Yellow metal I-beam	>1.00
141	Basement	Yellow wood window trim	>5.00
142	Basement	Yellow wood window sash	>5.00
147	Basement	Yellow brick wall	1.00
149	Basement	Yellow Brick Wall	0.50%
150	Basement	Blue brick wall	1.00
153	Basement	Yellow Wood window trim	>5.00

TABLE 3: LEAD-BASED PAINT
 Targeted Asbestos and Lead-Based Paint Survey
 Munjoy Commons
 56 North Street and 13 Emerson Street, Portland, Maine

READING NUMBER ¹	LOCATION	COMPONENT	READING ²
154	Basement	Red wood door trim	>5.00
156	Basement	Orange brick wall	>1.00
163	Basement	Blue brick wall	0.83%
167	Basement	Blue drywall wall	>1.00
168	Basement	Blue drywall wall	>1.00
172	Basement	Red metal air handler door	>5.00
177	Basement	White metal air handler duct	>4.46
178	Basement	Blue wood air handler door	>5.00
182	Basement	White plaster ceiling	>1.00
183	Basement	White plaster ceiling	>1.00
184	Basement	Black metal I-beam	>5.00

NOTES:





1. XRF reading numbers correspond to the Lead Inspection and Determination Report table found in Appendix D attached.
2. Result listed as a percent were found to contain lead by paint chip sampling.



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



Environmental Consultants, Inc.

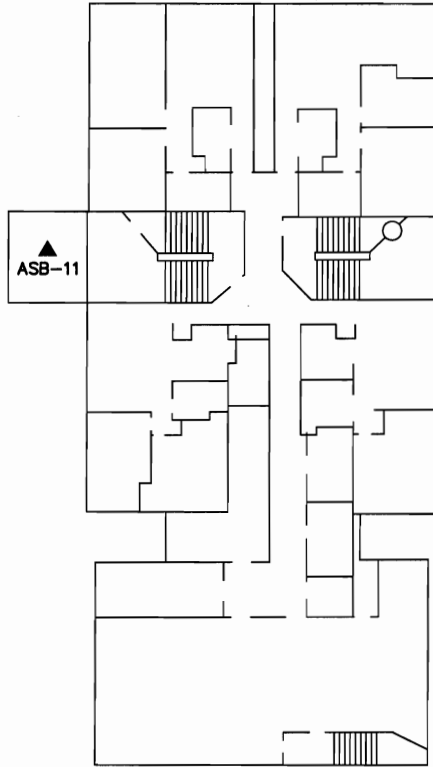
BASEMENT

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE

DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 1





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NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



Environmental Consultants, Inc.

FIRST FLOOR

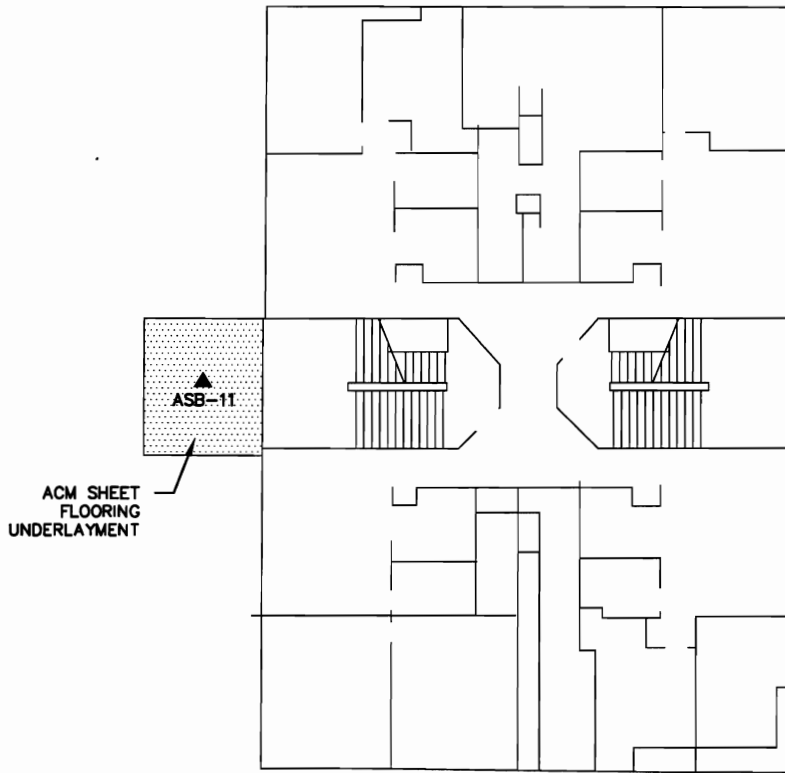
PREPARED FOR:

ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:

SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 2



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
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3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



Environmental Consultants, Inc.

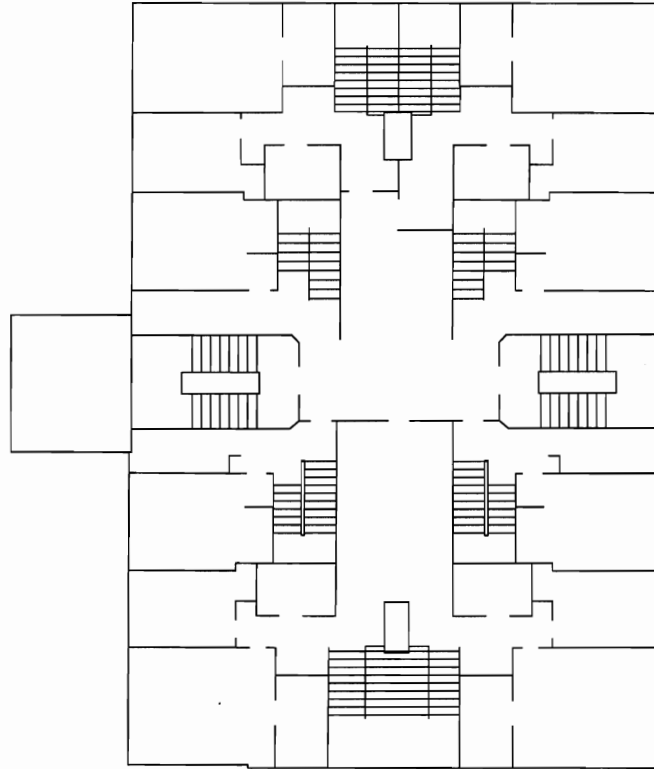
SECOND FLOOR

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE

DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 3





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NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
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3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



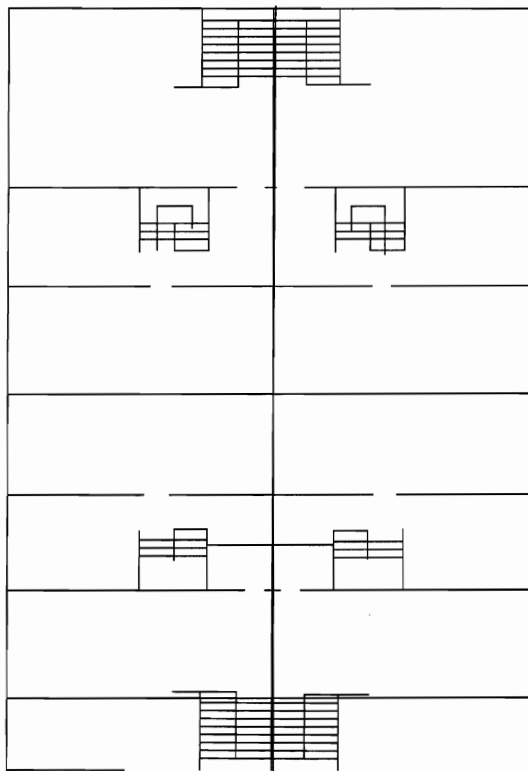
Environmental Consultants, Inc.

THIRD FLOOR

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 4



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



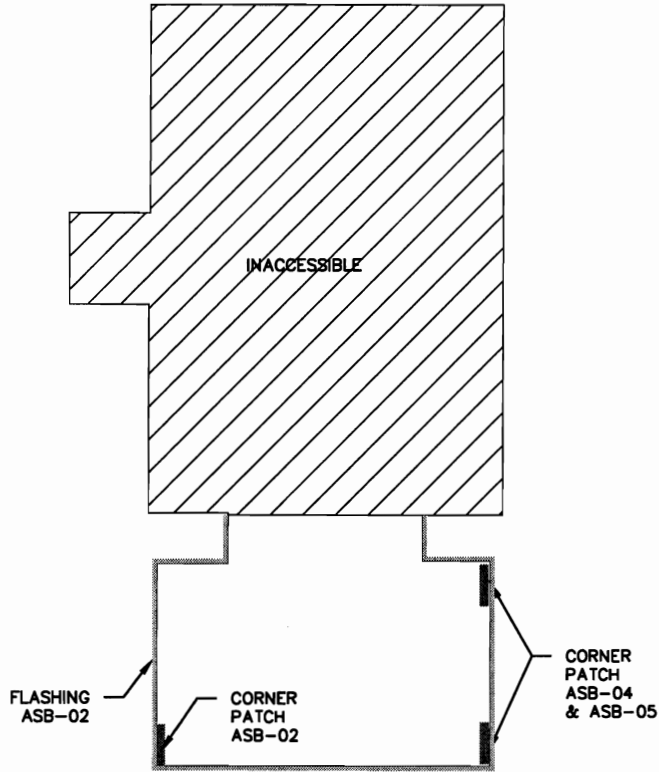
Environmental Consultants, Inc.

FOURTH FLOOR

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 5



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  FLASHING
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION

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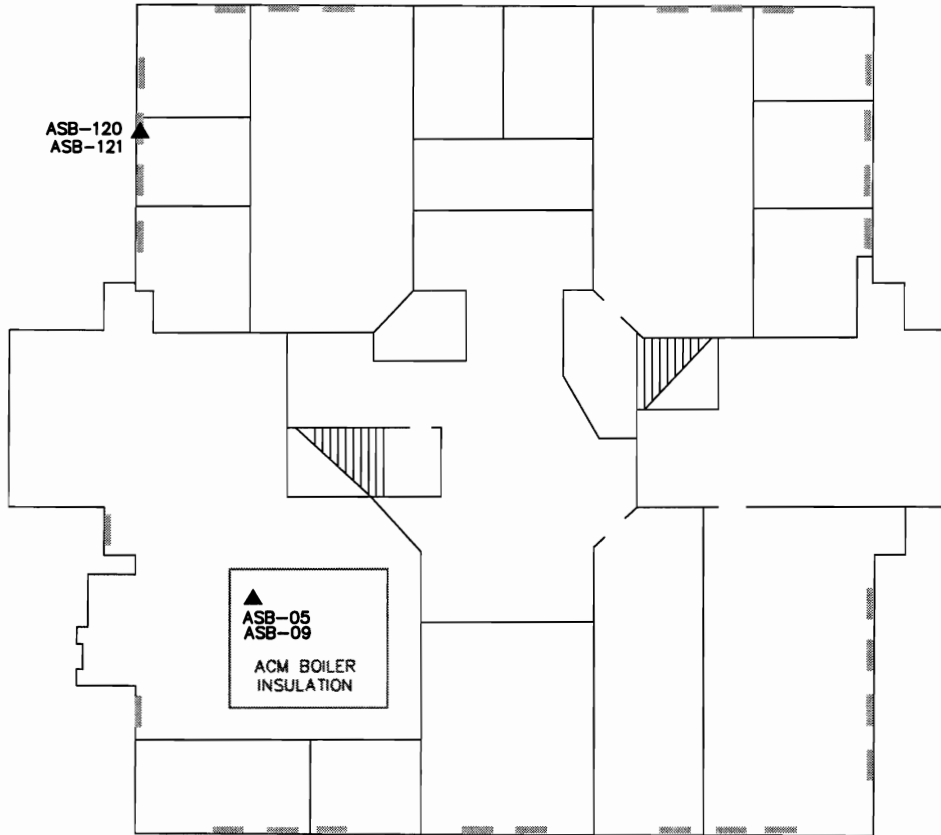
Environmental Consultants, Inc.

ROOF

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 SHAILER SCHOOL
 56 NORTH STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 6



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  CAULKING/WINDOW GLAZE
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



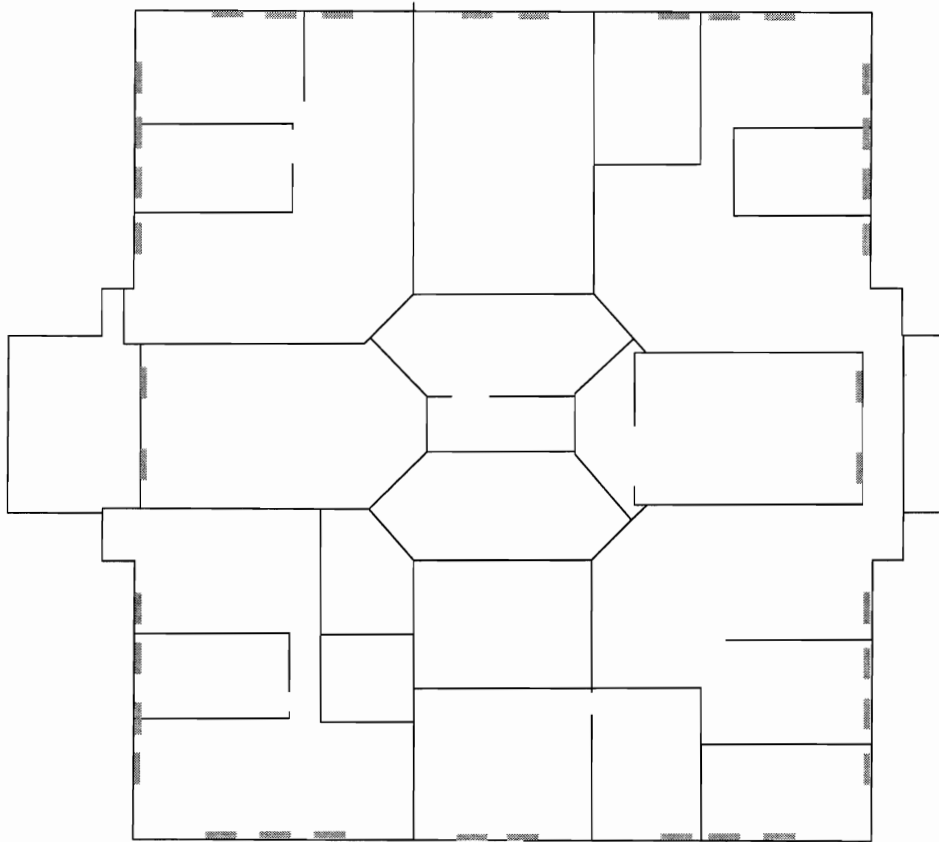
Environmental Consultants, Inc.

BASEMENT

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 EMERSON SCHOOL
 13 EMERSON STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 7



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  CAULKING/WINDOW GLAZE
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION



Environmental Consultants, Inc.

FIRST FLOOR

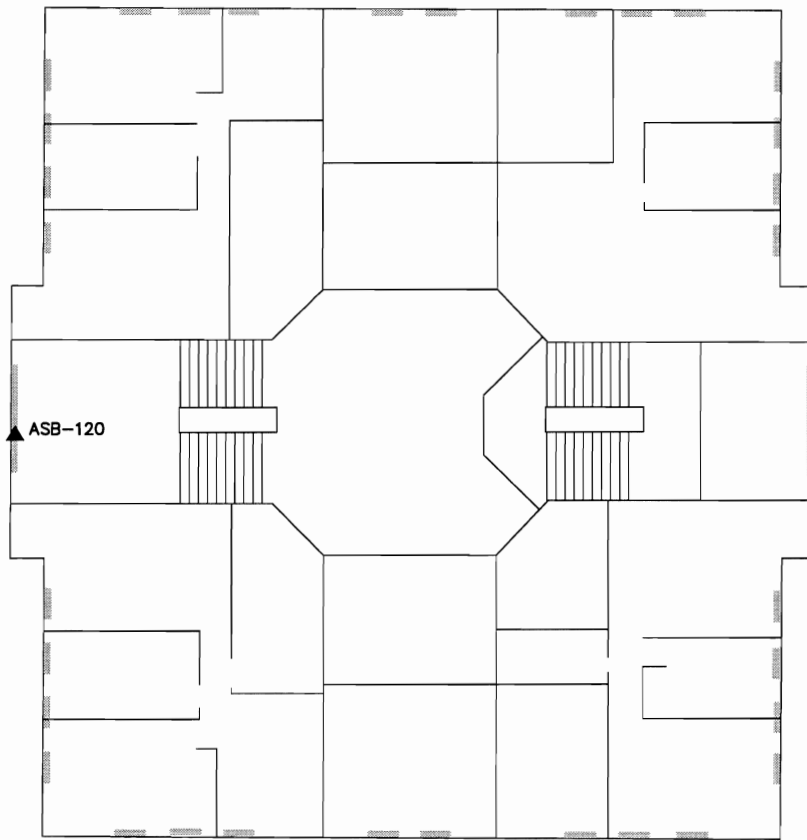
PREPARED FOR:

ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:

EMERSON SCHOOL
 13 EMERSON STREET
 PORTLAND, MAINE





DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 8



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
2. SOME FEATURES ARE APPROXIMATE IN LOCATION AND SCALE.
3. THIS PLAN HAS BEEN PREPARED FOR ETHAN BOXER-MACOMBER. ALL OTHER USES ARE NOT AUTHORIZED, UNLESS WRITTEN PERMISSION IS OBTAINED FROM RANSOM ENVIRONMENTAL CONSULTANTS, INC.

LEGEND:

-  CAULKING/WINDOW GLAZE
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION

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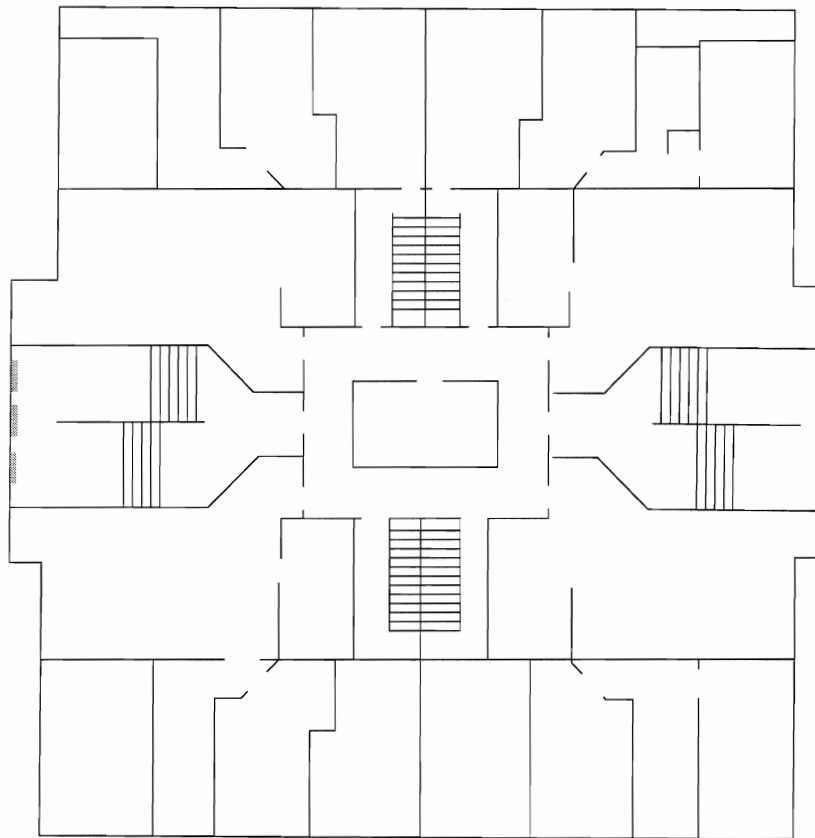
Environmental
Consultants, Inc.

SECOND FLOOR

PREPARED FOR:
ETHAN BOXER-MACOMBER
AVESTA HOUSING
307 CUMBERLAND AVENUE
PORTLAND, MAINE

SITE:
EMERSON SCHOOL
13 EMERSON STREET
PORTLAND, MAINE





DATE: JULY 2009
PROJECT: 091.06027
FIGURE: 9



NOTES:

1. SITE PLAN BASED ON OBSERVATIONS MADE BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON JUNE 4, 2009.
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LEGEND:

-  CAULKING/WINDOW GLAZE
-  THERMAL SYSTEM INSULATION
-  CORNER PATCH
-  BOILER INSULATION

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Environmental Consultants, Inc.

THIRD FLOOR

PREPARED FOR:
 ETHAN BOXER-MACOMBER
 AVESTA HOUSING
 307 CUMBERLAND AVENUE
 PORTLAND, MAINE

SITE:
 EMERSON SCHOOL
 13 EMERSON STREET
 PORTLAND, MAINE

DATE: JULY 2009
 PROJECT: 091.06027
 FIGURE: 10

ATTACHMENT A

Certifications

Targeted Asbestos and Lead-Based Paint Survey
Munjoy Commons
56 North Street and 13 Emerson Street, Portland, Maine

State of Maine
Asbestos Abatement Program

Amy K. Borslien

Inspector

Cert No. AI-0531

Expiration Date 11/30/2010

Trn.Exp.Date 11/20/2009

This is not a legal form of official identification



**INSTITUTE FOR ENVIRONMENTAL
EDUCATION, INC.**

16 Upton Drive, Wilmington, MA 01887
(Phone) 978.658.5272

IEE

IEE

This is to certify that
Amy Borslien

*has completed the requisite training, and has passed
an examination for reaccreditation as:*

Asbestos Inspector Refresher

pursuant to Title II of the Toxic Substance Control Act, 15 U.S.C. 2646

*For course participants seeking New York State certification or New York State training reciprocity, the official record of
successful completion is the DOH 2832 Certificate of Completion of Asbestos Safety Training.*

November 20, 2008
Examination Date

November 20, 2009
Expiration Date

Course Location
Institute for Environmental Education
16 Upton Drive
Wilmington, MA 01887

08-3536-106-235413
Certificate Number

Wentworth J

Training Director



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

May 12, 2009

Attn: Delano D. Leonard
Ransom Environmental Consultants
400 Commercial St., Suite 404
Portland, Maine 04101

Dear Mr. Leonard,

Your lead application for certification has been received and **approved**. You have been granted certification as a **Lead Inspector LI-0417**. Enclosed is your wallet card, with an expiration date of **March 31, 2010**. All employees working on a lead abatement project must carry this photo ID wallet card. The card is property of the individual to whom it is issued. Your responsibility as a licensee is to ensure delivery of the card to person in your employment. This letter should be retained for your company files as record of certification.

Thank you for your cooperation and your completed application(s). Applications can now be found on our DEP webpage at the following:
<http://www.maine.gov/dep/rwm/lead/forms/index.htm>

If you have any questions on this certification or on any other aspect of DEP's lead abatement licensing program, please call Sandra Moody (207) 287-7751.




Sincerely,

Sandra J. Moody, Environmental Technician
Division of Solid Waste Management
Bureau of Remediation and Waste Management

Enclosure

CERTIFICATION LETTER/sjm

State of Maine
Lead Abatement Program
Delano D. Leonard
Inspector
Cert No. LI-0417
Expiration Date 03/31/2010
Trn. Exp Date 03/26/2010
This is not a legal form of official identification

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

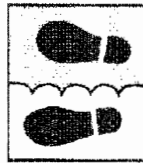
BANGOR
106 HOGAN ROAD
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769-2094
(207) 764-0477 FAX: (207) 760-3143

Klane's **E**ducation **I**nformation **T**raining **H**ubSM

491 Norridgewock Road * Fairfield, Maine 04937 * (207) 453-KEITH (5348) * Fax: (207) 453-5226 * E-mail: jonathan@trainerman.com



SM

"Take a step in the right direction" SM

Certifies that

Delano Leonard, CIH
DOB or SS#: 04/19/1962

has attended and successfully completed the required classroom and written examination under TSCA Title IV and Title X, HUD 24 CFR Part 35, and DEP Chapter 424 on March 26, 2009 for the

Lead Inspector
8-Hour Annual Refresher Training Course

* Refresher course is not valid without the corresponding initial and any required refresher training courses.

March 26, 2009

Exam Date

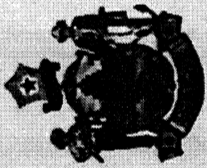
March 26, 2010

Expiration Date

KLIR-212

Certificate Number


Jonathan Klane, M.S.Ed., CIH, CHMM, CET



State of Maine
Department of Environmental Protection

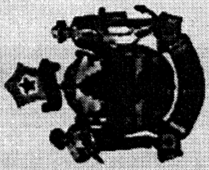
LICENSE

Scientific Analytical Institute, Inc.

Asbestos Analytical Laboratory
(Bulk)

License Number: LB-0073

Expiration Date: 02/28/2010



State of Maine
Department of Environmental Protection

LICENSE

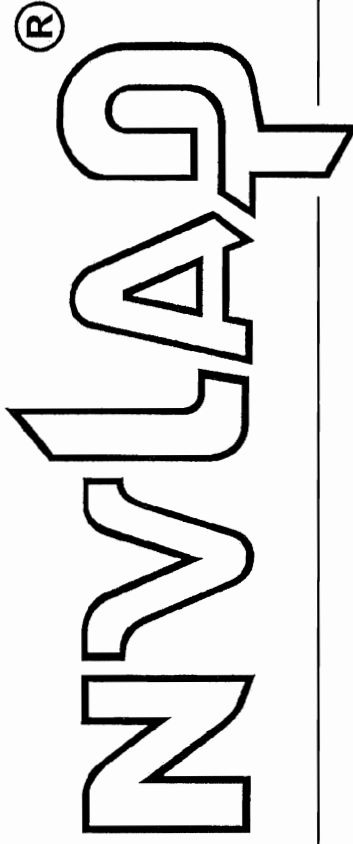
Scientific Analytical Institute, Inc.

Asbestos Analytical Laboratory
(Air)

License Number: LA-0081

Expiration Date: 02/28/2010

United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200664-0

Scientific Analytical Institute
Greensboro, NC

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005).*

2009-01-01 through 2009-12-31

Effective dates



Sally J. Bruce
For the National Institute of Standards and Technology



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Scientific Analytical Institute

302-L Pomona Drive
Greensboro, NC 27407

Mr. Nathaniel Durham

Phone: 336-292-3888 Fax: 336-292-3313

E-Mail: ndurham@sailab.com

URL: <http://www.sailab.com>

BULK ASBESTOS FIBER ANALYSIS (PLM)

NVLAP LAB CODE 200664-0

NVLAP Code Designation / Description

18/A01 EPA-600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples

2009-01-01 through 2009-12-31

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology



The American Industrial Hygiene Association

acknowledges that

Scientific Analytical Institute, Inc.

302-L Pomona Drive, Greensboro, NC 27407

Laboratory ID: 173190

has fulfilled the requirements of the AIHA Laboratory Quality Assurance Programs (LQAP), thereby, conforming to the ISO/IEC 17025:1999 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories*. The above named laboratory, along with all premises from which key activities are performed, as listed above, have been accredited by AIHA in the following:

ACCREDITATION PROGRAMS

- INDUSTRIAL HYGIENE Accreditation Expires: 03/01/2009
- ENVIRONMENTAL LEAD Accreditation Expires: 03/01/2009
- ENVIRONMENTAL MICROBIOLOGY Accreditation Expires: 04/01/2008
- FOOD Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with LQAP requirements. This certificate is not valid without the attached **Scope of Accreditation**.

James A. Kenny, CIH/CSP
Chairperson, Analytical Accreditation Board

Frank M. Renshaw, PhD, CIH, CSP
President, AIHA

Date Issued: 03/16/2007



ATTACHMENT B

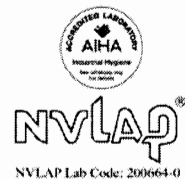
Laboratory Reports

Targeted Asbestos and Lead-Based Paint Survey
Munjoy Commons
56 North Street and 13 Emerson Street, Portland, Maine



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components		Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes						Treatment
asb-01a	Tar and Gravel Roofing	None Detected	30%	Fiber Glass	70%	Other	Black Fibrous Heterogeneous
905070PLM_1							Dissolved, Teased
asb-01b	Tar and Gravel Roofing	None Detected	30%	Fiber Glass	70%	Other	Black Fibrous Heterogeneous
905070PLM_2							Dissolved, Teased
asb-02a	Flashing	15% Chrysotile	20%	Cellulose	55%	Other	Black Fibrous Heterogeneous
905070PLM_3			10%	Fiber Glass			Dissolved, Teased
asb-02b	Flashing	Not Analyzed					
905070PLM_4							
asb-03a	Duct Sealant	None Detected	5%	Cellulose	95%	Other	Black Non Fibrous Heterogeneous
905070PLM_5							
asb-03b	Duct Sealant	None Detected	5%	Cellulose	95%	Other	Black Non Fibrous Heterogeneous
905070PLM_6							
asb-04a	Corner Patch- Tar	20% Chrysotile	30%	Cellulose	50%	Other	Black Fibrous Heterogeneous
905070PLM_7							
asb-04b	Corner Patch- Tar	Not Analyzed					
905070PLM_8							

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Ired Gulley (123)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-05a	Corner Patch- Felt	5% Chrysotile	20% Cellulose 10% Fiber Glass	65% Other	Black Fibrous Heterogeneous
905070PLM_9					Dissolved, Teased
asb-05b	Corner Patch- Felt	Not Analyzed			
905070PLM_10					
asb-06a	Window Glaze	None Detected	3% Other	97% Other	White Non Fibrous Heterogeneous
905070PLM_11					Teased
asb-06b	Window Glaze	None Detected	3% Other	97% Other	White Non Fibrous Heterogeneous
905070PLM_12					Teased
asb-07a	Shingle	None Detected	20% Fiber Glass	80% Other	Black, Gray Fibrous Heterogeneous
905070PLM_13					Crushed
asb-07b	Shingle	None Detected	20% Fiber Glass	80% Other	Black, Gray Fibrous Heterogeneous
905070PLM_14					Crushed
asb-08a	Plaster	None Detected	5% Hair	75% Other 20% Quartz	Gray Fibrous Heterogeneous
905070PLM_15					Crushed
asb-08b	Plaster	None Detected	5% Hair	75% Other 20% Quartz	Gray Fibrous Heterogeneous
905070PLM_16					Crushed

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Customer: Ransom Environmental
400 Commercial St Ste 404
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Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes			Quartz	Other	Treatment
asb-08c	Plaster	None Detected		80%	Other	Gray Non Fibrous Heterogeneous
905070PLM_17			20%	Quartz	Crushed	
asb-08d	Plaster	None Detected		80%	Other	Gray Non Fibrous Heterogeneous
905070PLM_18			20%	Quartz	Crushed	
asb-08e	Plaster	None Detected	5% Cellulose	75%	Other	Brown Fibrous Heterogeneous
905070PLM_19			20%	Quartz	Crushed	
asb-09a	Plaster Skim Coat	None Detected		100%	Other	White Non Fibrous Heterogeneous
905070PLM_20					Crushed	
asb-09b	Plaster Skim Coat	None Detected		100%	Other	White Non Fibrous Heterogeneous
905070PLM_21					Crushed	
asb-09c	Plaster Skim Coat	None Detected	3% Cellulose	97%	Other	White Non Fibrous Heterogeneous
905070PLM_22					Crushed	
asb-10a	Pastel Sheet Flooring	Not Submitted				
905070PLM_23						
asb-10b	Pastel Sheet Flooring	None Detected	30% Cellulose	70%	Other	Black, Gray, Brown Fibrous Heterogeneous
905070PLM_24					Dissolved, Teased	

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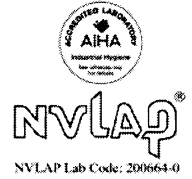
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Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				
asb-11a	Sheet Flooring Underlayment	3% Chrysotile	5% Cellulose	92% Other	Yellow, Black Non Fibrous Heterogeneous
905070PLM_25					Dissolved
asb-11b	Sheet Flooring Underlayment	Not Analyzed			
905070PLM_26					
asb-12a	Drywall	None Detected	15% Cellulose 5% Fiber Glass	80% Other	White, Brown Fibrous Heterogeneous
905070PLM_27					Teased
asb-12b	Drywall	None Detected	15% Cellulose 5% Fiber Glass	80% Other	White, Brown Fibrous Heterogeneous
905070PLM_28					Teased
asb-12c	Drywall	None Detected	15% Cellulose 5% Fiber Glass	80% Other	White, Brown Fibrous Heterogeneous
905070PLM_29					Teased
asb-13a	Joint Compound	None Detected		100% Other	White Non Fibrous Heterogeneous
905070PLM_30					Teased
asb-13b	Joint Compound	None Detected		100% Other	White Non Fibrous Heterogeneous
905070PLM_31					Teased
asb-13c	Joint Compound	None Detected		100% Other	White Non Fibrous Heterogeneous
905070PLM_32					Teased

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



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Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

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Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-14a	Tan Covebase	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_33					Dissolved
asb-14b	Tan Covebase	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_34					Dissolved
asb-15a	Covebase Adhesive	None Detected	3% Cellulose	97% Other	Yellow Non Fibrous Heterogeneous
905070PLM_35					Dissolved
asb-15b	Covebase Adhesive	None Detected	3% Cellulose	97% Other	Yellow Non Fibrous Heterogeneous
905070PLM_36					Dissolved
asb-16a	12-inch Green Floor Tile	None Detected		100% Other	Green Non Fibrous Heterogeneous
905070PLM_37					Dissolved
asb-16b	12-inch Green Floor Tile	None Detected		100% Other	Green Non Fibrous Heterogeneous
905070PLM_38					Dissolved
asb-17a	Floor Tile Adhesive	None Detected	10% Cellulose	90% Other	Black Non Fibrous Heterogeneous
905070PLM_39					Dissolved
asb-17b	Floor Tile Adhesive	None Detected	10% Cellulose	90% Other	Black Non Fibrous Heterogeneous
905070PLM_40					Dissolved

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Bulk Asbestos Analysis

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EPA Method: 600/R-93/116 and 600/M4-82-020



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Analysis ID: 905070PLM

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Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-18a	12-inch Tan Floor Tile	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_41					Dissolved
asb-18b	12-inch Tan Floor Tile	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_42					Dissolved
asb-19a	Underlayment	None Detected	50% Cellulose	50% Other	Yellow, Black Fibrous Heterogeneous
905070PLM_43			Dissolved, Teased		
asb-19b	Underlayment	None Detected	50% Cellulose	50% Other	Yellow, Black Fibrous Heterogeneous
905070PLM_44			Dissolved, Teased		
asb-20a	2-foot by 4-foot Ceiling Tile	None Detected	40% Cellulose 40% Fiber Glass	10% Perlite 10% Other	White Fibrous Heterogeneous
905070PLM_45			Teased		
asb-20b	2-foot by 4-foot Ceiling Tile	None Detected	40% Cellulose 40% Fiber Glass	10% Perlite 10% Other	White Fibrous Heterogeneous
905070PLM_46			Teased		
asb-21a	Tan Covebase	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_47					Dissolved
asb-21b	Tan Covebase	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_48					Dissolved

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Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



NVLAP[®]
NVLAP Lab Code: 200664-0

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

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Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

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Project: Avesta Survey

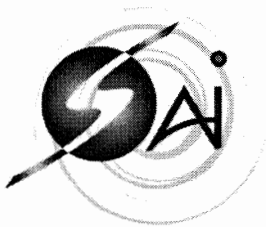
Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				
asb-22a	Covebase Adhesive	None Detected	3% Cellulose	97% Other	Yellow Non Fibrous Heterogeneous
905070PLM_49					Dissolved
asb-22b	Covebase Adhesive	None Detected	3% Cellulose	97% Other	Yellow Non Fibrous Heterogeneous
905070PLM_50					Dissolved
asb-23a	Vapor Paper	None Detected	60% Cellulose	40% Other	Brown Fibrous Heterogeneous
905070PLM_51					Teased
asb-23b	Vapor Paper	None Detected	60% Cellulose	40% Other	Brown Fibrous Heterogeneous
905070PLM_52					Teased
asb-24a	Small Boiler Insulation	None Detected	3% Cellulose	97% Other	White, Gray Non Fibrous Heterogeneous
905070PLM_53					Teased
asb-24b	Small Boiler Insulation	None Detected	3% Cellulose	97% Other	White, Gray Non Fibrous Heterogeneous
905070PLM_54					Teased
asb-25a	Thermal System Insulation Fitting	30% Chrysotile		70% Other	White Fibrous Heterogeneous
905070PLM_55	unable to separate wrap				Teased
asb-25b	Thermal System Insulation Fitting	Not Analyzed			
905070PLM_56					

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Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-25c	Thermal System Insulation Fitting	Not Analyzed			
905070PLM_57					
asb-26a	Breeching Cement	None Detected		70% 30%	Other Quartz
905070PLM_58					
asb-26b	Breeching Cement	None Detected		70% 30%	Other Quartz
905070PLM_59					
asb-27a	Large Boiler Insulation	30% Chrysotile		70%	Other
905070PLM_60	unable to separate wrap				
asb-27b	Large Boiler Insulation	Not Analyzed			
905070PLM_61					
asb-28a	Thermal System Insulation	50% Chrysotile	40% Cellulose	10%	Other
905070PLM_62					
asb-28b	Thermal System Insulation	Not Analyzed			
905070PLM_63					
asb-28c	Thermal System Insulation	Not Analyzed			
905070PLM_64					

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Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes					Treatment
asb-29a	Small Boiler Brick	None Detected		100%	Other	Red Non Fibrous Heterogeneous
905070PLM_65						Crushed
asb-29b	Small Boiler Brick	None Detected		100%	Other	Red Non Fibrous Heterogeneous
905070PLM_66						Crushed
asb-30a	Large Boiler Brick	None Detected	5% Other	95%	Other	Red Non Fibrous Heterogeneous
905070PLM_67			Crushed			
asb-30b	Large Boiler Brick	None Detected	5% Other	95%	Other	Red Non Fibrous Heterogeneous
905070PLM_68			Crushed			
asb-100a	Plaster	None Detected	5% Hair	75% 20%	Other Quartz	Gray Fibrous Heterogeneous
905070PLM_69			Crushed			
asb-100b	Plaster	None Detected	5% Hair	75% 20%	Other Quartz	Gray Fibrous Heterogeneous
905070PLM_70			Crushed			
asb-100c	Plaster	None Detected	15% Cellulose 5% Fiber Glass	80%	Other	White, Brown Fibrous Heterogeneous
905070PLM_71	drywall		Teased			
asb-101a	Joint Compound	None Detected		100%	Other	White Non Fibrous Heterogeneous
905070PLM_72						Teased

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Lab Sample ID	Lab Notes					Treatment
asb-101b	Joint Compound	None Detected		100%	Other	White Non Fibrous Heterogeneous
905070PLM_73						Teased
asb-101c	Joint Compound	None Detected		100%	Other	White Non Fibrous Heterogeneous
905070PLM_74						Teased
asb-102a	Drywall	None Detected	15% Cellulose	85%	Other	White, Brown Fibrous Heterogeneous
905070PLM_75	positive joint compound present					Teased
asb-102b	Drywall	None Detected	15% Cellulose	85%	Other	White, Brown Fibrous Heterogeneous
905070PLM_76						Teased
asb-102c	Drywall	None Detected	15% Cellulose	85%	Other	White, Brown Fibrous Heterogeneous
905070PLM_77						Teased
asb-103a	Breeching Cement	None Detected		70% 30%	Other Quartz	Gray Non Fibrous Heterogeneous
905070PLM_78						Crushed
asb-103b	Breeching Cement	None Detected		70% 30%	Other Quartz	Gray Non Fibrous Heterogeneous
905070PLM_79						Crushed
asb-104a - A	Thermal System Insulation	None Detected	90% Cellulose	10%	Other	Brown Fibrous Heterogeneous
905070PLM_80	insulation					Teased

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Lab Sample ID	Lab Notes						Treatment
asb-104a - B	Thermal System Insulation	None Detected	95%	Cellulose	5%	Other	Brown Fibrous Heterogeneous
905070PLM_119	wrap						Teased
asb-104b - A	Thermal System Insulation	None Detected	90%	Cellulose	10%	Other	Brown Fibrous Heterogeneous
905070PLM_81	insulation						Teased
asb-104b - B	Thermal System Insulation	None Detected	95%	Cellulose	5%	Other	Brown Fibrous Heterogeneous
905070PLM_122	wrap						Teased
asb-104c - A	Thermal System Insulation	None Detected	90%	Cellulose	10%	Other	Brown Fibrous Heterogeneous
905070PLM_82	insulation						Teased
asb-104c - B	Thermal System Insulation	None Detected	95%	Cellulose	5%	Other	Brown Fibrous Heterogeneous
905070PLM_121	wrap						Teased
asb-105a	Boiler 1 Casing	30% Chrysotile			70%	Other	Gray Fibrous Heterogeneous
905070PLM_83							Teased
asb-105b	Boiler 1 Casing	Not Analyzed					
905070PLM_84							
asb-106a	Tar Roofing	None Detected	30%	Cellulose	70%	Other	Black Fibrous Heterogeneous
905070PLM_85							Dissolved, Teased

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Ired Gulley (123)

Analyst

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-106b	Tar Roofing	None Detected	30% Cellulose	70% Other	Black Fibrous Heterogeneous
905070PLM_86					Dissolved, Teased
asb-107a	Roofing Paper	None Detected	50% Cellulose	50% Other	Black Fibrous Heterogeneous
905070PLM_87					Dissolved, Teased
asb-107b	Roofing Paper	None Detected	50% Cellulose	50% Other	Black Fibrous Heterogeneous
905070PLM_88					Dissolved, Teased
asb-108a	Shingle	None Detected	20% Fiber Glass	80% Other	Green, Black Fibrous Heterogeneous
905070PLM_89					Dissolved, Teased
asb-108b	Shingle	None Detected	20% Fiber Glass	80% Other	Green, Black Fibrous Heterogeneous
905070PLM_90					Dissolved, Teased
asb-109a - A	Boiler 2 Casing	60% Chrysotile		40% Other	White Fibrous Heterogeneous
905070PLM_91	paper				Teased
asb-109a - B	Boiler 2 Casing	30% Chrysotile		70% Other	Gray Fibrous Heterogeneous
905070PLM_123	mud				Teased
asb-109b - A	Boiler 2 Casing	Not Analyzed			
905070PLM_92	paper				

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Ired Gulley (123)

Analyst

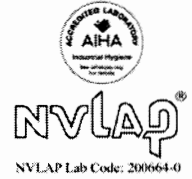
Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-109b - B	Boiler 2 Casing	Not Analyzed			
905070PLM_124	mud				
asb-110a	Boiler 1 Insulation	None Detected		100% Other	Black, Brown Non Fibrous Heterogeneous
905070PLM_93					Teased
asb-110b	Boiler 1 Insulation	None Detected		100% Other	Black, Brown Non Fibrous Heterogeneous
905070PLM_94					Teased
asb-111a	boiler 1 brick	None Detected		100% Other	Red Non Fibrous Heterogeneous
905070PLM_95					Crushed
asb-111b	boiler 1 brick	None Detected		100% Other	Red Non Fibrous Heterogeneous
905070PLM_96					Crushed
asb-112a	boiler 2 Insulation	None Detected		90% Other 10% Quartz	Black, Brown Non Fibrous Heterogeneous
905070PLM_97					Teased
asb-112b	boiler 2 Insulation	None Detected		90% Other 10% Quartz	Black, Brown Non Fibrous Heterogeneous
905070PLM_98					Teased
asb-113a	boiler 2 Brick	None Detected	3% Cellulose	97% Other	Brown Non Fibrous Heterogeneous
905070PLM_99			Crushed		

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Ired Gulley (123)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components		Non-Fibrous Components		Attributes
Lab Sample ID	Lab Notes						Treatment
asb-113b	boiler 2 Brick	None Detected	3%	Cellulose	97%	Other	Brown Non Fibrous Heterogeneous
905070PLM_100							Crushed
asb-114a	12-inch Gray Floor Tile	None Detected			100%	Other	Gray Non Fibrous Heterogeneous
905070PLM_101							Dissolved
asb-114b	12-inch Gray Floor Tile	None Detected			100%	Other	Gray Non Fibrous Heterogeneous
905070PLM_102							Dissolved
asb-115a	Floor Tile Mastic	None Detected	8%	Cellulose	92%	Other	Black Non Fibrous Heterogeneous
905070PLM_103							Dissolved
asb-115b	Floor Tile Mastic	None Detected	8%	Cellulose	92%	Other	Black Non Fibrous Heterogeneous
905070PLM_104							Dissolved
asb-116a	12-inch Green Floor Tile	None Detected			100%	Other	Green Non Fibrous Heterogeneous
905070PLM_105							Dissolved
asb-116b	12-inch Green Floor Tile	None Detected			100%	Other	Green Non Fibrous Heterogeneous
905070PLM_106							Dissolved
asb-117a	Floor Tile Mastic	None Detected	8%	Cellulose	92%	Other	Black Non Fibrous Heterogeneous
905070PLM_107							Dissolved

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Ired Gulley (123)

Analyst

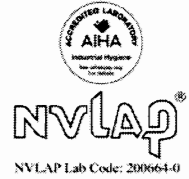
Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-117b	Floor Tile Mastic	None Detected	8% Cellulose	92% Other	Black Non Fibrous Heterogeneous
905070PLM_108					Dissolved
asb-118a	Underlayment	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_109					Dissolved
asb-118b	Underlayment	None Detected		100% Other	Tan Non Fibrous Heterogeneous
905070PLM_110					Dissolved
asb-119a	Battleship Flooring	None Detected	30% Cellulose	70% Other	Black Fibrous Heterogeneous
905070PLM_111					Dissolved, Teased
asb-119b	Battleship Flooring	None Detected	30% Cellulose	70% Other	Black Fibrous Heterogeneous
905070PLM_112					Dissolved, Teased
asb-120a	Window Glazing	3% Chrysotile		97% Other	Tan Non Fibrous Heterogeneous
905070PLM_113					Crushed
asb-120b	Window Glazing	Not Analyzed			
905070PLM_114					
asb-121a	Window Glazing	3% Chrysotile		97% Other	Gray Non Fibrous Heterogeneous
905070PLM_115					Crushed

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Ired Gulley (123)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory



Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020



NVLAP Lab Code: 290664-0

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland, ME 04101

Attn: Todd Young

Lab Order ID: 905070

Analysis ID: 905070PLM

Date Received: 6/9/2009

Date Reported: 6/12/2009

Date Amended: 6/15/2009

Project: Avesta Survey

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
Lab Sample ID	Lab Notes				Treatment
asb-121b	Window Caulking	Not Analyzed			
905070PLM_116					
asb-122a	Window Caulking	3% Chrysotile		97% Other	Gray Non Fibrous Heterogeneous
905070PLM_117					Crushed
asb-122b	Window Caulking	Not Analyzed			
905070PLM_118					

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Ired Gulley (123)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Nathaniel Durham, MS or Approved Signatory

905070

Client: Contact: Address: Phone: Fax: Email:	Ransom Environmental Todd Young Portland, ME 04101 (207) 772-2891 (207) 772-3248 Todd.Young@ransomenv.com	Instructions: Use Column 'B' for your contact info To See an Example Click the bottom Example Tab. Enter samples between "<" and ">" Begin Samples with a "<<" above the first sample and end with a ">>" below the last sample. Only Enter your data on the first sheet "Sheet1"	Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 Phone: 336.292.3888 Fax: 336.292.3313 Email: lab@sailab.com
Project: Avesta Survey Client Notes: Stop at First Positive	188 6/8/2009 0:00	Note: Data 1 and Data 2 are optional fields that do not show up on the official report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.	
P.O. #. Date Submitted: Analysis: TurnAroundTime:			
	Asbestos PLM Standard		

Sample Number	Building	Sample Description	Location
<<			
asb-01a	Shailer School	Tar and Gravel Roofing	Roof
asb-01b	Shailer School	Tar and Gravel Roofing	Roof
asb-02a	Shailer School	Flashing	Roof
asb-02b	Shailer School	Flashing	Roof
asb-03a	Shailer School	Duct Sealant	Roof
asb-03b	Shailer School	Duct Sealant	Roof
asb-04a	Shailer School	Corner Patch- Tar	Roof
asb-04b	Shailer School	Corner Patch- Tar	Roof
asb-05a	Shailer School	Corner Patch- Felt	Roof
asb-05b	Shailer School	Corner Patch- Felt	Roof
asb-06a	Shailer School	Window Glaze	Roof
asb-06b	Shailer School	Window Glaze	Exterior
asb-07a	Shailer School	Shingle	Exterior
asb-07b	Shailer School	Shingle	Upper Roof
asb-08a	Shailer School	Plaster	Upper Roof
asb-08b	Shailer School	Plaster	First Floor Overhang
asb-08c	Shailer School	Plaster	First Floor Overhang
asb-08d	Shailer School	Plaster	Basement
asb-08e	Shailer School	Plaster	Basement
asb-09a	Shailer School	Plaster Skim Coat	Basement
asb-09b	Shailer School	Plaster Skim Coat	Overhang
asb-09c	Shailer School	Plaster Skim Coat	Overhang
asb-10a	Shailer School	Pastel Sheet Flooring	Basement
asb-10b	Shailer School	Pastel Sheet Flooring	Overhang
asb-11a	Shailer School	Sheet Flooring Underlayment	Overhang
asb-11b	Shailer School	Sheet Flooring Underlayment	Overhang
asb-12a	Shailer School	Drywall	Overhang
asb-12b	Shailer School	Drywall	First Floor Overhang
			Ground Floor

Accepted
 Rejected

[Handwritten Signature]
 6-9-09
 9:20A

ASB

asb-12c	Shailer School	Drywall	Basement
asb-13a	Shailer School	Joint Compound	First Floor Overhang
asb-13b	Shailer School	Joint Compound	Ground Floor
asb-13c	Shailer School	Joint Compound	Basement
asb-14a	Shailer School	Tan Covebase	Overhang
asb-14b	Shailer School	Tan Covebase	Overhang
asb-15a	Shailer School	Covebase Adhesive	Overhang
asb-15b	Shailer School	Covebase Adhesive	Overhang
asb-16a	Shailer School	12-inch Green Floor Tile	Ground Floor
asb-16b	Shailer School	12-inch Green Floor Tile	Ground Floor
asb-17a	Shailer School	Floor Tile Adhesive	Ground Floor
asb-17b	Shailer School	Floor Tile Adhesive	Ground Floor
asb-18a	Shailer School	12-inch Tan Floor Tile	Ground Floor
asb-18b	Shailer School	12-inch Tan Floor Tile	Ground Floor
asb-19a	Shailer School	Underlayment	Ground Floor
asb-19b	Shailer School	Underlayment	Ground Floor
asb-20a	Shailer School	2-foot by 4-foot Ceiling Tile	Basement
asb-20b	Shailer School	2-foot by 4-foot Ceiling Tile	Basement
asb-21a	Shailer School	Tan Covebase	Basement
asb-21b	Shailer School	Tan Covebase	Basement
asb-22a	Shailer School	Covebase Adhesive	Basement
asb-22b	Shailer School	Covebase Adhesive	Basement
asb-23a	Shailer School	Vapor Paper	Basement
asb-23b	Shailer School	Vapor Paper	Basement
asb-24a	Shailer School	Small Boiler Insulation	Basement
asb-24b	Shailer School	Small Boiler Insulation	Basement
asb-25a	Shailer School	Thermal System Insulation Fitting	Basement
asb-25b	Shailer School	Thermal System Insulation Fitting	Basement
asb-25c	Shailer School	Thermal System Insulation Fitting	Basement
asb-26a	Shailer School	Breaching Cement	Basement
asb-26b	Shailer School	Breaching Cement	Basement
asb-27a	Shailer School	Large Boiler Insulation	Basement
asb-27b	Shailer School	Large Boiler Insulation	Basement
asb-28a	Shailer School	Thermal System Insulation	Basement
asb-28b	Shailer School	Thermal System Insulation	Basement
asb-28c	Shailer School	Thermal System Insulation	Basement
asb-29a	Shailer School	Small Boiler Brick	Basement
asb-29b	Shailer School	Small Boiler Brick	Basement
asb-30a	Shailer School	Large Boiler Brick	Basement
asb-30b	Shailer School	Large Boiler Brick	Basement
asb-100a	Emerson School	Plaster	Basement
asb-100b	Emerson School	Plaster	Second Floor
asb-100c	Emerson School	Plaster	Second Floor
asb-101a	Emerson School	Joint Compound	Basement
asb-101b	Emerson School	Joint Compound	Basement
asb-101c	Emerson School	Joint Compound	First Floor

785070

asb-102a	Emerson School	Drywall	Basement
asb-102b	Emerson School	Drywall	Basement
asb-102c	Emerson School	Drywall	First Floor
asb-103a	Emerson School	Breaching Cement	Basement
asb-103b	Emerson School	Breaching Cement	Basement
asb-104a	Emerson School	Thermal System Insulation	Basement
asb-104b	Emerson School	Thermal System Insulation	Basement
asb-104c	Emerson School	Thermal System Insulation	Basement
asb-105a	Emerson School	Boiler 1 Casing	Basement
asb-105b	Emerson School	Boiler 1 Casing	Basement
asb-106a	Emerson School	Tar Roofing	Roof
asb-106b	Emerson School	Tar Roofing	Roof
asb-107a	Emerson School	Roofing Paper	Roof
asb-107b	Emerson School	Roofing Paper	Roof
asb-108a	Emerson School	Shingle	Roof
asb-108b	Emerson School	Shingle	Roof
asb-109a	Emerson School	Boiler 2 Casing	Basement
asb-109b	Emerson School	Boiler 2 Casing	Basement
asb-110a	Emerson School	Boiler 1 Insulation	Basement
asb-110b	Emerson School	Boiler 1 Insulation	Basement
asb-111a	Emerson School	boiler 1 brick	Basement
asb-111b	Emerson School	boiler 1 brick	Basement
asb-112a	Emerson School	boiler 2 Insulation	Basement
asb-112b	Emerson School	boiler 2 Insulation	Basement
asb-113a	Emerson School	boiler 2 Brick	Basement
asb-113b	Emerson School	boiler 2 Brick	Basement
asb-114a	Emerson School	12-inch Gray Floor Tile	Entrance
asb-114b	Emerson School	12-inch Gray Floor Tile	Entrance
asb-115a	Emerson School	Floor Tile Mastic	Entrance
asb-115b	Emerson School	Floor Tile Mastic	Entrance
asb-116a	Emerson School	12-inch Green Floor Tile	Entrance
asb-116b	Emerson School	12-inch Green Floor Tile	Entrance
asb-117a	Emerson School	Floor Tile Mastic	Entrance
asb-117b	Emerson School	Floor Tile Mastic	Entrance
asb-118a	Emerson School	Underlayment	Entrance
asb-118b	Emerson School	Underlayment	Entrance
asb-119a	Emerson School	Battleship Flooring	Second Floor
asb-119b	Emerson School	Battleship Flooring	Second Floor
asb-120a	Emerson School	Window Glazing	Second Floor
asb-120b	Emerson School	Window Glazing	Second Floor
asb-121a	Emerson School	Window Glazing	Exterior
asb-121b	Emerson School	Window Caulking	Exterior
asb-122a	Emerson School	Window Caulking	Exterior
asb-122b	Emerson School	Window Caulking	Exterior



Analysis for Lead Concentration in Paint Chips



by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass	Analytical Sensitivity	Concentration
Lab Sample ID	Lab Notes	(g)	(% by weight)	(% by weight)
SB-PC-1	Blue wall paint over plaster	0.0482	0.002%	0.90%
905075PBP_1				
SB-PC-2	Green wall paint lower wall over brick	0.0521	0.002%	1.18%
905075PBP_2				
SB-PC-3	Green wall paint lower wall over brick	0.053	0.002%	1.47%
905075PBP_3				
EB-FC-1	Black floor covering	0.1381	0.0009%	0.46%
905075PBP_4				
EB-PC-2	Blue wall paint over lime-colored paint	0.0745	0.002%	0.79%
905075PBP_5				
EB-PC-3	Blue wall paint over green paint over brick	0.0622	0.002%	0.90%
905075PBP_6				
EB-PC-4	Yellow wall paint over brick	0.0808	0.001%	0.11%
905075PBP_7				
EB-PC-5	Red & multiple colors/layers on floor over wood	0.0705	0.002%	0.23%
905075PBP_8				
EB-PC-6	Blue wall paint over brick	0.0383	0.003%	0.51%
905075PBP_9				
EB-PC-7	Yellow wall paint over brick	0.0596	0.002%	0.50%
905075PBP_10				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Approved Signatory



Analysis for Lead Concentration in Paint Chips



by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass (g)	Analytical Sensitivity (% by weight)	Concentration (% by weight)
Lab Sample ID	Lab Notes			
EB-PC-8	Blue wall paint over brick	0.0825	0.001%	0.83%
905075PBP_11				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Approved Signatory

QUESTIONS

Client: Ransom Environmental
Contact: Todd Young
Address: Portland, ME 04101
Phone: (207) 772-2891
Fax: (207) 772-3248
Email: Todd.Young@ransomenv.com

Project: Avesta Housing Buildings
Client Notes: [Enter Client Notes Here]

P.O. #: 191
Date Submitted: 6/8/2009 PM FedEx Drop Box
Analysis: AA (LBP Chips)
TurnAroundTime: Standard

***Instructions:**
 Use Column "B" for your contact info
 To See an Example Click the bottom Example Tab.
 Enter samples between "<<" and ">>"
 Begin Samples with a "<<" above the first sample and end with a ">>" below the last sample.
 Only Enter your data on the first sheet "Sheet1"

Note: Data 1 and Data 2 are optional fields that do not show up on the official report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.

Scientific Analytical Institute, Inc.
 302-L Pomona Dr.
 Greensboro, NC 27407
 Phone: 336.292.3888
 Fax: 336.292.3313
 Email: lab@sailab.com

Sample Number	Building	Sample Description	Location
<<			
SB-PC-1	Shailer Building	Blue Wall Paint (over plaster)	1st Fl., Common area, Side A Wall
SB-PC-2	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #1, Side A Wall
SB-PC-3	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #2, Side B Wall
EB-FC-1	Emerson Building	Black Floor Covering	Vestibule #101
EB-PC-2	Emerson Building	Blue Wall Paint (over Lime-colored paint)	Bsmt., Room #1 (Boiler Rm.) Side D
EB-PC-3	Emerson Building	Blue Wall Paint (over green paint, over brick)	Bsmt., Room #3, Side C, lower wall
EB-PC-4	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #3, Side C, Upper wall
EB-PC-5	Emerson Building	Red & multiple colors/layers on Floor (over wood)	Bsmt., Room #5, Bathroom
EB-PC-6	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #6, Side C lower wall
EB-PC-7	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #6, Sides A & D
EB-PC-8	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #7, Side D, lower wall
>>			

W. Young
 6-9-09 9:30 A

Accepted
 Rejected

ATTACHMENT C

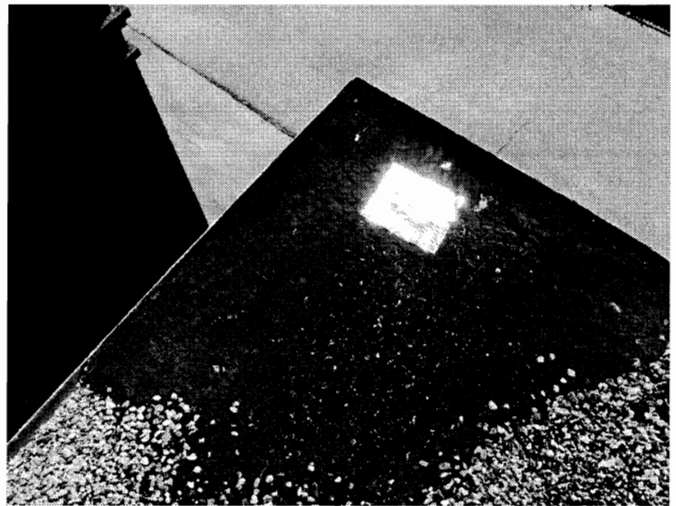
Photograph Log

Targeted Asbestos and Lead-Based Paint Survey
Munjoy Commons
56 North Street and 13 Emerson Street, Portland, Maine

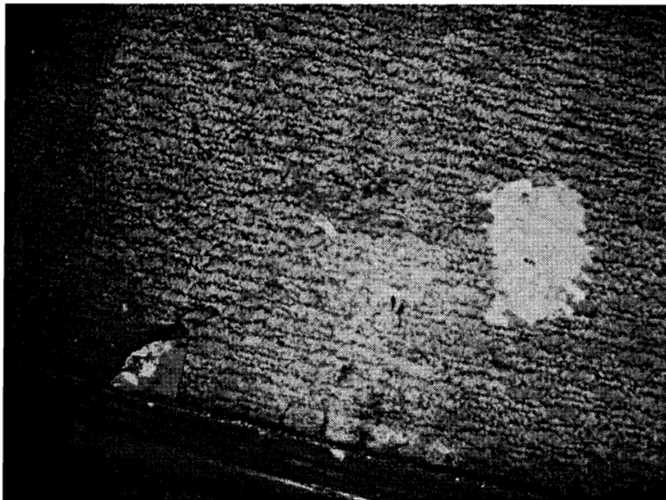
Photograph Log



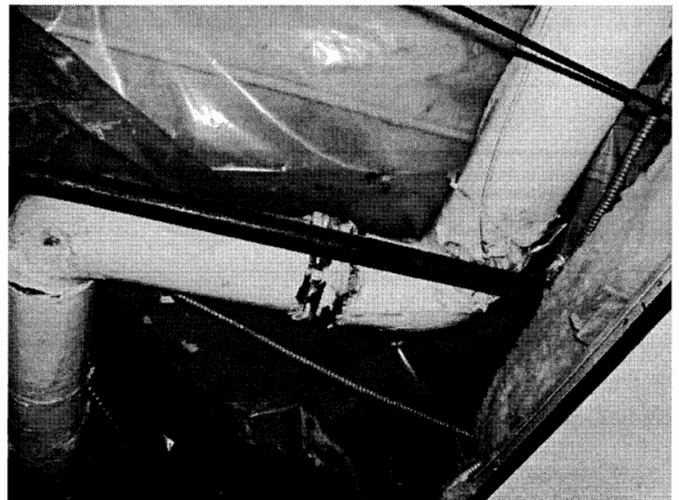
56 North Street: Asbestos-containing roof flashing (ASB-02A)



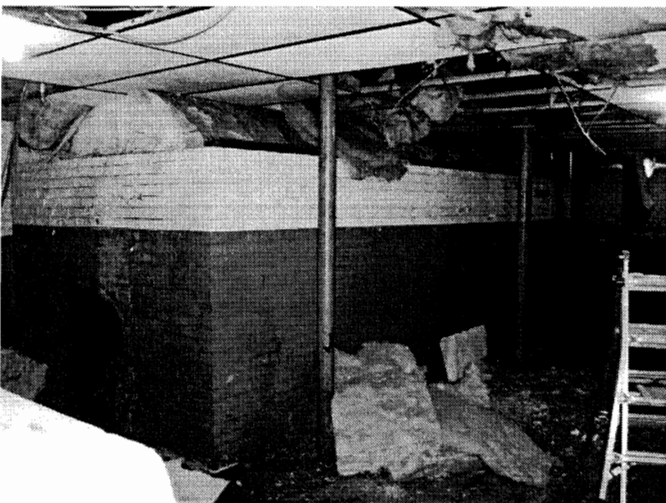
56 North Street: Asbestos-containing roof patch tar (ASB-04A) and roof patch felt (ASB-05A)



56 North Street: Asbestos-containing sheet flooring underlayment (ASB-11A)



56 North Street: Asbestos-containing pipe fitting insulation (ASB-25A) and thermal system insulation (ASB-27A)

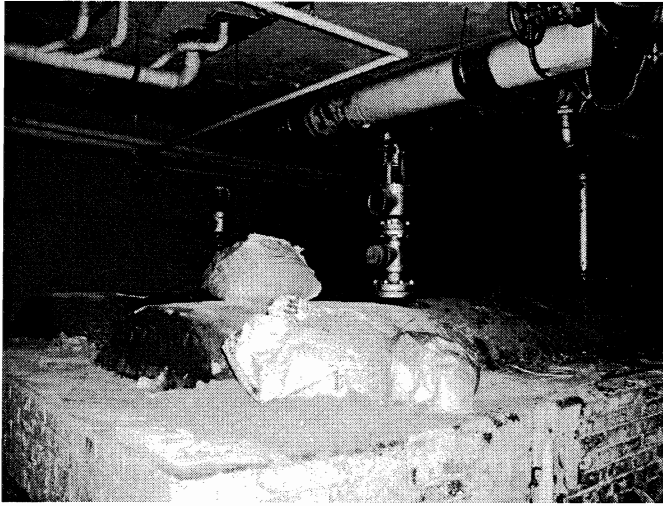


56 North Street: Asbestos-containing large boiler insulation (ASB-28A)

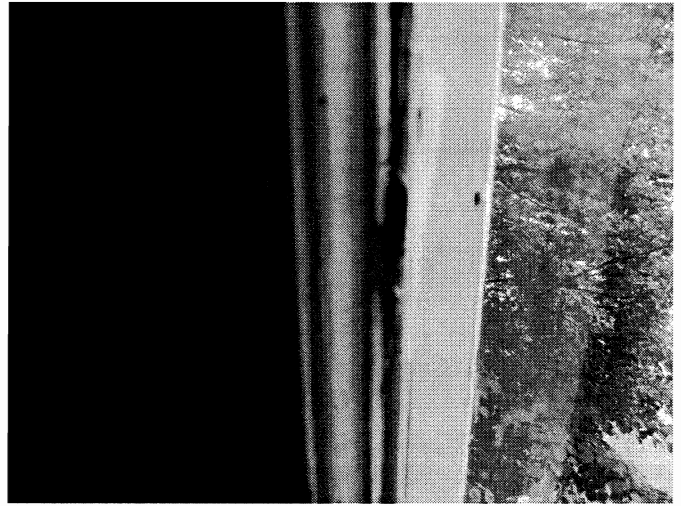


12 Emerson Street: Asbestos-containing boiler casing (ASB-105A) – Boiler 1

Photograph Log



12 Emerson Street: Asbestos-containing boiler casing (ASB-109A)



12 Emerson Street: Asbestos-containing interior window glaze (ASB-120A)



12 Emerson Street: Asbestos-containing exterior window glaze (ASB-121A) and window Caulk (ASB-122A)

ATTACHMENT D

Lead Inspection and Determination Report

Targeted Asbestos and Lead-Based Paint Survey

Munjoy Commons

56 North Street and 13 Emerson Street, Portland, Maine

LEAD INSPECTION / DETERMINATION REPORT	
Date of Inspection:	June 4, 2009
Building Address:	Former Shailer School 56 North Street Portland, Maine
Construction Summary:	The former Shailer School (56 North Street) is a four-story brick building constructed in the late 1800s and renovated in the 1980s into residential units. The built-out basement houses a former restroom, mechanical equipment and an electrical room. The remainder of the building has been converted into apartments connected by common hallways and stairwells. Interior finishes include painted plaster and drywall walls and ceilings, varnished wood trim work, and painted windows.
Building Owner:	Avesta Housing 307 Cumberland Avenue Portland, Maine 04101
Certified Lead Inspector/ Certificate Number:	Delano Leonard LI-0417
	Signature: <i>Delano D. Leonard</i> Delano Leonard 2009.07.07 14:38:25 -04'00'
Analytical Laboratory:	Scientific Analytical Institute, Inc. (SAI) 302-L Pomona Drive Greensboro, NC 27407
Test Methods:	Paint X-Ray Fluorescent Analyzer Serial Number: SN 8065 Paint Chip (EPA SW-846 3 rd Ed. Method 3050B/ Method 7420)
	Water Not Applicable
	Soil Not Applicable
	Dust Not Applicable
	Air Not Applicable
Scope of Inspection:	Lead Inspection limited to basement, common area vestibule, roof and windows.
Interpreting Results	
<p>Test points are identified by floor level, room number, side of building (A, B, C, or D), and structure/component. Per ME DEP/HUD protocol, the "street side" of the building is the "A" side and the other sides lettered in a clockwise fashion. Rooms are numbered starting with the A-side and numbered clockwise. Windows and doors in each room are identified in the same manner.</p> <p>Multiple test points on similar components were collected in each room to determine homogeneity of the coating(s). Fewer test points were necessary in instances where a conclusion of lead-positive or negative</p>	

could be determined with high confidence. Where results were inconclusive (e.g. inconsistent and/or slightly above or below the HUD action level of 1.0 mg/cm^2), bulk samples were collected and sent to Scientific Analytical Institute (SAI) in Greensboro, NC for analysis.

During initial start-up of the XRF and again after approximately four (4) hours of continuous use, a "standardization" calibration procedure was performed using a known standard (Alloy 316) provided by the manufacturer.

Paint chip samples were analyzed by Scientific Analytical Institute, Inc. (SAI) of Greensboro, North Carolina. SAI is certified to perform bulk sample analysis by the National Voluntary Laboratory Accreditation Program (NVLAP).

Testing Summary

Ransom collected one hundred forty-two (142) XRF readings and three (3) paint chip samples for lead content from various building components and surfaces at the former Shailer School. XRF readings ranged from below the instrument detection limit (BDL) to greater than 5.0 mg/cm^2 . A complete listing of the tested components including sample location, testing result(s) and condition and drawings are attached at the end of this report.

2nd Floor, Apt. #201 Windows

The newer, casement style windows accessible throughout Apartment #210 were negative for lead on interior and exterior components with the possible exception of the exterior sills. Results slightly above and well below 1.0 mg/cm^2 were recorded even on multiple tests of the same sill. The older, double-hung style windows present above the newer style tested positive with several reading above the upper detection limit of the XRF ($>5.0 \text{ mg/cm}^2$). These windows are covered/sealed inside the building and only accessible from outside. The original trim of the older windows is still present outside and runs along the outside vertical length of each newer window where most of the test points were taken. Three (3) window openings in room #3 were completely sealed inside, but the older style was observed to be present and intact when viewed outside the building. While these windows could not be accessed to test, the paint appears to be the same and is likely positive for lead.

1st Floor, Common Area (storage room)

The walls (blue) in the main room and the closets (green) tested positive for lead. Other surfaces including varnished wood work were below 1.0 mg/cm^2 . A paint chip sample was collected from the Side-A wall in the main room because the XRF test points were not consistently $> 1.0 \text{ mg/cm}^2$. The laboratory analysis of this sample revealed 0.90% lead content by weight, which is above the ME DEP / HUD 0.5% threshold for Lead-Based Paint (LBP). Paint on the walls was observed to be in poor condition overall, with large areas of peeling and bare areas where paint has completely delaminated from the plaster wall and fallen to the floor.

Basement

The structural ceiling in each basement room was obscured by a fiberglass-covered suspended ceiling system. On the underside of the wood structural ceiling, polyethylene sheeting had been fastened, presumably as a vapor barrier. In room #3, a large, damaged area of the suspended ceiling allowed access to test the white-painted structural ceiling. This test was negative for lead.

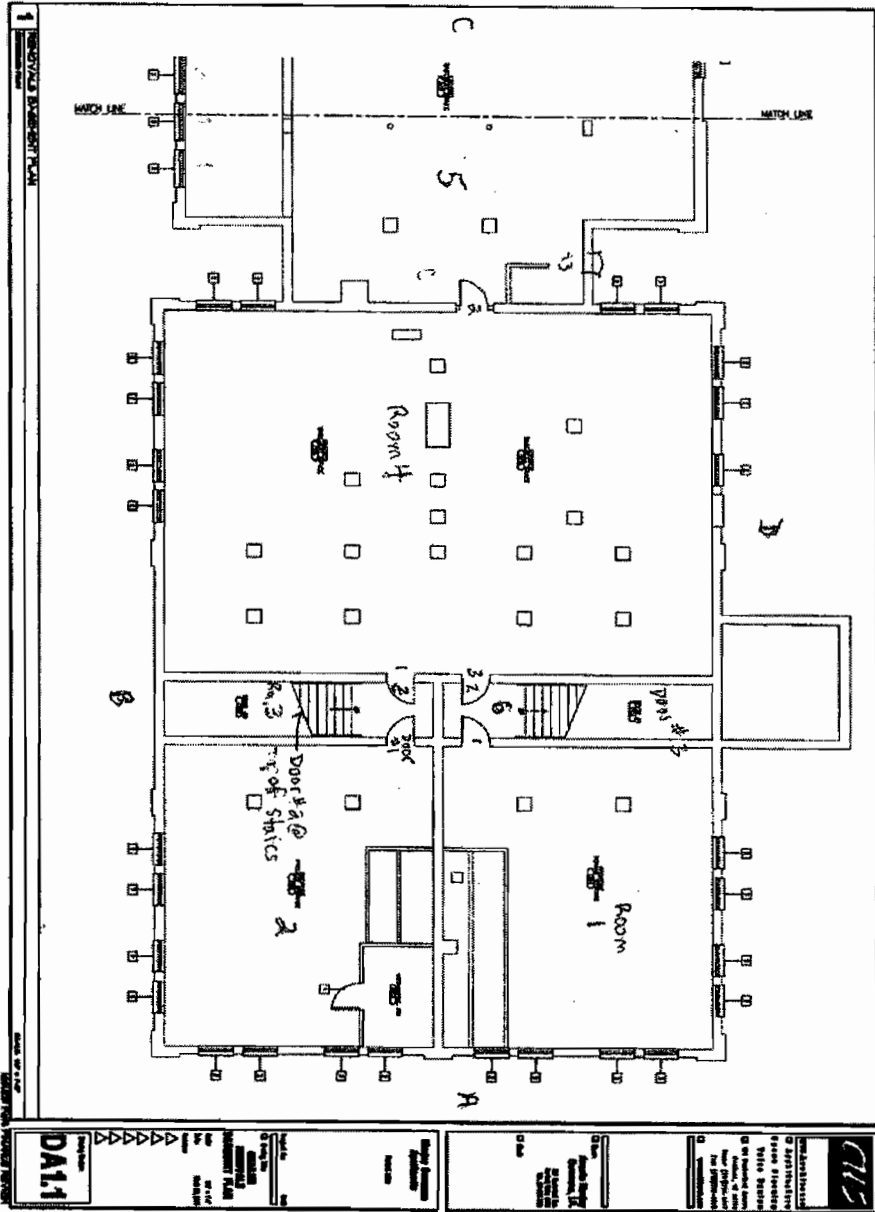
Throughout most of the basement area, interior and exterior room walls are painted white (upper half) and green (lower half). The green-painted surfaces were quite inconsistent with respect to lead content with both positive and negative readings, often on the same wall. Chip samples were collected from the A- and B-side walls in rooms #1 and #2, respectively. Lab analysis quantified lead content at 1.18% and 1.47%. Paint on the brick substrate was in very poor condition with significant peeling. The green-painted, lower portion of the wood partition running the length of room #3 tested positive ($>5.0 \text{ mg/cm}^2$). The walls (white/green painted) along both sets of stairs (rooms #3 and #6) were positive for lead ($>1.0 \text{ mg/cm}^2$).

The green-painted metal, wood-core fire doors between rooms #3 and #4, #4 and #5, and #5 and #6 were positive ($>5.0 \text{ mg/cm}^2$) as well as the paint (severely peeling) on the metal trim of each door.

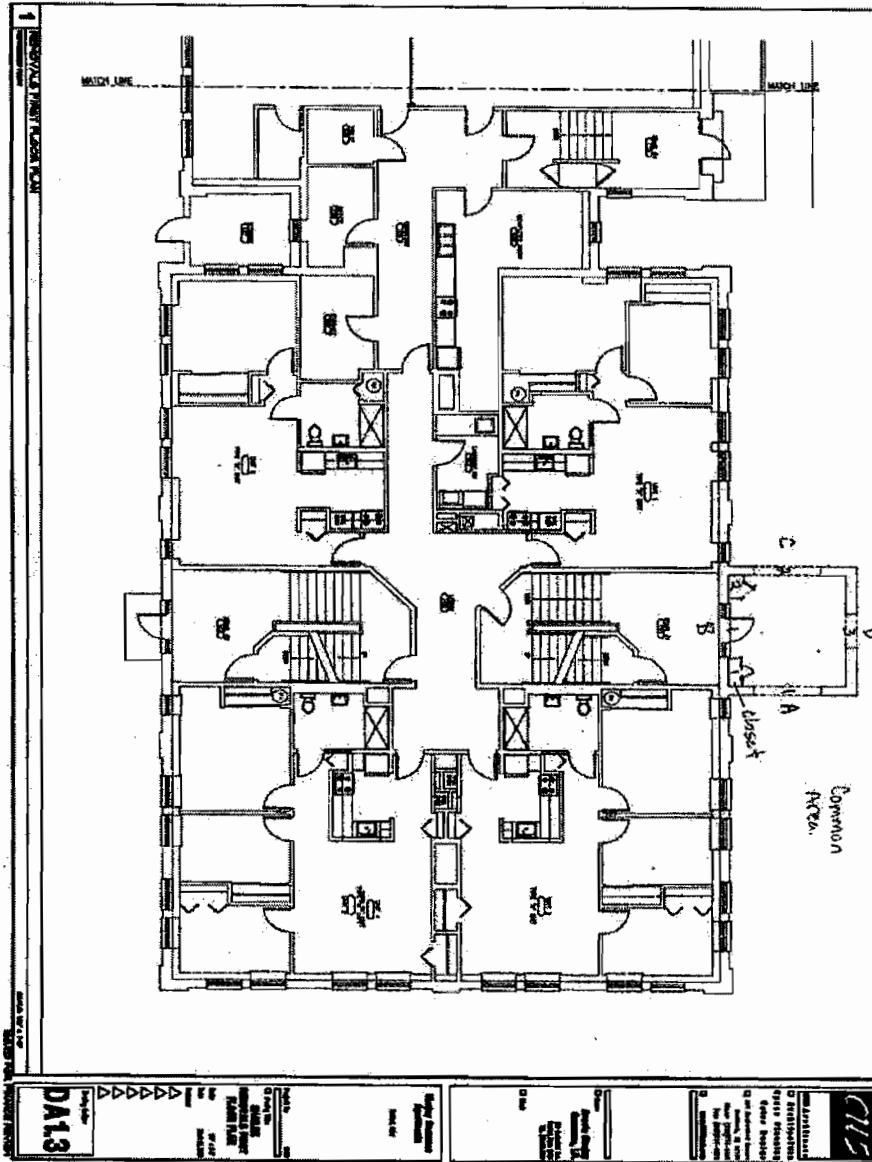
All windows and window trim inside and outside the building tested were positive for lead, with most readings $>5.0 \text{ mg/cm}^2$.

Attachments	1. Drawing
	2. XRF Testing Results
	3. Paint Chip Sampling Results

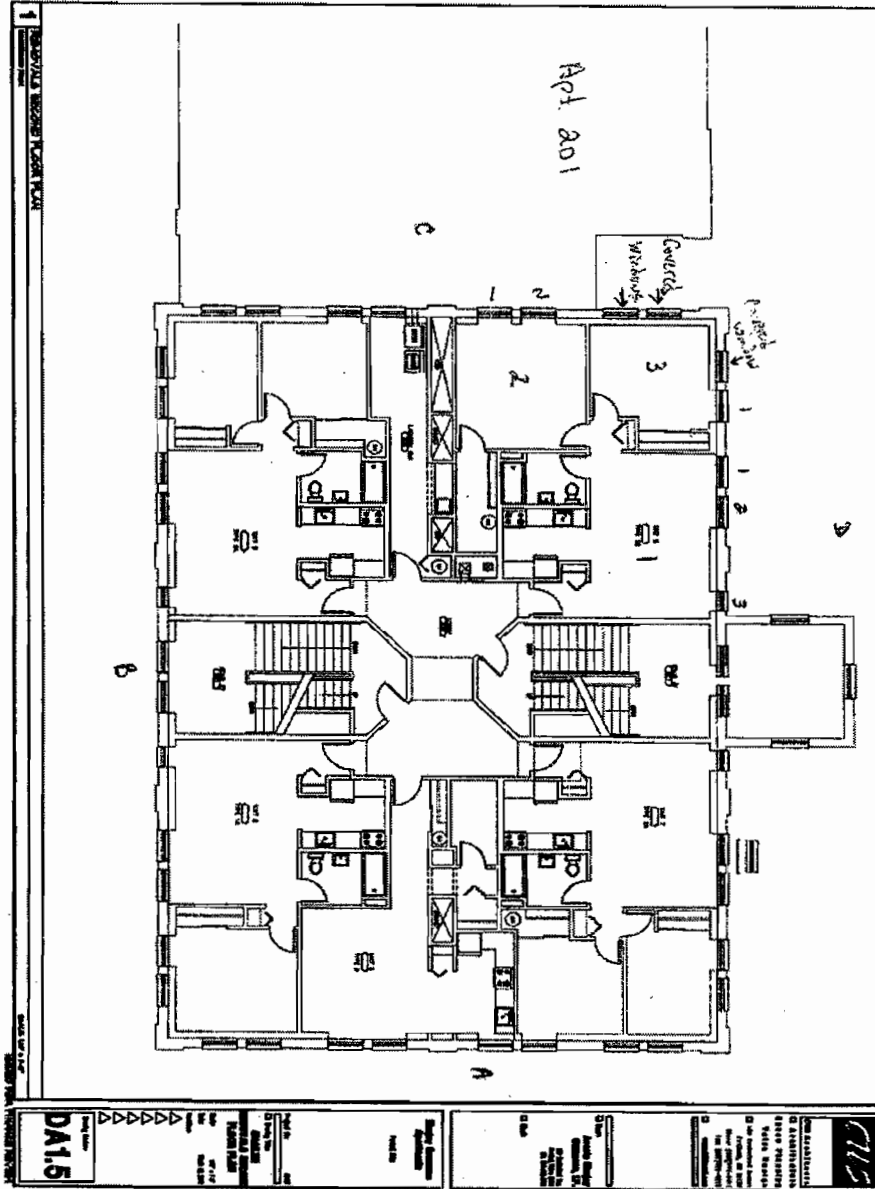
Attachment 1: Drawing – Basement (1)



Common Area



Apartment 201



North St.

XRF Testing Results - 56 North Street (Shailer School)								
Bldg. Level/ Location	Reading No.	Room No.	Structure/Substrate	Paint Color	Bldg. Side	Result (mg/cm ²)	Paint Cond.	Notes
N/A	N/A	N/A	N/A	N/A	N/A	174	N/A	Standardization
2 nd Floor/ Apt. 201	1	1	Window #1 – Interior Sill/wood	white	D	BDL	N/A	Newer, Casement window
	2		Window #1 – Apron/wood	white	D	BDL	N/A	
	3		Window #1 – Inner Trim/wood	white	D	BDL	N/A	
	4		Window #1 – Inner Stop/wood	white	D	0.03±0.01	N/A	
	5		Window #1 – Outer Sill/metal	white	D	0.06±0.04	G	
	6		Window #1 – Outer Casing/metal	white	D	BDL	N/A	
	7		Window #1 – Exterior Sash/wood	white	D	>5.0	F	Older, double-hung (above newer window)
	8		Window #1 – Exterior Outer, Vertical Trim/wood	white	D	1.8±0.17	F	
2 nd Floor/ Apt. 201	9	1	Window #2 – Interior Sill/wood	white	D	BDL	N/A	Newer, Casement window
	10		Window #2 – Inner Trim/wood	white	D	BDL	N/A	
	11		Window #2 – Inner Stop/wood	white	D	BDL	N/A	
	12		Window #2 – Exterior Sill/metal	white	D	0.96±0.45	G	
	13		Window #2 – Exterior Outer, Vertical Trim/wood	white	F	>5.0	F	Older, double-hung (above newer window)
2 nd Floor/ Apt. 201	14	1	Window #3 – Interior Sill/wood	white	D	BDL	N/A	Newer, Casement window
	15		Window #3 – Apron/wood	white	D	BDL	N/A	
	16		Window #3 – Inner Trim/wood	white	D	BDL	N/A	
	17		Window #3 – Inner Stop/wood	white	D	BDL	N/A	
2 nd Floor/ Apt. 201	18	2	Window #1 – Interior Sill/wood	white	C	BDL	N/A	Newer, Casement window
	19		Window #1 – Apron/wood	white	C	BDL	G	
	20		Window #1 – Inner Trim/wood	white	C	BDL	G	
	21		Window #1 – Inner Stop/wood	white	C	0.25±0.046	G	
	22		Window #1 – Inner Sash/wood	white	C	BDL	G	

	23		Window #1 – Exterior Sill/metal	white	C	>1.87, 0.03±0.01	G	
	24		Window #1 – Exterior Outer, Vertical Trim/wood	white	C	>5.0	F	Older, double-hung window
2 nd Floor/ Apt. 201	25	2	Window #2 – Interior Sill/wood	white	C	BDL	G	Newer, Casement window
	26		Window #2 – Inner Trim/wood	white	C	BDL	G	
	27		Window #2 – Inner Stop/wood	white	C	BDL	G	
	28		Window #2 – Inner Sash/wood	white	C	BDL	G	
	29		Window #2 – Exterior Trim/wood	white	C	BDL	G	
	30		Window #2 – Exterior Outer, Vertical Trim/wood	white	C	>5.0	F	Older, double-hung window
2 nd Floor/ Apt. 201	31	3	Window #1 – Interior Sill/wood	white	D	BDL	N/A	Newer, Casement window
2 nd Floor/ Apt. 201	32	3	Window #1 – Apron/wood	white	D	BDL	N/A	Newer, Casement window
	33		Window #1 – Inner Trim/wood	white	D	BDL	N/A	
	34		Window #1 – Inner Stop/wood	white	D	BDL	N/A	
	35		Window #1 – Exterior Trim/wood	white	D	BDL	N/A	
	36		Window #1 – Inner Sash/wood	white	D	BDL	N/a	
	37		Window #1 – Exterior Outer, Vertical Trim/wood	white	D	1.07±0.15	F	Older, double-hung window
1 st Floor, Common Area (storage)	38	N/A	Ceiling/Plaster	White	N/A	0.1±0.2	N/A	Large areas of significant peeling/damage. Chip sample from Side A = 0.90%. Bare spot
	39	N/A	Wall/Plaster	Blue	A	0.68±0.24	P	
	40	N/A	Wall/Plaster	Blue	B	1.04±0.21	P	
	41	N/A	Wall/Plaster	Blue	C	>1.0	P	
	42	N/A	Wall/Plaster	Blue	B	1.0±0.26	P	
	43	N/A	Wall/Plaster	Green	D	0.51±0.19	P	
1 st Floor, Common Area (storage)	44	N/A	Wall/Plaster	None	D	BDL	N/A	
	45	N/A	Entrance Door /Wood	Varnish	B	BDL	N/A	
	46	N/A	Entrance Door – Casing/Wood	Varnish	B	0.14±0.03	N/A	
	47	N/A	Entrance Door – Jamb/Wood	Varnish	B	0.11±0.03	N/A	
1 st Floor, Common	48	N/A	Entrance Door – Threshold/Wood	Varnish	B	BDL	N/A	
	49	N/A	Window #2 – Interior Sill/wood	Varnish	C	0.14±0.03	N/A	

	50	N/A	Window #2 – Apron/wood	Varnish	C	0.11±0.03	N/A	
	51	N/A	Window #2 – Inner Stop/wood	Varnish	C	0.15±0.04	N/A	
	52	N/A	Window #3 – Casing/Wood	Varnish.	B	0.15±0.04	N/A	
1 st Floor, Common Area (storage)	53	N/A	Closet #1 – Wall/Plaster	Green	B	1.00±0.10	G	
	54	N/A	Closet #1 – Door/Wood	Varnish	B	0.11±0.03	N/A	
	55	N/A	Closet #1 – Door Casing/Wood	Varnish	A	0.08±0.03	N/A	
	56	N/A	Closet #1 – Door Jamb/Wood	Varnish	A	0.07±0.02	N/A	
	57	N/A	Closet #1 – Door Threshold/Wood	Varnish	N/A	0.05±0.03	N/A	
	58	N/A	Closet #1 – Shelve/Wood	Varnish	A	0.05±0.06	N/A	
	59	N/A	Closet #1 – Shelve Support/Wood	Varnish	B	0.02±0.02	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	176	N/A	Standardization
Basement	N/A	1	Ceiling	N/A	N/A	Not Tested	N/A	Throughout bsmt., ceiling access obstructed by poly sheeting above fiberglass-covered suspended ceiling
	60		Upper Wall/Brick	White	A	0.02±0.02	N/A	
	61		Upper Wall/Brick	White	A	0.03±0.05	N/A	
	62		Upper Wall/Brick	White	D	0.08±0.11	N/A	
	63		Lower Wall/Brick	Green	A	1.00±0.13	P	Chip Sample, A-side wall = 1.18%
Basement	64	1	Lower Wall/Brick	Green	B	0.19±0.04	N/A	
	65		Lower Wall/Brick	Green	D	0.12±0.07	N/A	
	66		Upper Pillar/Brick	White	D	0.08±0.03	N/A	
	67		Lower Pillar/Brick	Green	D	0.33±0.13	N/A	
	68		Bathroom Stall – Wall	Green	D	0.17±0.03	N/A	
	69		Wall/drywall	Yellow	C	BDL	N/A	
Basement	N/A	2	Ceiling	N/A	N/A	Not Tested	N/A	See Note Above
	70		Upper Wall/Brick	White	A	0.05±0.06	N/A	
	71		Lower Wall/Brick	Green	A	>1.06	P	Chip Sample, B-side wall = 1.47%
	73		Wall/Drywall	Yellow	C	BDL	N/A	

	74		Sprinkler Riser Closet - Wall/Drywall	Yellow	D	BDL	N/A	
	75		Sprinkler Riser Closet - Door/Wood	White	B	BDL	N/A	
	76		Sprinkler Riser Closet – Door Casing/Wood	White	B	BDL	N/A	
	77		Sprinkler Riser Closet – Door Jamb/Wood	White	A	BDL	N/A	
Basement	N/A	3	Ceiling	N/A	N/A	Not Tested	N/A	See Note Above
	78		Upper Wall/Drywall	White	A	>1.00	G	Stairwell Wall
	79		Upper Wall/Drywall	White	A	>1.00	G	Stairwell Wall, 2 nd test point
	80		Lower Wall/Drywall	Green	A	>1.00	F	Stairwell Wall
	81		Door #1/Wood	White	A	BDL	N/A	
	82		Door #1 – Casing/Wood	White	A	BDL	N/A	
	83		Door #1 – Jamb/Wood	White	A	BDL	N/A	
	84		Door #2 – Casing/Wood	White	A	0.16±0.04	N/A	Top of Stairs
	85		Door #2 – Casing/Wood	White	D	0.16±0.04	N/A	
	86		Door #3/Metal	Green	C	>5.0	P	Paint on (metal) casing severely peeling,
	87		Stair Riser/Wood	Gray	B	0.11±0.03	N/A	
88	Stair Trim/Wood	Gray	D	0.06±0.03	N/A			
Basement	89	4	Partition Wall (lower)/Wood	Green	D	>5.0	G	Non-structural wall
	90		Partition Wall (lower)/Wood	Green	D	>5.0	G	2 nd test point
	91		Partition Wall (upper)/Wood	White	D	0.02±0.02	N/A	
	92		Partition Wall (upper)/Wood	White	D	0.02±0.02	N/A	2 nd test point
	93		Door #3/Metal	Green	A	>5.0	P	Wood-core door
	94		Door #3 – casing/Metal	Green	A	2.45	P	
Basement	95	4	Lower Wall/brick	Green	C	0.05±0.05	N/A	
	96		Lower Pillar (near Boiler)/Brick	Green	C	1.00±0.16	P	
	97		Floor (near door #3)/concrete	Gray	N/A	0.20±0.05	N/A	
	98		Floor (near door #2)/concrete	Gray	N/A	0.19±0.04	N/A	

Basement	99	5	Ceiling (near B-side of Boiler)	White	N/A	0.04±0.05	N/A	Structural ceiling accessible due to partial collapse of poly & suspended ceiling
	100		Wall (near D-side of Boiler)/Drywall	Yellow	A	BDL	N/A	
	101		Wall (near D-side of Boiler)/Drywall	Yellow	B	BDL	N/A	
	102		Sloped Wall (near room entrance)/Concrete	Green	A	0.17±0.08	N/A	
	103		Pillar/Metal	Green	A	0.32±0.05	N/A	
	104		Window #13 – trim/Wood	White	D	>5.0	P	
	105		Window #13 – sash/Wood	White	D	>5.0	P	
	106		Window #6 – trim/Wood	White	D	>5.0	P	
	107		Window #8 – trim/Wood	White	D	>5.0	P	
	108		Upper Wall/Brick	White	C	BDL	N/A	
	109		Wall, Electrical Closet/Wood	Black	A	BDL	N/A	
	110		Boiler (front, doors)/Metal	Silver	C	0.15±0.04	N/A	
	111		Boiler (front, doors)/Metal	Red	C	0.30±0.06	N/A	
	112		Boiler (front, below doors)/Metal	Silver	C	0.22±0.05	N/A	
113	Floor (near entrance)/concrete	Gray	N/A	0.30±0.07	N/A			
114	Floor (near Boiler)/concrete	Gray	N/A	0.17±0.05	N/A			
Basement	115	6	Upper Wall (along stairs)/Drywall	White	A	>1.00	G	
	116		Upper Wall (along stairs)/Drywall	White	C	>1.00	G	
	117		Lower Wall (along stairs)/Drywall	Green	A	>1.00	G	
	118		Lower Wall (along stairs)/Drywall	Green	C	>1.00	G	
	119		Wall (bottom of stairs)/Drywall	Yellow	C	BDL	N/A	
	120		Chair Rail (top of stairs)/Wood	Varnish.	A	0.05±0.03	N/A	
	121		Door #3 (top of stairs) - trim/Wood	Varnish.	B	0.06±0.04	N/A	
	122		Door #3 (top of stairs) - trim/Wood	Varnish.	D	0.10±0.04	N/A	

	123		Door #3 (top of stairs) - jamb/Wood	Varnish.	A	BDL	N/A	
	124		Door #3 (top of stairs)/Wood	Red	D	BDL	N/A	
	125		Door #1 (bottom of stairs)/Wood	Red	A	0.07±0.21	N/A	
	126		Door #2 (bottom of stairs)/Metal	Green	A	>5.0	P	
	127		Stair Hand Rail/Wood	Varnish.	A	0.02±0.02	N/A	
	128		Stair run/Wood	Gray	N/A	0.06±0.03	N/A	
Basement	129	6	Stair trim/Wood	Gray	N/A	0.09±0.03	N/A	
Outside	130	N/A	Window #1 – sash/Wood	White	A	>5.0	F	
	131		Window #4 – sill/Wood			0.02±0.07	N/A	
	132		Window #4 – sash/Wood			>5.0	F	
	133		Window #6 – sash/Wood			>5.0	F	
	134		Window #8 – trim/Wood			1.08±0.11	F	
Outside	135	N/A	Window #2 – sill/Wood	White	B	0.12±0.10	N/A	
	136		Window #4 – sash/Wood			>5.0	F	
	137		Window #8 – trim/Wood				F	
	138		Window #12 – plywood/Wood			BDL	N/A	
	139		Window #13 – trim/Wood			>2.09	F	
Outside	140	N/A	Window #2 – trim/Wood	White	C	>3.03	F	
	141		Window #4 – plywood/Wood			BDL	N/A	
Outside	142	N/A	Window #8 – sash/Wood	White	D	>5.0	F	

Notes:

1. XRF readings collected using an Innov-X Systems Alpha Series XRF.
2. BDL: Below Detection Limit.
3. Items in bold are above the EPA/HUD “lead-based paint” level of 1.0 mg/cm² or 0.50% by weight.
4. The upper limit for the Innov-X XRF is 5.00 mg/cm²
5. Paint condition: P – Poor, F- -Fair, G - Good



Analysis for Lead Concentration in Paint Chips



by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass	Analytical Sensitivity	Concentration
Lab Sample ID	Lab Notes	(g)	(% by weight)	(% by weight)
SB-PC-1	Blue wall paint over plaster	0.0482	0.002%	0.90%
905075PBP_1				
SB-PC-2	Green wall paint lower wall over brick	0.0521	0.002%	1.18%
905075PBP_2				
SB-PC-3	Green wall paint lower wall over brick	0.053	0.002%	1.47%
905075PBP_3				
EB-FC-1	Black floor covering	0.1381	0.0009%	0.46%
905075PBP_4				
EB-PC-2	Blue wall paint over lime-colored paint	0.0745	0.002%	0.79%
905075PBP_5				
EB-PC-3	Blue wall paint over green pait over brick	0.0622	0.002%	0.90%
905075PBP_6				
EB-PC-4	Yellow wall paint over brick	0.0808	0.001%	0.11%
905075PBP_7				
EB-PC-5	Red & multiple colors/layers on floor over wood	0.0705	0.002%	0.23%
905075PBP_8				
EB-PC-6	Blue wall paint over brick	0.0383	0.003%	0.51%
905075PBP_9				
EB-PC-7	Yellow wall paint over brick	0.0596	0.002%	0.50%
905075PBP_10				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Approved Signatory



Analysis for Lead Concentration in Paint Chips



by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass	Analytical Sensitivity	Concentration
<i>Lab Sample ID</i>	<i>Lab Notes</i>	(g)	(% by weight)	(% by weight)
EB-PC-8	Blue wall paint over brick	0.0825	0.001%	0.83%
905075PBP_11				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Approved Signatory

QUESTIONS

Client: Contact: Todd Young Address: Portland, ME 04101 Phone: (207) 772-2891 Fax: (207) 772-3248 Email: Todd.Young@ransomenv.com	Ransom Environmental Todd Young Portland, ME 04101 (207) 772-2891 (207) 772-3248 Todd.Young@ransomenv.com	Instructions: Use Column "B" for your contact info To See an Example Click the bottom Example Tab. Enter samples between "<<" and ">>" Begin Samples with a "<<" above the first sample and end with a ">>" below the last sample. Only Enter your data on the first sheet "Sheet1" Note: Data 1 and Data 2 are optional fields that do not show up on the official report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.	Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 Phone: 336.292.3888 Fax: 336.292.3313 Email: lab@sailab.com
Project: Avesta Housing Buildings Client Notes: [Enter Client Notes Here]	191		
P.O. #: Date Submitted: Analysis: TurnAroundTime:	6/8/2009 PM FedEx Drop Box AA (LBP Chips) Standard		

Sample Number	Building	Sample Description	Location
SB-PC-1	Shailer Building	Blue Wall Paint (over plaster)	1st Fl., Common area, Side A Wall
SB-PC-2	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #1, Side A Wall
SB-PC-3	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #2, Side B Wall
EB-FC-1	Emerson Building	Black Floor Covering	Vestibule #101
EB-PC-2	Emerson Building	Blue Wall Paint (over Lime-colored paint)	Bsmt., Room #1 (Boiler Rm.) Side D
EB-PC-3	Emerson Building	Blue Wall Paint (over green paint, over brick)	Bsmt., Room #3, Side C, lower wall
EB-PC-4	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #3, Side C, Upper wall
EB-PC-5	Emerson Building	Red & multiple colors/layers on Floor (over wood)	Bsmt., Room #5, Bathroom
EB-PC-6	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #6, Side C lower wall
EB-PC-7	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #6, Sides A & D
EB-PC-8	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #7, Side D, lower wall

W. J. Payne
 6-9-09 9:30 AM

Accepted Rejected

LEAD INSPECTION / DETERMINATION REPORT	
Date of Inspection:	June 5, 2009
Building Address:	Former Emerson School 13 Emerson Street Portland, Maine
Construction Summary:	The former Emerson School (13 Emerson Street) is a three-story brick building constructed in the late 1800s and renovated in the 1980s into residential units. The built-out basement houses storage space, a former restroom area, and mechanical spaces. The remainder of the building has been converted into apartments connected by common hallways and stairwells. Interior finishes include painted plaster and drywall walls and ceilings, varnished wood trim work, and painted windows.
Building Owner:	Avesta Housing 307 Cumberland Avenue Portland, Maine 04101
Certified Lead Inspector/ Certificate Number:	Delano Leonard LI-0417
	Signature: <i>Delano D. Leonard</i> Delano Leonard 2009.07.07 14:46:28 -04'00'
Analytical Laboratory:	Scientific Analytical Institute, Inc. (SAI) 302-L Pomona Drive Greensboro, NC 27407
Test Methods:	Paint X-Ray Fluorescent Analyzer Serial Number: SN 8065 Paint Chip (EPA SW-846 3 rd Ed. Method 3050B/ Method 7420)
	Water Not Applicable
	Soil Not Applicable
	Dust Not Applicable
	Air Not Applicable
Scope of Inspection:	Lead Inspection limited to basement, common areas, roof and windows.
Interpreting Results	
<p>Test points are identified by floor level, room number, side of building (A, B, C, or D), and structure/component. Per ME DEP/HUD protocol, the "street side" of the building is the "A" side and the other sides lettered in a clockwise fashion. Rooms are numbered starting with the A-side and numbered clockwise. Windows and doors in each room are identified in the same manner.</p> <p>Multiple test points on similar components were collected in each room to determine homogeneity of the coating(s). Fewer test points were necessary in instances where a conclusion of lead-positive or negative</p>	

could be determined with high confidence. Where results were inconclusive (e.g. inconsistent and/or slightly above or below the HUD action level of 1.0 mg/cm²), bulk samples were collected and sent to Scientific Analytical Institute (SAI) in Greensboro, NC for analysis.

During initial start-up of the XRF and again after approximately four (4) hours of continuous use, a "standardization" calibration procedure was performed using a known standard (Alloy 316) provided by the manufacturer.

Paint chip samples were analyzed by Scientific Analytical Institute, Inc. (SAI) of Greensboro, North Carolina. SAI is certified to perform bulk sample analysis by the National Voluntary Laboratory Accreditation Program (NVLAP).

Testing Summary

Ransom collected one hundred ninety-six (196) XRF readings and eight (8) paint chip samples for lead content from various building components and surfaces at the Emerson building. XRF readings ranged from below the instrument detection limit (BDL) to greater than 5.0 mg/cm². A complete listing of the tested components, including sample location, testing result(s) and condition, and drawings, are attached to this report.

Vestibule 100 – Inside Room

The white-painted ceiling was positive (>5.0 mg/cm²) for lead. This room and another in the basement were the only ceiling areas found to be positive. The condition of the paint was noted to be in fair condition.

All wall tests were positive and the white-painted surfaces (over plaster substrate) were in fair to poor condition with localized areas of peeling.

The white-painted, sealed windows on the B-side (stair landing side) wall inside the varnish trim were positive. The sash and other white-painted wood work on the D-side (outside) windows were also coated with lead-based paint and in poor condition. These windows were sealed shut, so exterior tests could not be collected. The paint age, color and condition appeared similar to the inside and it is assumed that the outside paint is also lead-positive.

Vestibule 100 – Outside Wall (Stair Landing Side)

The wall facing the stairs was tested, as this is scheduled to be impacted by renovations. The light yellow-painted upper wall surfaces above the tongue-and-groove varnished lower wall was positive for lead (>5.0 mg/cm²).

As a note of interest, no varnished woodwork in any of the surveyed areas was at or near the 1.0 mg/cm² threshold for lead-positive.

Vestibule 101 – Inside Room

All wall areas (blue-painted) were positive including both closets (green-painted). Test points were consistently near or greater than 5.0 mg/cm². Paint condition was noted to be in fair to good condition with the exception of a localized, significantly water/moisture damaged area where the A- and B-side

walls intersect. The ceiling was negative.

Similar to Vestibule 100, the blue-painted, sealed windows on the D-side (stair landing side) wall inside the varnish trim were also positive. The sash and other white-painted wood work on the D-side (outside) windows were also coated with lead-based paint and in poor condition. These windows were also sealed shut, so exterior tests could not be collected. The paint age, color and condition appeared similar to the inside and it is assumed that the outside paint is also lead-positive.

The black, linoleum-like floor covering tested close to the 1.0 mg/cm² threshold with the XRF, so a bulk sample was collected for Atomic Absorption analysis. The laboratory result of 0.46% is below the ME DEP/HUD threshold of 0.5%.

Vestibule 101 – Outside Wall (Stair Landing Side)

The stair landing side of the wall painted light yellow was positive for lead-based paint (>5.0 mg/cm²).

Basement

The basement areas not renovated into apartments were surveyed. These unoccupied spaces were observed to be cluttered and the paint on brick walls was in poor condition. Room numbers were assigned to each room starting with the Boiler Room (Room #1) and moving clockwise to the Electrical Room (Room #9) adjacent to the entrance stairwell (Room #8).

Throughout most of the basement area, walls are painted yellow (upper half) and blue (lower half). Both yellow- and blue-painted surfaces were inconsistent with respect to lead content with both positive and negative readings, often on the same wall. When positive XRF tests were obtained from walls of either color, they were consistently just above or below 1.00 mg/cm² – the lead-positive/lead-negative cut-off point of the instrument. A total of six (6) chip samples were collected from walls in rooms 1, 3, 6, and 7. Lab analysis quantified lead below 0.5% Room #3, upper wall, yellow paint and at or above 0.5% but below 1% in the remaining five (5) samples of yellow (1 sample) and blue (4 samples) paint.

With the exception of the railing around the sump pump pit in Room #7 and the Room #5 bathroom floor, all red-painted surfaces were lead-based.

Of the nine rooms, only the (white-painted) ceiling at the bottom of the stairs (Room #8) was consistently lead-based paint.

All tests of window wood-work (sash/trim) throughout the basement were positive for lead at concentrations >5.0 mg/cm². No tests were collected from outside the building since interior testing of the windows determined they are coated with lead-based paint.

Room #1 (Boiler Room)

Both the yellow-painted, A-side wall (the wall opposite the Old Air Handler Room entrance) and the D-side (room entrance side) blue-painted (lower) wall tested positive. A chip sample of blue paint from the D-side wall was greater than 0.5% (0.79%) lead by weight. The brick, blue-painted B-side wall of the Boiler also tested positive.

The red-painted doors and windows/window trim were positive as well as the yellow-painted

windows/trim on the B-side of the room.

Room #2 (Old Air Handler Room)

The yellow-painted portion of the air handler ductwork was positive for lead as well as the red-painted window trim.

Room #3

Room #3 is the small, un-used area on the C-side of Room #7. The A-side yellow-painted upper wall and the blue (lower) wall tested positive. The blue-painted lower C-side wall also tested positive.

Chip samples of yellow and blue paint were collected from the C-side wall. Lab analysis revealed that the blue paint was above 0.5% (0.90%) and the yellow below 0.5% (0.11%).

Room #4

Room #4 is the un-used space below the other (blocked) access stairs. The accessible space at the bottom stair landing was designated as Room #4A.

A single test on the lower ceiling was positive; however, this could not be confirmed with multiple tests elsewhere on the ceiling and it is thought to be an anomalous reading or a very localized area of lead-based paint.

The yellow-painted horizontal I-beam consistently tested as lead-containing ($>1.00\text{mg}/\text{cm}^2$).

The yellow-painted A-side wall (drywall substrate) tested positive. One positive test was observed on the D-side lower wall (brick substrate), but could not be repeated elsewhere on the same wall.

Room #4A

Positive tests were obtained from both the yellow-painted upper wall and blue-painted lower wall.

Room #5 (Locker Room & Bathroom)

The yellow-painted horizontal support beam tested positive as well as the window woodwork in both rooms. The red-painted wood floor in the bathroom was close to $1.0\text{ mg}/\text{cm}^2$, so a chip sample was collected. The floor is covered with numerous layers of paint below the top coat. The lab analysis revealed a concentration less than 0.5% (0.23%).

Room #6

Multiple XRF test points of the yellow- and blue-painted walls were inconsistent with both positive and negative readings. Representative paint chip samples of both colors were collected and sent to the lab. Results were 0.51% for the blue (C-side wall) and 0.50% for the yellow (A- and D-sides).

The window woodwork was positive.

Room #7

A single positive test was obtained from the orange-painted (A-side) wall near the air handler duct. Consistent positive tests were obtained on the blue painted drywall (lower wall) near the entrance to the Boiler Room. Elevated tests from points on the (lower) blue-painted brick wall on the D-side prompted collection of a chip sample. The lab analysis revealed >0.5% (0.83%) lead by weight.

The white-painted air handler ductwork was positive. The small, red-painted access door to the air handler piping chase as well as the blue-painted trim around the door tested positive.

Room #8

The (white-painted) ceiling at the bottom of the stairs and the black-painted horizontal support beam are lead-positive.

Room #9

No positive detections were obtained.

Attachments

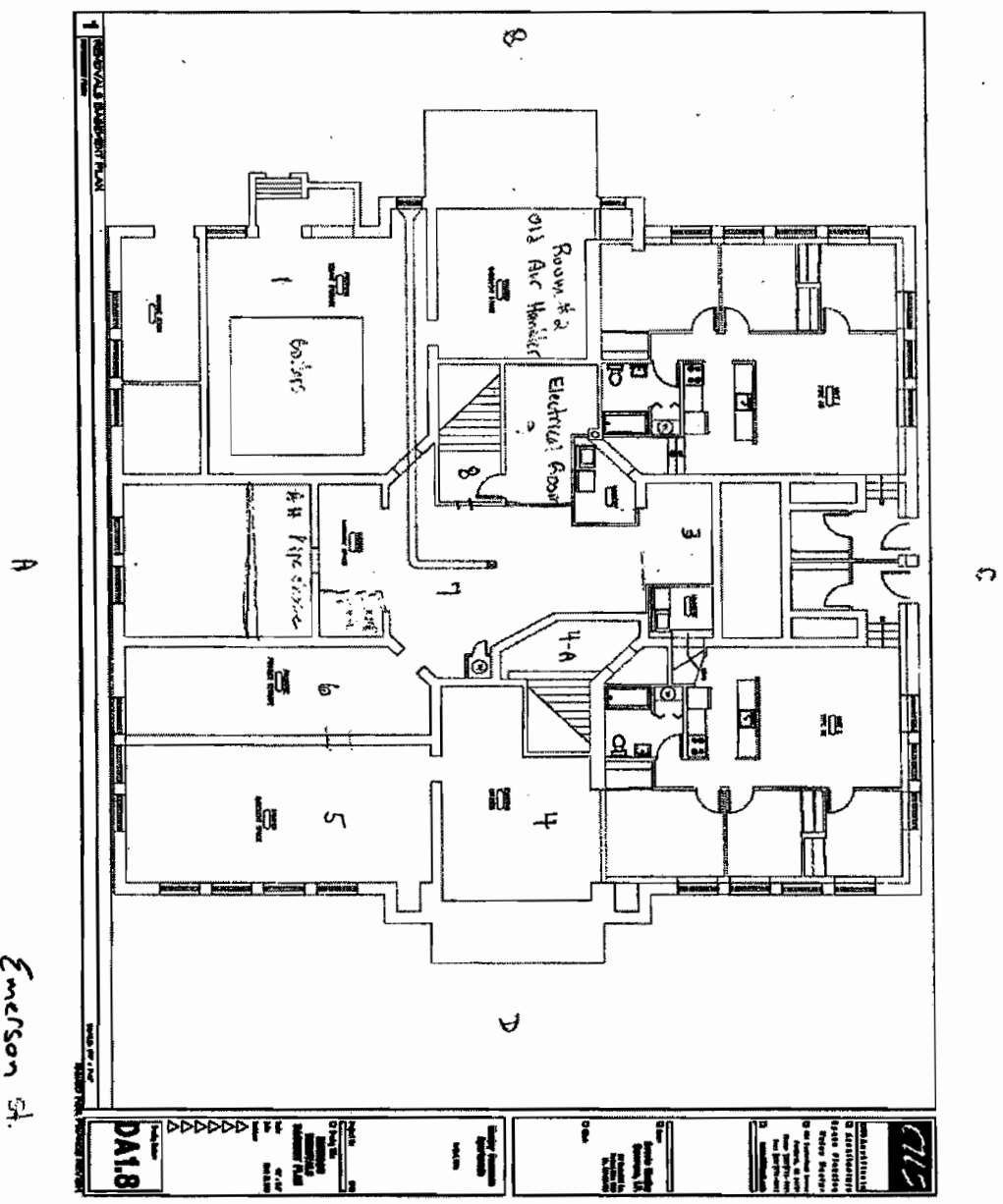
1. Drawing

2. XRF Testing Results

3. Paint Chip Sampling Results

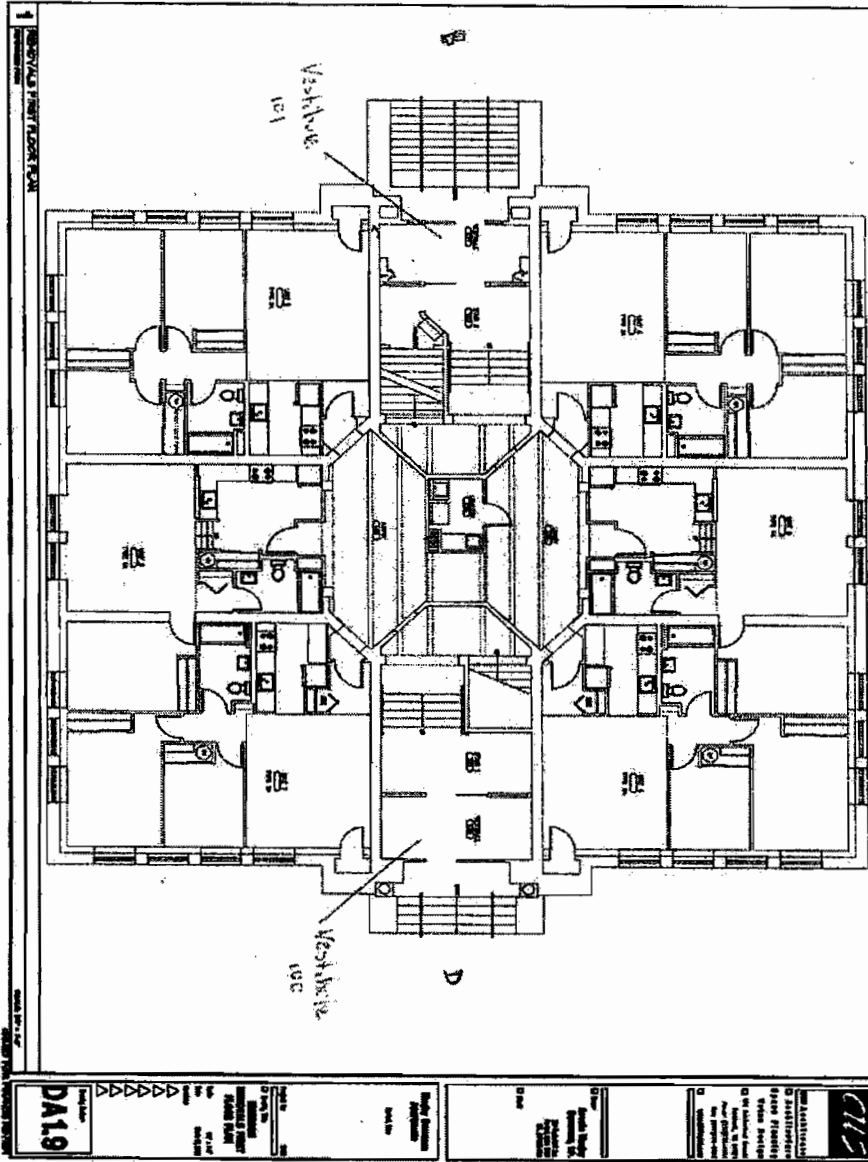
Drawing: Basement

il



Emerson St.

Vestibule



XRF Testing Results - 13 Emerson Street (Emerson School)								
Bldg. Level / Location	Reading No.	Room No.	Structure / Substrate	Paint Color	Bldg. Side	Result (mg/cm ²)	Paint Cond.	Notes
N/A	N/A	N/A	N/A	N/A	N/A	177	N/A	Standardization
Vestibule 100	1	Inside Room	Ceiling	White	N/A	>5.0	F	
	2		Ceiling Trim	Varnish	B	0.09±0.05	N/A	
	3		Upper Wall/Plaster	White	B	>5.0	F-P	Localized areas on walls of significant peeling
	4		Chair Rail (10' above floor)/Wood	Varnish	A	0.08±0.11	N/A	
	5		Sealed window (above entrance door)/ Wood	White	B	>1.00	G	Test point inside framing
	6		Sealed window – trim (above entrance door)/Wood	White	B	0.04±0.05	G	¼-round trim
	7		Sealed window – trim (A-side of entrance door)/Wood	White	B	>1.00	G	Test point inside framing
	8		Sealed window (above Entrance door) – frame/Wood	Varnish	B	0.18±0.05	N/A	Trim above door
	9		Sealed window (C-side of entrance door) – frame/Wood	Varnish	B	0.13±0.04	N/A	
	10		Sealed window (D-side of entrance door) – trim/Wood	Varnish	D	0.20±0.05	N/A	
	11		Window – apron	Varnish	D	0.14±0.05	N/A	
	12		Window – sash	White	D	>5.0	P	Windows fastened shut, exterior not accessible
	13		Lower Wall (below windows)/Plaster	White	D	>4.32	F-P	
	14		Shelving unit	Varnish	A	0.07±0.04	N/A	
	15		Baseboard trim/Wood	Varnish	D	BDL	N/A	
	16		Floor	Varnish	N/A	0.16±0.05	N/A	
Vestibule 100 (wall)	17	Stair Landing Area	Upper Wall/Plaster	Yellow	D	>5.0	G	
	18		Sealed window – frame/Wood	Varnish	D	0.14±0.05	N/A	
	19		Sealed window (C-side of entrance door)/Wood	Yellow	D	0.09±0.04	N/A	Test point inside framing
	20		Sealed window (A-side of entrance door)/Wood	Yellow	D	0.07±0.09	N/A	
	21		Chair rail/Wood	Varnish	D	0.14±0.06	G	
	22		Lower Wall/Wood	Varnish	D	0.08±0.03	G	2 nd test point
	23		Entrance door	Varnish	D	0.09±0.04	N/A	
Vestibule 101	24	Inside Room	Ceiling	White	N/A	0.02±0.04	N/A	
	25		Ceiling Trim	Varnish	D	0.08±0.03	N/A	
	26		Upper Wall/Plaster	White	A	0.06±0.09	N/A	Test above closet
	27		Chair Rail (10' above floor)/Wood	Varnish	A	0.11±0.05	N/A	

	28		Sealed window (above entrance door) - frame/Wood	Varnish	D	0.19±0.05	G	Test point inside framing
	29		Sealed window (above entrance door)/ Wood	Blue	D	>1.00	G	Test point inside framing
	30		Lower wall/Plaster	Blue	C	>4.76	G	Localized damage from water/moisture on A-side
	31		Lower wall/Plaster	Blue	A	>5.0	G	
	32		Shelving/Wood	Varnish	C	BDL	N/A	
	33		Shelving support/Wood	Blue	B	BDL	N/A	
	34		Shelving support/Wood	Blue	D	0.02±0.01	N/A	
	35		Closet #2 Door/Wood	Varnish	C	0.13±0.04	N/A	
	36		Closet #2 Door – trim/Wood	Varnish	C	0.16±0.04	N/A	
	37		Entrance door/Wood	Blue	D	BDL	N/A	
	38		Bulletin (cork) board - trim	Blue	D	BDL	N/A	
	39		Entrance door – trim/Wood	Varnish	D	0.19±0.04	N/A	
	40		Closet #1 Door/Wood	Varnish	A	0.14±0.04	N/A	
	41		Window – trim/Wood	Varnish	B	0.22±0.05	N/A	
	42		Window – apron/Wood	Varnish	A	0.22±0.05	N/A	
	43		Lower window – sash/Wood	White	A	>5.0	P	Windows fastened shut, exterior not accessible
	44		Upper window – sash/Wood	Blue	A	>5.0	P	Blue paint over white
	45		Lower wall (below windows)/Drywall	Blue	B	BDL	N/A	Original paint (pink) visible under drywall
	46		Baseboard trim/Wood	Varnish	B	0.21±0.06	N/A	
	47		Baseboard trim/Wood	Varnish	A	0.19±0.06	N/A	
	48		Closet #2 shelf support/Wood	Varnish	C	0.13±0.04	N/A	
	49		Closet #2 shelf support/Wood	Varnish	C	BDL	N/A	
	50		Closet #2 wall/Plaster	Green	C	>5.0	F	
	51		Closet #2 door – jamb/Wood	Varnish	B	0.20±0.06	N/A	
	52		Closet #1 wall/Plaster	Green	A	>5.0	F	
	53		Floor covering (over wood) – tested near entrance	Black	N/A	0.78±0.16	F	Bulk sample analysis = 0.46%
	54		Floor covering (over wood)	Black	N/A	0.68±0.16	F	2 nd test point
Vestibule 101 (wall)	55	Stair Landing Area	Upper Wall (above sealed windows)/Plaster	Yellow	B	>5.00	G	
	56		Upper Wall (above sealed windows)/Plaster	Yellow	B	>5.00	G	2 nd test point

	57		Sealed window – trim/Wood	Varnish	B	0.14±0.04	N/A	
	58		Sealed window/Wood	Varnish	B	0.08±0.04	N/A	Test point inside framing
	59		Sealed window – sill/Wood	Varnish	B	0.15±0.05	N/A	
	60		Chair Rail/Wood	Varnish.	B	0.17±0.06	N/A	
	61		Lower wall (tongue & groove)	Varnish.	B	0.06±0.05	N/A	
	62		Entrance door #3 – jamb/Wood	Varnish.	C	0.14±0.05	N/A	
	63		Entrance door – threshold/Wood	Varnish.	N/A	BDL	N/A	
Basement	64	Room #1 – Boiler Room	Ceiling (above boilers)	White	N/A	0.02±0.04	N/A	
	65		Ceiling (above boilers)/Plaster	White	N/A	0.09±0.22	N/A	2 nd test point
	66		Boiler wall (top)/Insulation	Red	D	0.19±0.14	N/A	
	67		Upper wall/Brick	Yellow	D	0.09±0.06	N/A	
	68		Upper wall/Brick	Yellow	A	>1.00	F	
	69		Upper wall/Brick	Yellow	D	0.16±0.11	N/A	2 nd test point
	70		Upper wall/Brick	Yellow	A	>1.00	F	2 nd test point
	71		Lower wall/Brick	Blue	D	>1.00	P	
	72		Boiler wall (lower)/Brick	Blue	C	>1.00	P	
	73		Lower wall/Brick	Blue	B	0.28±0.11	F	
	74		Boiler wall (lower)/Brick	Blue	D	0.54±0.13	N/A	Chip sample = 0.79%
	75		Upper wall/Brick	Yellow	C	0.08±0.07	N/A	
	76		Lower wall/Brick	Blue	C	0.17±0.12		
	77		Entrance door – trim/Wood	Red	D	1.17±0.18	G	
	Basement		83	Room #2 – Old Air Handler	Ceiling/Plaster	Gray	N/A	BDL
84		Wall/Brick	Gray		D	0.03±0.04	N/A	
85		Wall/Brick	Gray		C	0.02±0.04	N/A	
86		Air handler duct/Metal	Yellow		C	3.90±0.53	P	
87		Air handler duct/Metal	Black		C	0.13±0.03	N/A	
88		Air handler duct/Metal	Black		C	0.30±0.05	N/A	2 nd test point
Basement	89	Room #2	Window – trim/Wood	Red	A	>5.0	F	
Basement	90		Wall/Wood	Black	D	0.08±0.04	N/A	Plywood behind electrical junction
Basement	91	Room #3	Ceiling/Plaster	White	N/A	0.14±0.14	N/A	
	92		Wall (C-side of parapet wall)/Brick	White	C	BDL	N/A	
	93		Wall (C-side of parapet wall)/Brick	White	B	BDL	N/A	
	94		Upper wall/Brick	Yellow	C	>1.00	P	
	95		Upper wall/Brick	Yellow	C	0.20±0.16	N/A	Chip Sample = 0.11%

	96		Lower wall/Brick	Blue	C	0.28±0.19	N/A	Chip sample = 0.90%
	97		Lower wall/Brick	Green	C	0.29±0.13	N/A	Green under blue
	98		Upper wall/Brick	Yellow	A	1.00±0.09	P	
	99		Lower wall/Brick	Blue	A	>1.00	P	
Basement	100	Room #4	Upper ceiling/Plaster	White	N/A	0.04±0.07	N/A	
	101		Lower ceiling/Plaster	White	N/A	>1.00	P	Test near B-side wall
	102		Upper ceiling/Plaster	White	N/A	0.03±0.04	P	2 nd test point
	103		Lower ceiling/Plaster	White	N/A	0.09±0.10	N/A	2 nd test, near D-side wall
	104		Lower ceiling/Plaster	White	N/A	0.02±0.04	N/A	3 rd test, near B-side wall
	105		Lower ceiling/Plaster	White	N/A	0.03±0.03	N/A	4 th test, near B-side wall
	106		Upper wall/Brick	Yellow	B	0.02±0.05	N/A	
	107		Upper wall/Brick	Yellow	A	0.13±0.14	N/A	
	108		Upper wall – horizontal support I-beam/Metal	Yellow	B	>1.00	G	
	109		Upper wall – horizontal support I-beam/Metal	Yellow	B	>1.00	G	2 nd test point
	110		Upper wall/Drywall	Yellow	A	>1.00	G	
	111		Upper wall/Brick	Yellow	D	0.10±0.08	N/A	
	112		Upper wall/Brick	Yellow	D	0.19±0.16	N/A	2 nd test point
	113		Upper wall – horizontal support I-beam/Metal	Yellow	A	>1.00	G	
	114		Upper wall – horizontal support I-beam/Metal	Yellow	C	>1.00	G	
	115		Lower wall/Drywall	Blue	A	BDL	N/A	
	116		Lower wall/Brick	Blue	D	1.00±0.36	P	
	117		Lower wall/Stone	Blue	D	0.07±0.06	N/A	
118	Lower wall/Brick	Blue	D	0.20±0.21	N/A			
	119		Wall (under stairs)/Wood	Varnish	B	0.10±0.03	N/A	
Basement	120	Room #4A (Stair Landin g)	Ceiling/Plaster	White	N/A	0.04±0.09	N/A	
	121		Upper wall/Plaster skim coat over brick	Yellow	A	1.00±0.12	G	
	122		Upper wall/Plaster skim coat over brick	Yellow	B	0.32±0.23	N/A	
	123		Lower wall/Plaster skim coat over brick	Blue	A	>1.00	G	
	124		Lower wall/Plaster skim coat over brick	Blue	B	>1.00	G	
Basement	125	Room #5	Ceiling/Plaster	White	N/A	BDL	N/A	
	126		Upper wall/Brick	Yellow	C	0.06±0.07	N/A	
	127		Upper wall/Brick	Yellow	B	0.10±0.14	N/A	
	128		Upper wall/Wood	Yellow	A	0.04±0.03	N/A	
	129		Window – trim/Wood	Yellow	D	>5.0	F-P	
	130		Window – sash/Wood	Yellow	D	>5.0	F-P	
	131		Upper wall – horizontal support I-beam/Metal	Yellow	C	>1.00	G	
	132		Lower wall/Drywall	Blue	C	BDL	N/A	

	133		Lower wall/Brick	Blue	B	0.59±0.26	N/A	
	134		Lower wall/Brick	Blue	B	0.03±0.06	N/A	2 nd test point
	135		Lower wall/Wood	Blue	A	0.07±0.06	N/A	
	136		Floor/Concrete	Red	N/A	0.02±0.04	N/A	
Basement	137	Room #5 Bath-room	Upper wall/Wood	Yellow	D	0.17±0.11	N/A	
	138		Upper wall/Wood	Yellow	A	0.16±0.05	N/A	
	139		Lower wall/Wood	Red	A	0.12±0.05	N/A	
	140		Lower wall/Wood	Blue	A	0.10±0.05	N/A	
	141		Window – trim/Wood	Yellow	A	>5.0	F-G	
	142		Window – sash/Wood	Yellow	A	>5.0	F-G	
	143		Floor/Wood	Red	N/A	0.95±0.15	F	
	144		Floor/Wood	Red	N/A	0.62±0.13	F	2 nd XRF test point, chip sample = 0.23%
Basement	145	Room #6	Ceiling/Plaster	White	N/A	0.03±0.04	N/A	
	146		Upper wall/Brick	Yellow	C	0.30±0.15	N/A	
	147		Upper wall/Brick	Yellow	D	1.00±0.15	P	Chip sample = 0.50%
	148		Upper wall/Brick	Yellow	B	0.19±0.12	N/A	
	149		Upper wall/Brick	Yellow	A	1.00±0.11	P	Chip sample = 0.50%
	150		Lower wall/Brick	Blue	C	1.00±0.27	P	Chip sample = 0.51%
N/A	N/A	N/A	N/A	N/A	N/A	179	N/A	Standardization
Basement	151	Room #6	Lower wall/Brick	Green	D	0.06±0.10	N/A	Green under blue
Basement	152	Room #6	Lower wall/Brick	Blue	D	0.02±0.04	N/A	
	153		Window – trim/Wood	Yellow	A	>5.0	P	
	154		Door – trim/Wood	Red	B	>5.0	G	Door between rooms 6&7
Basement	155	Room #7	Ceiling/Plaster	White	N/A	0.07±0.07	N/A	
	156		Upper wall/Brick	Orange	A	>1.00	F	B-side of Air Handler duct
	157		Upper wall/Brick	Oran	D	0.10±0.07	N/A	
	158		Upper wall/Brick	Oran	B	0.15±0.09	N/A	Above work bench
	159		Upper wall/Brick	Oran	A	0.11±0.08	N/A	D-side of Air Handler duct
	160		Upper wall/Brick	Yellow	D	0.25±0.19	N/A	
	161		Upper wall/Brick	Yellow	B	0.15±0.12	N/A	
	162		Lower wall/Brick	Blue	D	0.46±0.20	N/A	
	163		Lower wall/Brick	Blue	D	0.71±0.28	N/A	Chip sample = 0.83%
	164		Lower wall/Brick	Blue	A	0.73±0.20	N/A	Test near Rm. #6 door
	165		Lower wall/Brick	Blue	A	0.19±0.16	N/A	Test below AH duct
	166		Lower wall/Brick	Blue	B	0.63±0.25	N/A	Test near Rm. #1 entrance
	167		Lower wall/Drywall	Blue	C	>1.00	G	
	168		Lower wall/Drywall	Blue	C	>1.00	G	2 nd test point
	169		Upper wall/Drywall	Yellow	C	0.19±0.04	N/A	
170	Upper wall/Drywall	Yellow	C	0.13±0.05	N/A			
171	Lower wall/Drywall	Blue	B	0.01±0.05	N/A			
	172		Access door to air handler pipe chase/Metal	Red	A	>5.0	G	

	173		Railing – around sump pump pit/Metal	Red	N/A	0.38±0.08	N/A	
	174		Railing – around sump pump pit/Metal	Red	N/A	0.10±0.03	N/A	
	175		Floor – near sump pump pit/Concrete	Red	N/A	0.13±0.09	N/A	
	176		Work bench top/Wood	Red	N/A	0.20±0.08	N/A	
	177		Air Handler Duct/Metal	White	A	>4.46	P	
	178		Access door to AH pipe chase – trim/Wood	Blue	A	>5.0	G	
	179		Wall, hot water tank closet/Brick	Yellow	D	0.01±0.02	N/A	
	180		Wall, hot water tank closet/Drywall	Yellow	A	BDL	N/A	
	181		Sump pump (in pit)/Metal	Blue	N/A	0.16±0.09	N/A	
	Basement		182	Room #8 (Stairs)	Ceiling/Plaster	White	N/A	>1.00
183		Ceiling/Plaster	White		N/A	>1.00	P	2 nd test point
184		Horizontal I-Beam (above stairs)/Metal	Black		N/A	>5.00	G	
185		Upper wall/Drywall	Yellow		A	0.11±0.04	N/A	
186		Upper wall/Drywall	Yellow		C	0.05±0.02	N/A	
187		Lower wall/Drywall	Blue		A	0.03±0.08	N/A	
188		Lower wall (top of stairs)/Drywall	Blue		C	0.09±0.04	N/A	
198		Wall (along stairs)/Wood	Varnishish		A	0.09±0.04	N/A	
190		Door Frame/Metal	White		C	BDL	N/A	
191		Stair – riser/Wood	Gray		N/A	0.12±0.06	N/A	
Basement	192	Room #9 (Electric Room)	Upper wall/Drywall	Yellow	A	0.09±0.04	N/A	
	193		Lower wall/Drywall	Blue	A	0.02±0.07	N/A	
	194		Wall/Plywood	Black	A	0.01±0.01	N/A	
	195		Vertical support column (upper portion)/Metal	Yellow	N/A	0.33±0.06	N/A	
	196		Vertical support column (lower portion)/Metal	Blue	N/A	0.07±0.03	N/A	

Notes:

1. XRF readings collected using an Innov-X Systems Alpha Series XRF.
2. BDL: Below Detection Limit.
3. Items in bold are above the EPA/HUD “lead-based paint” level of 1.0 mg/cm² or 0.50% by weight.
4. The upper limit for the Innov-X XRF is 5.00 mg/cm²
5. Paint condition: P – Poor, F- -Fair, G - Good



Analysis for Lead Concentration in Paint Chips

by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420



Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass	Analytical Sensitivity	Concentration
Lab Sample ID	Lab Notes	(g)	(% by weight)	(% by weight)
SB-PC-1	Blue wall paint over plaster	0.0482	0.002%	0.90%
905075PBP_1				
SB-PC-2	Green wall paint lower wall over brick	0.0521	0.002%	1.18%
905075PBP_2				
SB-PC-3	Green wall paint lower wall over brick	0.053	0.002%	1.47%
905075PBP_3				
EB-FC-1	Black floor covering	0.1381	0.0009%	0.46%
905075PBP_4				
EB-PC-2	Blue wall paint over lime-colored paint	0.0745	0.002%	0.79%
905075PBP_5				
EB-PC-3	Blue wall paint over green paint over brick	0.0622	0.002%	0.90%
905075PBP_6				
EB-PC-4	Yellow wall paint over brick	0.0808	0.001%	0.11%
905075PBP_7				
EB-PC-5	Red & multiple colors/layers on floor over wood	0.0705	0.002%	0.23%
905075PBP_8				
EB-PC-6	Blue wall paint over brick	0.0383	0.003%	0.51%
905075PBP_9				
EB-PC-7	Yellow wall paint over brick	0.0596	0.002%	0.50%
905075PBP_10				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Approved Signatory



Analysis for Lead Concentration in Paint Chips



by Flame Atomic Absorption Spectroscopy
EPA SW-846 3rd Ed. Method No. 3050B/Method No. 7420

Customer: Ransom Environmental
400 Commercial St Ste 404
Portland ME 04101

Attn: Todd Young

Lab Order ID: 905075

Analysis ID: 905075_PBP

Date Received: 6/9/2009

Date Reported: 6/12/2009

Project: Avesta Housing Buildings

Sample ID	Description	Mass (g)	Analytical Sensitivity (% by weight)	Concentration (% by weight)
Lab Sample ID	Lab Notes			
EB-PC-8	Blue wall paint over brick	0.0825	0.001%	0.83%
905075PBP_11				

Scientific Analytical Institute successfully participates in the AIHA ELPAT for Lead program. ELPAT Laboratory ID: 173190 (R.L. = 0.01 wt.%)
The quality control samples run with the samples in this report have passed all AIHA required specifications unless otherwise noted.

Kristie Armstrong, Ph.D. (11)

Analyst

Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 (336) 292-3888

Approved Signatory

QUESTIONS

Client: Contact: Ransom Environmental Address: Todd Young Portland, ME 04101 Phone: (207) 772-2891 Fax: (207) 772-3248 Email: Todd.Young@ransomenv.com	Instructions: Use Column "B" for your contact info To See an Example Click the bottom Example Tab. Enter samples between "<<" and ">>" Begin Samples with a "<<" above the first sample and end with a ">>" below the last sample. Only Enter your data on the first sheet "Sheet1" Note: Data 1 and Data 2 are optional fields that do not show up on the official report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.	Scientific Analytical Institute, Inc. 302-L Pomona Dr. Greensboro, NC 27407 Phone: 336.292.3888 Fax: 336.292.3313 Email: lab@sailab.com
Project: Ransom Environmental Todd Young Portland, ME 04101 (207) 772-2891 (207) 772-3248 Todd.Young@ransomenv.com	Client Notes: Avesta Housing Buildings [Enter Client Notes Here]	
P.O. #: 191 Date Submitted: 6/8/2009 PM FedEx Drop Box	Analysis: AA (LBP Chips) TurnAroundTime: Standard	

Sample Number	Building	Sample Description	Location
SB-PC-1	Shailer Building	Blue Wall Paint (over plaster)	1st Fl., Common area, Side A Wall
SB-PC-2	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #1, Side A Wall
SB-PC-3	Shailer Building	Green Wall Paint (lower wall, over brick)	Bsmt., Room #2, Side B Wall
EB-FC-1	Emerson Building	Black Floor Covering	Vestibule #101
EB-PC-2	Emerson Building	Blue Wall Paint (over Lime-colored paint)	Bsmt., Room #1 (Boiler Rm.) Side D
EB-PC-3	Emerson Building	Blue Wall Paint (over green paint, over brick)	Bsmt., Room #3, Side C, lower wall
EB-PC-4	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #3, Side C, Upper wall
EB-PC-5	Emerson Building	Red & multiple colors/layers on Floor (over wood)	Bsmt., Room #5, Bathroom
EB-PC-6	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #6, Side C lower wall
EB-PC-7	Emerson Building	Yellow Wall Paint (over brick)	Bsmt., Room #6, Sides A & D
EB-PC-8	Emerson Building	Blue Wall Paint (over brick)	Bsmt., Room #7, Side D, lower wall

W. J. Payne
 6-9-09
 9:30 A

Accepted
 Rejected

Part II
Division 1

General Requirement

SECTION 01 00 00

BASIC REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary:

1. Contract description.
2. Work by Owner.
3. Contractor's use of premises.
4. Future work.
5. Specification conventions.

B. Price and Payment Procedures:

1. Cash allowances.
2. Contingency allowances.
3. Testing and inspection allowances.
4. Schedule of values.
5. Applications for payment.
6. Change procedures.
7. Unit prices.
8. Alternates.

C. Administrative Requirements:

1. Coordination.
2. Field engineering.
3. Meetings.
4. Progress meetings.
5. Equipment electrical characteristics and components.
6. Cutting and patching.

D. Submittals:

1. Submittal procedures.
2. Construction progress schedules.
3. Proposed products list.
4. Product data.
5. Shop drawings.
6. Samples.
7. Manufacturer's instructions.
8. Manufacturer's certificates.

E. Quality Requirements:

1. Quality control.
2. Tolerances.
3. References.
4. Labeling.
5. Mock-ups.
6. Testing and inspection laboratory services.

7. Manufacturer's field services and reports.
8. Examination.
9. Preparation.

F. Temporary Facilities and Controls:

1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary heating and cooling.
4. Temporary ventilation.
5. Telephone and facsimile service.
6. Temporary water service.
7. Temporary sanitary facilities.
8. Field offices and sheds.
9. Access roads.
10. Parking.
11. Progress cleaning and waste removal.
12. Project identification.
13. Fire prevention facilities.
14. Barriers and fencing.
15. Enclosures.
16. Protection of installed work.
17. Security.
18. Water control.
19. Pollution and environmental control.
20. Removal of utilities, facilities, and controls.

G. Product Requirements:

1. Products.
2. Delivery, handling, storage, and protection.
3. Product options.
4. Substitutions.

H. Execution Requirements:

1. Closeout procedures.
2. Final cleaning.
3. Starting of systems.
4. Demonstration and instructions.
5. Testing, adjusting and balancing.
6. Protecting installed construction.
7. Project record documents.
8. Operation and maintenance data.
9. Spare parts and maintenance materials.
10. Warranties.

1.2 CONTRACT DESCRIPTION

- A. The construction of the project will be administrated under the AIA A133 2009 (Standard Form of Agreement between Owner and Construction Manager as Constructor at Risk). For the sake of clarity, all references to either the Construction Manager (CM) or Contractor shall be the same.

1.3 DAVIS BACON REPORTING AND WAGE DETERMINATIONS

- A. The construction of this project is governed by the Davis Bacon Act. Refer to Specification Section 00 30 00 Information Available to Bidder for applicable Davis Bacon Wage Rates.

1.4 WORK BY OWNER

- A. Items noted as NIC (Not in Contract), will be furnished and installed by Owner beginning at Substantial Completion.

1.5 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow:
 - 1. Owner occupancy.
 - 2. Work by others and work by owner.
 - 3. Use of premises by public and tenants as required.

1.6 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

1.7 CASH ALLOWANCES

- A. Costs Included in Allowances: Cost of Product to Contractor or subcontractor and applicable taxes, less applicable trade discounts and delivery to site.
- B. Costs Not Included in Allowances but Included in Contract Sum/Price: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage and labor for installation and finishing.
- C. Difference in cost will be adjusted by Change Order.
- D. Allowances Schedule:
 - 1. Permanent Project Site Sign N/A, by owner
 - 2. Utility Connection, Service & Impact Fees N/A, by owner
(Including Electric, Water, Sewer, Cable and Telephone)
 - 3. Concrete Substrate Vapor Barriers
(All work outlined in 09 65 00 – Resilient Flooring, Section 2.4 CSVB)
 - a) Shailer Building (2,400 SF @ \$5/SF) \$12,000.00
 - b) Emerson Building (800 SF @ \$5/SF) \$4,000.00

1.8 TESTING AND INSPECTION ALLOWANCES

- A. Testing and Inspection Allowances: Include in the Contract, sum of \$10,000 for payment of testing and inspection services.
- B. Costs Included in Allowance: Cost of engaging testing or inspection firm, execution of tests or inspection, and reporting of results.
- C. Costs Not Included in Allowance:
 - 1. Incidental labor and facilities required to assist testing or inspection firm.

2. Costs of re-testing upon failure of previous tests as determined by Architect/Engineer. Costs of re-testing will be charged to the Contractor.
- D. Costs will be drawn from testing and inspection allowances by Change Order.
- E. Reports will be submitted by independent firm to Owner, Architect/Engineer, Contractor, and authority having jurisdiction, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
1. Submit final report indicating correction of Work previously reported as non-compliant.
- F. Agency Reports: After each test, promptly submit copies of report to Owner, Architect/Engineer, Contractor, and authority having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.

1.9 SCHEDULE OF VALUES

- A. Submit schedule of values on AIA Form G703, similar electronic media printout will be considered.
- B. Submit Schedule of Values at prior to initial closing.

1.10 APPLICATIONS FOR PAYMENT

- A. Requisition Forms: Submit seven copies of each application on AIA Form G702, with backup information on AIA Form G703; similar electronic media printout for backup will be considered.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Monthly. Requisition to be submitted 10 days prior to on-site requisition meeting for payment approximately 10 days following. Specific requisition dates and payment time frame to be determined at preconstruction meeting.
- D. Approvals: Requisition forms must be approved and signed by Contractor, Architect and MSHA Inspector.

1.11 CHANGE PROCEDURES

- A. Stipulated Sum Change Order: Based on Proposal Request with General Contractor profit and overhead delineated and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer, Owner and MSHA Inspector.
- B. Change Order Forms: AIA Form G701.
- C. Approvals: Change Orders must be approved and signed by Contractor, Architect, Owner and MSHA Inspector.

1.12 UNIT PRICES

- A. **Refinish Existing Hardwood Floors (09 64 00)** – Provide multiple prices (dollars per square foot) to delete each scheduled new flooring system and strip and refinish existing hardwood floors as per specification Section 09 64 00. Exclude any costs associated with patching existing damaged flooring.

1.13 ALTERNATES

- A. Alternates quoted on Bid Forms will be used in conjunction with Base Bids to determine the low bid for the project.
- B. Coordinate related Work and modify surrounding Work as required.
- C. Alternates Schedule:
1. **Delete the Solar Pre-Heat System (22 00 00)** – Provide a deduct price for the complete removal of all components associated with the Solar Pre-Heat System specified.
 2. **Delete the Direct Digital Control (DDC) System (23 09 00)** - Provide a deduct price for the complete removal of all components associated with the Direct Digital Control System specified. In its place provide an electric / electronic system capable of providing the control sequences specified.
 3. **Replace Sheet Vinyl Plank Flooring (09 65 00) system with Carpet and Pad (09 68 00)** - Provide a deduct price for the complete replacement of all Sheet Vinyl Plank Flooring as specified in Section 09 65 00, 2.3 with carpet and pad system as specified in Section 09 68 00 – Carpet.
 4. **Provide Blown in Cellulose Ceiling Sound Absorption System (07 21 00)** – Provide a price to add 4" blown in loose fill cellulose insulation as specified in 07 21 00 above the suspended GWB ceilings: a) Shailer Building - every 1st Floor, and 2nd Floor residential unit; b) Emerson Building - every 1st Floor, 2nd Floor and 3rd Floor residential unit. Include in the price the cost of cutting and patching existing GWB ceilings to provide access to the cavity.

1.14 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements. No claims for additional Time will be considered if the Work has not been properly coordinated.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction.
- E. Inspection/Commissioning Requirements:
1. Cooperate with and assist the Owner as necessary to coordinate the Owner's Inspection and Commissioning Requirements (commissioning and testing agents contracted by the Owner, coordinated by Contractor).
 2. Contractor to work carefully with the commission and testing agents to implement, coordinate and achieve MaineHousing's Green Building Standards including systems commissioning, building construction air sealing and blower door testing.

1.15 FIELD ENGINEERING

- A. Employ a Land Surveyor to locate a reference datum and protect survey control and reference points.
- B. Establish elevations, lines, and levels and certify that elevations and locations of the Work conform with the Contract Documents.
- C. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.16 PRECONSTRUCTION AND PREINSTALLATION MEETINGS

- A. Owner will schedule a preconstruction meeting for all affected parties.
- B. When required in individual specification section, convene a preinstallation meeting at Project site prior to commencing work of the section.

1.17 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
- B. Preside at meetings, record minutes, and distribute copies within two days to those affected by decisions made.

1.18 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Motors: NEMA MG1 Type; specific motor type is specified in individual specification sections.
- B. Wiring Terminations: Terminal lugs to match branch circuit conductor; size terminal lugs to NFPA 70.
- C. Cord and Plug: Minimum 6 foot cord and plug including grounding connector; cord of longer length is specified in individual sections.

1.19 CUTTING AND PATCHING

- A. Employ original installer to perform cutting and patching new Work; restore Work with new Products.
- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.
- E. Cut from finished side of surfaces to concealed side.
- F. Protect existing construction from damage during cutting and patching.
- G. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- H. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. Refinish surfaces to match adjacent finishes in a manner that will eliminate evidence of patching and refinishing. Extend refinishing to entire contiguous surface where necessary to eliminate evidence of patching.

1.20 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Contract Document references.
- B. Submittals to Architect shall consist of two prints and one sepia if larger than 11"X17" and 3 copies if 11"X17" or smaller, plus the number of copies needed by Contractor for distribution. Submittals will be reviewed by Architect/Engineer and sepia will be marked and returned for printing of distribution set with architect's/engineer's comments included.
- C. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- D. Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.
- E. Revise and resubmit submittals as required; identify all changes made since previous submittal.
- F. Distribute submittals reviewed by Architect/Engineer to project site and all affected parties.
- G. Allow 15 working days for review and return of submittals or resubmittals by Architect. Schedule submittals with adequate time for review by Architect before products need to be ordered.
- H. Do not allow submittals requiring Architect/Engineer's action stamp to be used on the project site without marking.
- I. Architect/Engineer's review is only for conformance with design intent. Architect's action stamp is self-explanatory and reads as follows:

"Submittals are not Contract Documents. Review of the Contractor's Submittals by CWS Architects (CWS) and its Consultants is for the limited purpose of checking for general conformance with the intent of the Contract Documents. Review is not conducted for the purpose of determining accuracy and completeness of other details such as dimensions, quantities, etc. Review does not constitute approval of assembly in which the submittal serves or imply approval of the contractor's means, methods, duties and coordination responsibilities. Approval does not authorize changes to Contract Sum or Contract Time.

The Contractor, in so providing CWS with the attached Submittal and upon accepting its return, represents and certifies that the Submittal conforms to the Contract Documents and acknowledges that CWS relies on said certification in reviewing the Submittal. Submittals that do not conform to the Contract Documents but have been represented by the Contractor to be in conformance shall be considered rejected by CWS regardless of markings below and shall be resubmitted as a Substitution Request or with a conforming Submittal.

- APPROVED – No Exceptions Taken
- APPROVED AS NOTED – Make Corrections
- REVISE AND RESUBMIT – Identify Changes Made
- NOT APPROVED – Rejected
- Reviewed by Consultant: _____

1.21 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within 15 days after date of Owner-Contractor Agreement for Architect/Engineer review.
- B. Submit revised schedules with each Application for Payment, identifying changes since previous version. Indicate estimated percentage of completion for each item of Work at each submission.

- C. Submit a horizontal bar chart with separate line for each major section of Work or operation, identifying first workday of each week.

1.22 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Owner-Contractor Agreement, submit list of major Products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.23 PROPOSED SUBCONTRACTOR/SUPPLIER LIST

- A. Within 15 days after date of Owner-Contractor Agreement, submit list of major subcontractors/suppliers proposed, with indication of trade/product type.

1.24 PRODUCT DATA

- A. Product Data for Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.
- B. Product Data for Information:
 - 1. Submitted for the Architect/Engineer's benefit as contract administrator or for the Owner.
- C. Product Data for Project Close-out:
 - 1. Submitted for the Owner's benefit during and after project completion.
- D. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Architect/Engineer.
- E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.

1.25 SHOP DRAWINGS

- A. Shop Drawings for Review:
 - 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
 - 2. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.
- B. Shop Drawings for Information:
 - 1. Submitted for the Architect/Engineer's benefit as contract administrator or for the Owner.
- C. Shop Drawings for Project Close-out:
 - 1. Submitted for the Owner's benefit during and after project completion.

- D. Submit the number of opaque reproductions which Contractor requires, plus three copies which will be retained by Architect/Engineer.

1.26 SAMPLES

- A. Samples for Review:

- 1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.

- B. Samples for Information:

- 1. Submitted for the Architect/Engineer's benefit as contract administrator or for the Owner.

- C. Samples for Selection:

- 1. Submitted to Architect/Engineer for aesthetic, color, or finish selection.
- 2. Submit samples of finishes from the full range of manufacturers' standard colors, in custom colors selected, textures, and patterns for Architect/Engineer selection.
- 3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.

- D. Submit samples to illustrate functional and aesthetic characteristics of the Product.

- E. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Architect/Engineer's selection.

1.27 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.28 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certifications by manufacturer to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.29 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.30 TOLERANCES

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- A. Monitor fabrication and installation tolerance control of installed Products over suppliers, manufacturers, Products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply fully with manufacturers' tolerances unless more stringent tolerances are specified.

1.31 REFERENCES

- A. Conform to reference standards by date of issue current as of date of Contract Documents.
- B. Should specified reference standard conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Reference Standards have the same force and effect as if bound herein and include publications of the following:
 - 1. American National Standards Institute (ANSI).
 - 2. American Concrete Institute (ACI).
 - 3. American Institute of Steel Construction (AISC).
 - 4. American Plywood Association (APA).
 - 5. American Society for Testing and Materials (ASTM).
 - 6. American Society of Civil Engineers (ASCE).
 - 7. American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE).
 - 8. American Society of Mechanical Engineers (ASME).
 - 9. Americans with Disabilities Act (ADA).
 - 10. American Water Works Association (AWWA).
 - 11. American Welding Society (AWS).
 - 12. Consumer Product Safety Commission (CSPC).
 - 13. Factory Mutual (FM).
 - 14. International Building Code (IBC).
 - 15. International Code Council (ICC).
 - 16. National Electric Manufacturers Association (NEMA).
 - 17. National Fire Protection Association (NFPA).
 - 18. Underwriters Laboratories, Inc. (UL).
 - 19. US Department of Commerce, National Bureau of Standards (NBS).
 - 20. Federal, State and local codes and regulations.

1.32 LABELING

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.

1.33 MOCK-UPS

- C. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- D. Accepted mock-ups are representative of quality required for the Work.

- E. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

1.34 TESTING AND INSPECTION LABORATORY SERVICES

- A. Contractor shall appoint and employ services of independent firm(s), approved by Owner and Architect, to perform testing and inspection, except for Special Inspections required by IBC 2003, which will be handled separately by the Owner.
- B. Independent firm(s) will perform tests, inspections, and other services as required.
- C. Cooperate fully with independent firm(s); furnish samples as requested. Notify independent firm(s) well in advance of when portions of the Work will be ready for testing and coordinate scheduling of all tests with independent firm(s) to avoid any delays. Provide unrestricted access to materials and assemblies to be tested, and provide incidental labor and facilities required to accomplish testing.
- D. The cost of any re-testing required because of non-conformance to specified requirements will be charged to Contractor.

1.35 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, to initiate instructions and conduct warranty inspections when necessary.
- B. Report observations and site decisions or instructions that are supplemental or contrary to manufacturers' written instructions.
- C. When specified in individual specification sections, have qualified manufacturer's or Product suppliers representative inspect installed Work and prepare a report listing any deficiencies. Distribute report to Architect/Engineer and Owner. Take corrective actions as recommended by inspector to cure any deficiencies and have the Work reinspected and a final report prepared and distributed.

1.36 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions and assumption of sole responsibility for outcome.
- B. Verify that utility services are available, of the correct characteristics, and in the correct location.

1.37 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.38 CORRELATION AND INTENT

- A. Contract Documents are complementary, and elements of the Work required by one shall be as binding as if required by all. The intent of the Documents is to include all items necessary for the proper execution and completion of the Work.
- B. Where discrepancies or conflicting requirements exist among the Contract Documents and/or applicable reference standards, the Contractor shall assume the greater quantity or quality level, normally the most costly. Refer conflicting requirements to the Architect/Engineer for interpretation before proceeding.

1.39 TEMPORARY ELECTRICITY

- A. Cost: Contractor will be allowed to connect to existing electrical services, but must arrange and pay for metering and power used in execution of the Work.
- B. Provide temporary electricity and power outlets for construction operations, connections, branch wiring, distribution boxes, and flexible power cords as required. Do not disrupt Owner's need for continuous service.

1.40 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain temporary lighting for construction operations.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Permanent building lighting may not be utilized during construction. Repair, clean, and replace lamps to achieve new condition at end of construction.

1.41 TEMPORARY HEAT

- A. Provide heating devices with temporary units and heat as needed to maintain specified conditions for construction operations.
- B. Pay cost of energy used.
- C. Provide and pay for operation as per manufacturers recommended procedures, maintenance, and regular replacement of filters and worn or consumed parts.
- D. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.42 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.43 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone and telephone facsimile service to field office at time of project mobilization. Allow Owner, Architect/Engineer and inspecting authorities incidental use.

1.44 TEMPORARY WATER SERVICE

- A. Contractor will be allowed to connect to existing water services, but must arrange for metering, maintain and pay for suitable quality water service required for construction operations.

1.45 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. New or existing building facilities may not be used.
- B. Maintain in clean and sanitary condition.

1.46 FIELD OFFICES AND SHEDS

- A. Office: Weather tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

1.47 ACCESS ROADS

- A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area as required.

- B. Maintain access for emergency personnel to construction site and building at all times.

1.48 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel.

1.49 PROGRESS CLEANING AND WASTE REMOVAL

- A. Collect and maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Recycle waste materials to the greatest extent possible.

1.50 PROJECT IDENTIFICATION

- A. Provide an 8 foot wide x 4 foot high project sign of exterior grade Luster Board, painted, to Architect/Engineer's design and colors. See sample sign in Specification Section 00 31 00.
- B. Erect on site at location established by Architect/Engineer prior to first requisition for payment and maintain sign until final completion.

1.51 FIRE PREVENTION FACILITIES

- A. Prohibit smoking within buildings under construction and demolition. Designate area on site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Fully cooperate with emergency personnel at all times.
- D. Standpipes: Install minimum one standpipe for use during construction before building reaches 40 feet (12 m) in height.
- E. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B; C UL rating.
 - 1. Provide one fire extinguisher at each stair on each floor of buildings under construction [and demolition].
 - 2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
 - 3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.52 BARRIERS AND FENCING

- A. Provide barriers and/or fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.
- B. Construction: Contractor's option, as allowed by authorities having jurisdiction.

1.53 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closures to exterior openings to permit acceptable working conditions and protection of the Work.

1.54 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Prohibit traffic or storage upon waterproofed or roofed surfaces.

1.55 SECURITY

- A. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Provide measures to protect Owner's personnel, tenants and the public from physical harm at all times.

1.56 WATER CONTROL

- A. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Provide erosion control in accordance with environmental regulations and approvals.

1.57 POLLUTION AND ENVIRONMENTAL CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Provide dust control, erosion and sediment controls, noise control, pest control and rodent control to allow for proper execution of the Work.

1.58 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials, prior to Substantial Completion review.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.59 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents.
- C. Provide interchangeable components of the same manufacture for components being replaced.
- D. Provide Products of the same type from the same manufacturer.

1.60 DELIVERY, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store, and protect Products in accordance with manufacturer's instructions.

1.61 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions (or equal clause): Submit a request for substitution for any manufacturer not named.

1.62 SUBSTITUTIONS

- A. Architect/Engineer will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement. .
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
- D. Conditions: Substitutions will be considered under the following conditions:
 - 1. Revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the intent of the Contract Documents.
 - 3. The specified product or construction method cannot be provided within the Contract Time, if not due to failure by the Contractor to pursue the work promptly.
 - 4. The specified product or construction method cannot receive approval by governing authorities, and the substitution can be approved.
 - 5. A substantial advantage is offered to the Owner in terms of cost, time or maintenance.
 - 6. The specified product or construction method is not compatible with other materials, and the substitution is compatible.
 - 7. The specified product or construction method cannot receive a required warranty, and the substitution can be warranted.
 - 8. The Contractor will bear the impact of additional cost or time needed to provide the substitution, including design services.
 - 9. The Contractor will be responsible for coordinating the substitution with other Work.

1.63 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Sum/Price, previous payments, and amount remaining due.

1.64 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Thoroughly clean interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces, wash and polish glass, reflective and smooth hard surfaces.
- C. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
- D. Replace filters of operating equipment.
- E. Replace lamps in light fixtures that have been used during construction.
- F. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.65 STARTING SYSTEMS

- A. Provide seven days notification prior to start-up of each item.
- B. Ensure that each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.66 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion. .
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

1.67 TESTING, ADJUSTING, AND BALANCING

- A. Contractor will appoint, employ, and pay for services of an independent firm to perform testing, adjusting, and balancing.
- B. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.
- C. Cooperate with independent firm; furnish assistance as requested.
- D. Re-testing required because of non-conformance to specified requirements will be charged to the Contractor.
- E. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.68 PROTECTING INSTALLED CONSTRUCTION

- A. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- B. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- C. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- D. Prohibit traffic from landscaped areas.
- E. Protect personal property of Owner and tenants.

1.69 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of Contract Documents to be utilized for record documents.
- B. Record actual revisions to the Work. Record information concurrent with construction progress.
- C. Specifications: Legibly mark and record at each Product section a description of actual Products installed.
- D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
- E. Submit original and two photocopies of record documents to Owner with claim for final Application for Payment.

1.70 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

- C. Internally subdivide the binder contents with permanent page dividers, logically organized, with tab titles clearly printed under reinforced laminated plastic tabs.

1.71 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed obtain receipt prior to final payment.

1.72 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Submit prior to final Application for Payment.

2 PART 2 PRODUCTS - Not Used.

3 PART 3 EXECUTION - Not Used.

...END OF SECTION 01 00 00

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT

1 PART 1 GENERAL

1.1 WASTE MANAGEMENT GOALS FOR THE PROJECT

- A. The Owner has established that this Project shall minimize the creation of construction and demolition waste on the job site. *[Contributing/actors include over-packaging, ordering errors, poor planning, improper storage, breakage, mishandling, and contamination.]* Recycle as many of the waste materials as economically feasible. Minimize waste sent to landfills.
- B. Diversion Goals: A minimum of 70 percent of total project waste shall be diverted from landfill. The following waste categories, at a minimum, shall be diverted from landfill:
1. Land-clearing debris.
 2. Clean dimensional wood, pallet wood.
 3. Plywood, OSB, and particleboard.
 4. Concrete.
 5. Bricks.
 6. Concrete masonry units.
 7. Asphaltic concrete.
 8. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - a. Paper.
 - b. Cardboard.
 - c. Boxes.
 - d. Plastic sheet and film.
 - e. Polystyrene packaging.
 - f. Wood crates.
 - g. Plastic pails.
 9. Asphalt roofmg shingles.
 10. Metals.
 11. Gypsum drywall (unpainted).
 12. Paint.
 13. Glass.
 14. Plastics.
 15. Carpet and pad.
 16. Beverage containers.
 17. Piping.
 18. Electrical conduit.
- C. Related Sections include the following:
1. Divisions 2 through 16 for packaging requirements for products in those Sections.

1.2 SUBMITTALS

- A. Waste Management Plan: Prior to any waste removal, the Contractor shall submit to the Owner a Waste Management Plan. The Plan shall contain the following:
1. Designation of the party who will implement the plan.

2. Analysis of the estimated job-site waste to be generated, including types and quantities.
 3. Proposed Alternatives to Landfilling: A list of each material planned to be salvaged or recycled during the course of the Project and the proposed destination of each material.
- B. Progress Reports: Submit monthly, and at end of job, a Waste Management Progress Report. The report shall contain the following information:
1. Project title, name of company completing report, and dates of period covered by the report
 2. Amount (in tons or cubic yards) of material and filled from the Project and identity of the landfill
 3. For each material recycled or salvaged from the Project, provide the following:
 - a. Amount (in tons or cubic yards).
 - b. Date(s) removed from the job site.
 - c. Receiving party.
 - d. Cost: Bin rental, hauling and facility fees.
 - e. What was done with the material.

1.3 PROJECT MEETINGS

- A. Waste Management plans and implementation shall be discussed at the following meetings:
1. Pre-bid meeting.
 2. Pre-construction meeting.
 3. Regular job-site meetings.

1.4 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

2 PART 2 PRODUCTS (Not Used)

3 PART 3 EXECUTION

3.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with Division 1 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
 1. Almighty Waste (207-782-4000) and division of ERRCO, Epping NH (603-679-2626).
 2. Recycler of construction and demolition materials
 3. Pike Industries in Augusta, ME (207-782-2411) will recycle asphalt paving.
 4. Cousineau Bark & Wood, Wilton, ME will chip clean dimensional lumber (without nails or paint).
 5. Boralex, Inc., Livermore Falls, ME will recycle OSB, plywood and particleboard (no pressure treated materials)
 6. Sandy River Waste, Route 2, Farmington, ME (207-778-3254) will recycle paper, cardboard, cans, bottles, some plastics.
 7. Grimm Industries, Topsham, ME (207-729-2191) will recycle metals.

- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.
 - 1. Comply with requirements in Division 2 Section "Exterior Plants" for use of chipped organic waste as organic mulch.
- C. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 2 Section "Exterior Plants" for use of clean sawdust as organic mulch.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Division 2 Section "Exterior Plants" for use of clean ground gypsum board as inorganic soil amendment.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

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- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

...END OF SECTION 01 74 19

Part II
Division 2
Sitework

SECTION 02 41 00

DEMOLITION

1 PART 1 GENERAL

1.1 DESCRIPTION:

A. Section Includes:

1. Demolition shall include, unless otherwise noted on Drawings, removal of existing objects or improvements, whether indicated on drawings or not, that would, in the opinion of the owner, prevent or interfere with progress or completion of proposed work.
2. Permits, fees and licenses shall be secured and paid for by Contractor, including disposal charges as required to ensure progress of work will proceed.
3. Work shall comply with requirements of governing authorities in demolition of existing pavement, curbs and gutters, drainage structures and utilities as may be required.
4. Demolition requires removal and disposal charges as required to ensure progress of work will proceed. Protect items designated to remain.
 - a. Building structures as indicated on Drawings or as required by Specifications. Including demolition of designated structures, foundations, slabs-on-grade, building components and fixtures, designated utilities (including disconnecting and capping).
 - b. Bituminous pavement, concrete curbing, concrete slab, brick walk, concrete ramp and adjacent landscape work to limits indicated on Drawings, or as required by Specifications.

1.2 SUBMITTALS:

- A. Shop Drawings and Schedule: Describe demolition, removal procedures, sequence and schedule.
- B. Design Data: Submit calculations for bracing, shoring, and underpinning to protect structures indicated to remain signed and sealed by professional engineer.
- C. Closeout Submittals - Project Record Documents: Record actual locations of capped utilities.

1.3 JOB CONDITIONS

- A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
- B. Owner assumes no responsibility for condition of structures to be demolished.
- C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. Variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.

- D. Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed. Storage or sale of removed items on site will not be permitted.

1.4 PROTECTIONS

A. Summary:

1. Ensure safe passage of persons around all areas of demolition.
2. Conduct operations to prevent damage to adjacent buildings, structures, other facilities, or injury to persons.
3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and of adjacent facilities to remain.
4. Promptly repair damages caused to adjacent facilities by demolition operations at no cost to Owner.
5. Maintain existing utilities indicated to remain, keep in service and protect against damage during demolition operations.
6. Prevent interruption of existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
7. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities.
8. Make arrangements, before initiating demolition, for relocating, disconnection, rerouting, abandoning, or similar action as may be required relative to utilities and other underground piping, to permit work to proceed without delay. Arrangements shall be made in accordance with regulations of authorities of utilities concerned, including by not restricting any other services not mentioned, such as overhead and underground power and telephone lines and equipment, gas piping, storm sewers, sanitary sewers, or water piping. Contractor shall not use water when it may create hazardous or objectionable conditions, such as ice, flooding and/or pollution.
9. Use water sprinkling and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level.
10. Comply with governing regulations pertaining to environmental protection.
11. Clean adjacent structures, streets and improvements of dust, dirt and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
12. Notify abutting property owners of demolition schedule in advance of demolition. Notify adjacent owners of work which may affect their property, potential noise, utility outage, or disruption prior to the start of Work. Coordinate with Owner's Representative.

2 PART 2 PRODUCTS

2.1 MATERIAL:

- A. Fill Material: Refer to Specifications Division 31 – Earthwork.

3 PART 3 EXECUTION

3.1 IMPLEMENTATION

- A. Permits - Perform all work in accordance with the demolition requirements of the applicable building code as adopted and, if applicable, amended by the authority having jurisdiction. Apply for, pay for and obtain required demolition permits.
- B. Examination
 - 1. Document condition of adjacent structures indicated to remain.
 - 2. Monitor buildings for movement during demolition operations. Notify Owner's Representative of measured movement.
- C. Preparation
 - 1. Call Local Utility Line Information service "Dig Safe" as per their notification requirements. Request underground utilities to be located and marked within and surrounding construction areas.
 - 2. Provide, erect, and maintain temporary barriers and security devices.
- D. Standards
 - 1. Conduct operations with minimum interference to public or private accessways.
 - 2. Maintain egress and access at all times. Do not close or obstruct roadways, sidewalks without permits.
 - 3. Cease operations immediately when adjacent structures appear to be in danger. Notify authority having jurisdiction and Owner's Representative.
 - 4. Disconnect, remove and cap designated utilities to a location acceptable to authority having jurisdiction and utility company. Identify utilities at termination of demolition. Record termination or capped location on Record Documents.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from the site all debris, rubbish and other materials resulting from demolition.
- B. Demolition debris removed from the site shall be disposed of at an approved licensed recycling or disposal facility in accordance with state regulations.
- C. No burning of any materials, debris or trash on-site will be allowed.
- D. Leave areas of work in clean condition.

...END OF SECTION 02 41 00

SECTION 02 41 16
SELECTIVE DEMOLITION

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Demolishing designated portions of structures.
 2. Demolishing designated portions of foundations.
 3. Demolishing designated portions of slabs-on-grade.
 4. Demolishing, disconnecting and capping designated utilities.
 5. Demolishing designated building components, equipment and fixtures.
 6. Removing designated items for reuse and Owner's retention.
 7. Protecting items designated to remain.
 8. Removing demolished materials from site.

1.2 SUBMITTALS

- A. Shop Drawings and Schedule: Describe demolition, removal procedures, sequence and schedule.
- B. Design Data: Submit calculations for bracing, shoring, and underpinning as may be required to protect portions of structures indicated to remain, signed and sealed by professional engineer.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of capped utilities.

2 PART 2 PRODUCTS

Not Used.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Document condition of adjacent portions of structures indicated to remain.
- B. Monitor buildings for movement during demolition operations. Notify Architect/Engineer of measured movement.

3.2 PREPARATION

- A. Call Local Utility Line Information service at not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Provide, erect, and maintain temporary barriers and security devices.
- C. Notify adjacent owners of work which may affect their property, potential noise, utility outage, or disruption prior to the start of Work. Coordinate with Owner.
- D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches (300 mm) of any stressing tendon. Notify Architect/Engineer seven days in advance of cutting post-tensioned concrete.
- E. Prevent movement or settlement of adjacent portions of structures. Provide bracing and shoring.
- F. Protect existing landscaping materials indicated to remain.
- G. Erect and maintain weatherproof airtight insulated closures for exterior openings.
- H. Erect and maintain temporary partitions to prevent spread of dust, odors and noise.
- I. Protect existing items indicated to remain.

3.3 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent building areas.
- B. Conduct operations with minimum interference to public or private accesses.
- C. Maintain protected egress and access at all times. Do not close or obstruct roadways sidewalks without permits.
- D. Cease operations immediately when adjacent portions of structures appear to be in danger. Notify authority having jurisdiction and Architect/Engineer.
- E. Conform to Asbestos 16-Hour Operations & Maintenance training requirements for OSHA Class III work, for OSHA Competent Person for Classes III and IV, and AHERA O&M.

3.4 BUILDING DEMOLITION

- A. Disconnect remove and cap designated utilities to property line, or point as designated by applicable utility authorities. Identify utilities at termination of demolition. Record termination or capped location on Record Documents.
- B. Demolish components indicated in orderly and careful manner.
- C. Remove foundations to minimum two feet below finished grade.

- D. Remove concrete slabs on grade.
- E. Backfill areas excavated, open pits and holes resulting from demolition with fill materials. Backfill and compact fill materials as specified in Section 31 20 00.
- F. Rough grade and compact areas affected by demolition to maintain site grades and contours.

3.5 SELECTIVE DEMOLITION

- A. Demolish and remove components in orderly and careful manner.
- B. Protect existing supporting structural members.

3.6 CLEAN UP

- A. Remove demolished materials from site as work progresses and dispose of in a legal manner. Recycle demolished materials to the greatest extent possible.
- B. Involve only professionals certified and/or licensed to perform removal/mitigation and disposal of any hazardous materials encountered.
- C. Leave areas of work in clean condition.

...END OF SECTION 02 41 16

Part II
Division 3
Concrete

SECTION 033000 – CAST -IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:
 - 1. The extent of cast-in-place concrete work is shown on drawings and includes (but not by way of limitation) formwork, reinforcing, cast-in-place concrete, accessories, finishing, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.
 - 2. Equipment support pads indicated on mechanical drawings to be installed by the Building Contractor.
 - 3. Cast-in-place retaining walls, exterior slabs on grade and other concrete shown on site drawings.

1.03 RELATED WORK:

- A. Metal Fabrications: Section 055000
 - 1. Expansion Anchors - Section 051200
 - 2. Embedded Items - Section 055000
- B. Anchor Bolts: Section 051200
- C. Joint Sealants: Division 7
- D. Underslab Vapor Retarders/Wall Waterproofing: Division 7

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI "Manual of Concrete Practice".
 2. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
 4. ACI 212.3R "Chemical Admixtures for Concrete."
 5. ACI 301 "Specifications for Structural Concrete for Buildings."
 6. ACI 302.1R "Guide for Concrete Floor and Slab Construction."
 7. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 8. ACI 304.2R "Placing Concrete by Pumping Methods."
 9. ACI 306 R "Cold Weather Concreting."
 10. ACI 308 "Standard Practice for Curing Concrete."
 11. ACI 309R "Guide for Consolidation of Concrete."
 12. ACI 315 "ACI Detailing Manual."
 13. ACI 318 "Building Code Requirements for Reinforced Concrete."
 14. ACI 347R "Guide to Formwork for Concrete."
 15. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."
 16. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 17. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working days.
- D. Incomplete submittals will not be reviewed.

- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.
 - 2. Patching products.
 - 3. Non-shrink grout.
 - 4. Curing compounds, where applicable.
 - 5. Admixtures.
 - 6. Expansion/Adhesive Anchors.
- H. Shop Drawings:
 - 1. Shop Drawing Preparation: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings is prohibited. Shop drawings created from reproduced Construction Documents will be returned without review. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete elements. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within forms or slabs.
 - a. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. **Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.**
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. **Incomplete submittals will not be reviewed.**

- I. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Include the calculation of average strength and standard deviation. Proportioning by water cement ratio method will not be permitted.
- J. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.
- K. Curing Methods: Submit documentation of curing methods to be used for review. Account for anticipated project temperature ranges and conditions in curing methods.
- L. Test Reports: Test reports shall be submitted to the Owner, Architect and Engineer within 48 hour after completion of each test.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
 - 1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.
- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use plastic, wire bar type supports or concrete block supports complying with CRSI recommendations, unless otherwise specified. Wood, clay brick and other unspecified devices are not acceptable.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS:

- A. Single-Source Supplier: Ready-mix concrete shall be from one supplier unless specific written approval is received from the Structural Engineer.
- B. Portland Cement: ASTM C 150, Type I or Type II, unless otherwise approved. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- C. Normal Weight Aggregates: ASTM C 33. Provide from a single source for exposed concrete. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, or ochre which can cause stains on exposed concrete surfaces.
- D. Light Weight Aggregates: ASTM C 330.
- E. Water: Potable.
- F. Air-Entraining Admixture: ASTM C 260.
- G. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.
- H. Fiber reinforcement shall be Type III Synthetic Virgin Homopolymer Polypropylene Fibers conforming to ASTM C1116. Fiber reinforcing shall be added and distributed prior to incorporation of Super Plasticizer.
- I. Normal range water reducing admixture: ASTM C 494 Type A containing no calcium chloride.
- J. Accelerating Admixture: ASTM C 494, Type C or E.
- K. Blast Furnace Slag: ASTM C989
- L. Fly Ash: ASTM C618, Class C or F
- M. Calcium Chloride is not permitted.

2.04 RELATED MATERIALS:

- A. Underslab Vapor Retarder: Provide vapor retarder over prepared sub base. Refer to architectural drawings, geotechnical report and/or division 7 specifications for additional requirements and vapor retarder location.
- B. Non-Shrink Cement-based Grout: Provide grout consisting of pre-measured, prepackaged materials supplied by the manufacturer requiring only the addition of water. Manufacturer's instructions must be printed on the outside of each bag.
 1. Non-shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No shrinkage (0.0%) and a maximum of 0.3% expansion in the hardened state when tested in accordance with CRD-C-621.

2. Compressive strength: A minimum 28 day compressive strength of 5000 psi when tested in accordance with ASTM C-109.
 3. Setting time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.
 4. Composition: Shall not contain metallic particles or expansive cement.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- E. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Curing compound shall not impair bonding of any material, including floor finishes, to be applied directly to the concrete. Demonstrate the non-impairment prior to use.
- F. Preformed Expansion Joint Formers:
1. Bituminous Fiber Type, ASTM D 1751.
 2. Felt Void, Poly-Styrene Cap with removable top as manufactured by SUPERIOR.
- G. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type).
- H. Waterstops shall be Bentonite/Butyl Rubberbased product. Use in conjunction with manufacturer's approved mastic. Acceptable products include:
1. "Waterstop Rx," by American Colloid Co.
 2. "Adeka Ultra Seal MC-2010," by Asahi Denka Koeoyo, Kik MN.

2.05 PROPORTIONING AND DESIGN OF MIXES:

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 318. Use material, including all admixtures, proposed for use on the project. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.
- B. Submit written reports to Architect of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been reviewed by Architect.
- C. Proportion design mixes to provide concrete with the following properties:

1. Footings and foundation walls
 - a. Strength: 3000 psi at 28 days.
 - b. Aggregate: 3/4"
 - c. W/C Ratio: 0.54 maximum
 - d. Entrained Air: 6% +/- 1.5%
 - e. Slump: 4" maximum
 2. Interior Slabs on grade:
 - a. Strength: 3000 psi at 28 days
 - b. Aggregate: 3/4" minimum, 1 1/2" maximum.
 - c. W/C Ratio: 0.54 maximum
 - d. Entrapped Air only (no entrainment), 2.5% +/- 1%
 - e. Slump: 4" maximum
 3. Exterior Slabs and all other exposed Site Concrete not specified elsewhere:
 - a. Strength: 4500 psi at 28 days
 - b. Aggregate: 3/4"
 - c. W/C Ratio: 0.45 maximum
 - d. Entrained Air: 6% +/- 1.5%
 - e. Slump: 4" maximum
 4. Add air entraining admixture at manufacturers prescribed rate to result in concrete at point of placement having the above noted air contents.
 5. Additional slump may be achieved by the addition of a mid-range or high-range water reducing admixture. Maximum slump after the addition of admixture shall be 6 or 8 inches for mid-range or high range water reducing admixtures, respectively.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor, when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Structural Engineer before using in work.
1. Water may be added at the project only if the maximum specified slump and design mix maximum water/cement ratio is not exceeded.

2. Additional dosages of superplasticizer should be used when delays occur and required slump has not been maintained. A maximum of two additional dosages will be permitted per ACI 212.3R recommendations.

2.06 CONCRETE MIXING:

- A. Job-Site Mixing will not be permitted.
- B. Ready-Mix Concrete: Must comply with the requirements of ASTM C 94, and as herein specified. Provide batch ticket for each batch discharged and used in work, indicating project name, mix type, mix time and quantity.
 1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required by Structural Engineer.
 2. When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 1 1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMS:

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.
- C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
- D. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, dovetail slots, reglets, recesses, and the like to prevent swelling and for easy removal.
- F. Provide temporary openings where interior area of formwork is inaccessible for clean out, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

- G. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- H. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
 - 1. Unless otherwise indicated, provide ties for concrete surfaces to be exposed to view in the final condition so portion remaining within concrete after removal is 1" (minimum) inside concrete.
 - 2. Form ties shall not leave holes larger than 1" diameter in concrete surface. Repair holes left by form ties after removal of formwork.
- I. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- J. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT:

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Subgrade tolerance shall conform to a tolerance of $+0/-1\ 1/2"$. Base tolerance (fine grading) for slabs shall conform to a tolerance of $+0"/-3/4"$ in. Confirm compliance of above tolerances with surveyed measurements taken at 20 ft. intervals in each direction.
 - 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 - 3. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
 - 4. Place reinforcement to obtain specified coverage for concrete protection within tolerances of ACI-318. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - 5. Install welded wire fabric in flat sheets in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS:

- A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect. Submit plan indicating proposed location of construction joints for review prior to beginning work.
 - 1. Provide keyways at least 1-1/2" deep in construction joints in walls, and slabs; bulkheads reviewed by the Engineer, designed for this purpose may be used for slabs.
 - 2. Roughened surfaces shall be used between walls and footings unless shown otherwise on the drawings. The footing surface shall be roughened to at least an amplitude of 1/4" for the width of the wall before placing the wall concrete.
 - 3. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
 - 4. Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required, the early-entry dry-cut process shall be used. Refer to ACI 302, section 8.3.12.

3.04 INSTALLATION OF EMBEDDED ITEMS:

- A. General: Set and build into work anchorage devices and other embedded items (including reinforcement and reinforcing dowels) required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Notify other trades to permit installation of their work. Templates to be utilized for setting of anchorage devices shall be constructed in a manner to allow mechanical consolidation of concrete. “Wet Setting” of embedded items into plastic concrete will not be permitted without special permission from the Engineer.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.
- C. Provide PVC sleeves where pipes and/or conduit pass through exterior concrete or slabs. Sleeves or penetrations shall not be placed through footings, piers, pedestals, drop caps, columns or pilasters unless specifically noted.
- D. Tolerances: Tolerances for Anchor Bolts/Rods, other embedded items and bearing surfaces shall meet the requirement set forth in the latest edition of the American Institute of Steel Construction “Code of Standard Practice for Steel Buildings and Bridges,” and ACI 117. The more stringent criteria from these documents shall apply.

3.05 INSTALLATION OF GROUT

- A. Place grout for base plates in accordance with manufacturer's recommendations.
- B. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.

- C. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

3.06 PREPARATION OF FORM SURFACES:

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating material manufacturer's directions. Do not allow excess form coating to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.07 CONCRETE PLACEMENT:

- A. Preplacement Review: Footing bottoms are subject to review by the Geotechnical Engineer. Reinforcement and all concrete preparation work shall be subject to review by the Structural Engineer. Verify that reinforcing, ducts, anchors, seats, plates and other items cast into concrete are placed and securely held. Notify Engineer/Project Special Inspector 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement. Be sure that all debris and foreign matter is removed from forms.
- B. Concrete shall be placed in the presence of an approved testing agency.
- C. General: Comply with ACI 304, and as herein specified.
 - 1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
 - 2. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
 - 3. Conveying equipment shall be approved and shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:
 - a. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

- b. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long, and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.
 - c. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete.
 - d. Concrete shall not be conveyed through pipe made of aluminum alloy. Standby equipment shall be provided on the site.
 - e. Tined rakes are prohibited as a means of conveying fiber reinforced concrete.
4. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- 1. Consolidate placed concrete by mechanical vibrating equipment. Hand-spading, rodding or tamping as the sole means for the consolidation of concrete will only be permitted with special permission from the Engineer. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
 - 2. Use vibrators designed to operate with vibratory equipment submerged in concrete, maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine, generally at points 18 inches maximum apart. Place vibrators to rapidly penetrate placed layer and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion maintain the duration of vibration for the time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operation.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- 1. Consolidate concrete using internal vibrators during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Do not sprinkle water on plastic surface.
 3. Maintain reinforcing in proper position during concrete placement operations.
 4. Slab thicknesses indicated on the drawings are minimums. Provide sufficient concrete to account for structure deflection, subgrade fluctuations, and to obtain the specified slab elevation at the flatness and levelness indicated here within.
 5. Finish: See "Monolithic Slab Finishes" in this specification for slab finish requirements.
- F. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
1. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27degrees C) at point of placement.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
 4. All temporary heat, form insulation, insulated blankets, coverings, hay or other equipment and materials necessary to protect the concrete work from physical damage caused by frost , freezing action, or low temperature shall be provided prior to start of placing operations.
 5. When the air temperature has fallen to or is expected to fall below 40 degrees F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 and 70 degrees F.
- G. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Wet forms thoroughly before placing concrete.
 4. Do not use retarding admixtures without the written acceptance by the Architect.

3.08 FINISH OF FORMED SURFACES:

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This concrete surface shall have texture imparted by form facing material, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 in. in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp-proofing, painting or other similar system. This as-cast concrete surface shall be obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
- C. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment. Combine one part Portland cement to 1-1/2 parts fine sand by volume and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.
 - 1. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- D. Related Unformed Surfaces: At tops of walls and grade beams, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off, smooth and finish with a texture matching adjacent unformed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FLOOR FLATNESS AND LEVELNESS

- A. Floor flatness/levelness tolerances: Tolerances for various floor uses shall conform to the requirements set forth in ACI 117 and ACI 302 for "flat" floor profile.
 - 1. Minimum Test Area Flatness/Levelness: F_F30/F_L20
 - 2. Minimum Local F Number: F_F15/F_L10
- B. Levelness criteria shall be applied to slabs-on-grade only.
- C. Contractor shall measure floor finish within 72 hours after slab finishing and provide corrective measures for finishes not within tolerance. Corrective procedures shall be reviewed by the Architect prior to implementation.

3.10 MONOLITHIC SLAB FINISHES:

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds, and as otherwise indicated.

1. After placing slabs, plane surface to a tolerance not exceeding 1/2 in. in 10 ft. when tested with a 10-ft. straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.
- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.
- D. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
- E. Slab finishes for floor coverings not indicated or exposed to view in the final condition shall be coordinated with the Architect prior to slab placement.
- F. Slab Joints: Where indicated, sawn slab contraction joints shall be "soft cut", immediately after concrete surface is firm enough not to be torn or damaged by the blade.

3.11 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 308 as herein specified.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified unless noted otherwise. Curing shall commence as soon as concrete surfaces are sufficiently hard as to withstand surface damage. Slabs-on-grade shall be cured by moist curing methods.
- C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- D. Protection From Mechanical Injury: During the curing period and duration of construction, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.12 REMOVAL OF FORMS:

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as joints, slabs and other structural elements, may not be removed in fewer than 14 days or until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and support.

3.13 REUSE OF FORMS:

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and latency, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

- A. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.15 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Architect.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with approved bonding agent. Place patching mortar after bonding compound has dried.
 - 2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, form tie holes, cracks, spalls, air bubbles, honeycomb, rock pockets, fins, and other projections on surface and stains and other discolorations that cannot be removed by cleaning.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. Testing Agency/Project Special Inspector shall verify reinforcement, including foundation reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify WWF or reinforcement has been chair/placed with proper clearances.
- B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Concrete testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.
- C. Concrete shall be sampled and tested for quality control during placement. Quality control testing shall include the following, unless otherwise directed by the Architect.
- D. See Submittals section for report requirements.
- E. Sampling Fresh Concrete: ASTM C 172.
 - 1. Slump: ASTM C143; one test for each set of compressive strength test specimens. Sample shall be taken from middle third of the load per ASTM C172. A slump test must be run prior to the incorporation of the CFP fibers per recommendations of ACI 544. A slump test must be run prior to and following the addition of a water reducer (superplasticizer) per recommendations of ACI 301.
 - 2. Air Content: ASTM C231 "Pressure method for normal weight concrete." one test for each set of compressive strength specimens measured at point of discharge.
 - 3. Concrete Temperature: Per ASTM C-1064; one test each time a set of compression test specimens are made.
 - 4. Compression Test Specimen: ASTM C31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - a. An insulated Cure Box for specimen curing shall be supplied by Testing Agency for initial curing as defined in ACI C31.
 - b. Means of heating or cooling the Cure Box shall be provided by the Inspection Agency if required in order to maintain a temperature between 60 and 80 degrees F. Contractor shall provide an electrical source to the Testing Agency when required for temperature control.
 - c. A maximum-minimum thermometer shall be provided in the Cure Box by the Testing Agency to record the temperature range of the Cure Box during specimen curing. The Testing Agency shall record the maximum/minimum temperature of the Cure Box when transferring the specimens to the laboratory.

- d. Test Specimens shall be moist cured.
 - e. Refer to ACI C31 for additional requirements for Test Specimens.
5. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 4,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days, 1 specimen retained in reserve for later testing if required.
6. Pumped concrete shall be tested at point of discharge per ACI 301.
- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

Part II
Division 4
Masonry

SECTION 04 01 00
MAINTENANCE OF MASONRY

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes water and chemical cleaning of brick masonry surfaces; replacement of brick units; repointing mortar joints; and repair of damaged masonry.
- B. Related Sections:
 - 1. Section 04 05 16 - Masonry Grouting.
 - 2. Section 07 90 00 - Joint Protection.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
 - 3. National Park Service, Technical Preservation Services, Preservation Brief 1 – Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings.
 - 4. National Park Service, Technical Preservation Services, Preservation Brief – Repointing Mortar Joints in Historic Masonry Buildings.

1.3 SUBMITTALS

- A. Section 01 00 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on cleaning compounds, cleaning solutions, and mortar mixes.
- C. Samples: Submit four samples of face brick units to illustrate color, texture, and extremes of color range to match existing.
- D. Manufacturer's Installation Instructions: Submit installation procedures for products selected for use, manufacturer's installation instructions and perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1 requirements.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 MOCKUP

- A. Section 01 00 00 - Quality Requirements: Mockup requirements.
- B. Restore and repoint a masonry wall, 8 feet long by 6 feet high, including mortar and accessories, wall openings, flashings.
- C. Clean a wall panel, 10 x 10 ft to determine extent of cleaning, cleaning methods and cleaning products.
- D. Repeat, using different cleaning methods up to three different panels, until acceptable.
- E. Locate where directed by Architect/Engineer.
- F. Acceptable panel illustrating results of restoration and cleaning will become standard for work of this section.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 00 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 00 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver masonry neatly stacked and tied on pallets. Store clear of ground with adequate waterproof covering.
- C. Store restoration cleaner materials in manufacturer's packaging.
- D. Store mortar ingredients in manufacturer's packaging, or when delivered loose, with adequate weatherproof covering.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 00 00 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F (4 degrees C).

- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F (38 degrees C) or ambient temperature is greater than 90 degrees F (32 degrees C) with wind velocity greater than 8 mph (13 km/h).

1.10 SEQUENCING

- A. Section 01 00 00 - Summary: Work sequence.
- B. Perform repointing before cleaning masonry surfaces.

2 PART 2 PRODUCTS

2.1 MASONRY RESTORATION AND CLEANING

- A. Manufacturers:
 - 1. Diedrich Chemicals Restoration Technology; 101 Masonry Restorer
 - 2. ProSoCo Inc; Sure Klean Restoration Cleaner.
 - 3. Substitutions: Not Permitted.

2.2 COMPONENTS

- A. Cleaning Agent: Acid solution type.
- B. Mortar and Grout Materials: Conform to requirements of Section 04 05 16, and TPS Preservation Brief 2. Conduct an analysis of existing mortar and match characteristics in conjunction with specified mortar mixing components in formulating new pointing mortar.
- C. Face Brick: ASTM C216, Type FBS, Grade MW. At brick veneer infill or replacement locations (if and where required), if reclaimed bricks are not available, submit a brick unit product that matches as closely as available existing brick unit color, size, shape and face texture for review and approval of architect.
- D. Lead Flashing: Provide #4, 1.73 mm rolled lead sheet flashing at head of all existing horizontal brick surfaces at each arched opening and over existing mortar washes on brick sills at Shailer addition, set into riglet cut into the mortar at the head of each horizontal surface, hammered to fit contour of surface and neatly trimmed at edges.
- E. Galvanized Steel Angle Lintels: Remove existing steel lintels and provide new G90 galvanized steel angles (see Structural drawings) at existing window head locations on the Shailer addition.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 00 00 - Administrative Requirements: Coordination and project conditions.

- B. Verify surfaces to be cleaned or restored are ready for work of this section.

3.2 PREPARATION

- A. Protect elements surrounding work of this section from damage or disfiguration.
- B. Immediately remove stains, efflorescence, or other excess resulting from work of this section.
- C. Protect roof membrane and flashings from damage.
- D. Carefully remove and store fixtures, fittings, finishing hardware, and accessories.
- E. Close off, seal, mask, and protect landscaping, materials, and surfaces not receiving work of this section to protect from damage.
- F. Construct dust proof and weatherproof partitions to close off occupied areas.

3.3 INSTALLATION

A. Rebuilding:

1. Cut out damaged and deteriorated masonry with care in manner to prevent damage to adjacent remaining materials.
2. Support structure in advance of cutting out units to maintain stability of remaining materials.
3. Cut away loose or unsound adjoining masonry as directed by Architect/Engineer to provide firm and solid bearing for new work.
4. Build in new and reclaimed units following procedures for new work specified in Section 04 05 16 and Section 04 22 00.
5. Mortar Mix: Colored and proportioned to match existing work. [
6. Ensure anchors, ties, reinforcing, and flashings are correctly located and built in.
7. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in openings, accessories and fittings.

B. Repointing:

1. Cut out loose or disintegrated mortar in joints to minimum depth equal to 2 ½ times the joint width or until sound mortar is reached.
2. Utilize hand tools, or power tools only after test cuts determine no damage to masonry units results.
3. Do not damage masonry units.
4. When cutting is complete, remove dust and loose material with water jet.
5. Premoisten joint and apply mortar specified in Section 04 05 03. Pack tightly in maximum ¼ inch layers allowing for previous application to fully cure before placing next application.
6. Form smooth, compact concave joint to match existing.
7. Moist cure for 72 hours.

C. Cleaning New Masonry:

1. Verify mortar is fully set and cured.

2. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
3. Use acid solution mixed with water. Apply acid solution and scrub brick masonry with stiff fiber brushes. Do not scrub mortar joints.
4. Protect area below cleaning operation and keep brick type masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.
5. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.

D. Restoration Cleaning:

1. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.
2. Spray coat brick type masonry with acid type restoration cleaner, mixed into solution identical to solution required for sample area.
3. Provide second application when required by preliminary test of sample area.
4. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.
5. Rinse from bottom up with potable water applied at 400 psi and at rate of 4 gal/min.

3.4 CLEANING

- A. Section 01 00 00 - Execution and Closeout Requirements: Final cleaning.
- B. As work proceeds and on completion, remove excess mortar, smears, and droppings.
- C. Clean surrounding surfaces.

3.5 SCHEDULE OF MAINTENANCE OF MASONRY

- A. Inspect all existing conditions to determine scope of required work.
- B. Provide the following maintenance scopes:
 1. Complete restoration cleaning, flashing and re-pointing of all existing exterior masonry surfaces.
 2. Complete restoration cleaning and resealing of existing brownstone surfaces.
 3. Complete restoration cleaning and resealing of existing granite surfaces.
 4. Complete replacement of existing steel lintels with new at Shailer addition (see Structural plans).
 5. Complete structural repairs of existing interior structural components (see Structural plans).

...END OF SECTION 04 01 00

SECTION 04 05 16

MASONRY GROUTING

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes mortar and grout for masonry.

1.2 SUBMITTALS

- A. Samples: Submit two samples of mortar, illustrating mortar color and color range.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with MSJC Code (ACI 530/ASCE, 5/TMS 402) and MSJC Specification (ACI 530.1/ASCE, 6/TMS 602).

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Hot and Cold Weather Requirements: MSJC Specification.

2 PART 2 PRODUCTS

2.1 MORTAR AND MASONRY GROUT

- A. Manufacturers:
 - 1. Blue Circle Cement
 - 2. Citadel Cement
 - 3. CTS Cement Manufacturing Co.
 - 4. Lehigh Portland Cement
 - 5. Medusa Cement Co.

2.2 COMPONENTS

- A. Portland Cement: ASTM C150, Type I gray color.
- B. Mortar Aggregate: ASTM C144, standard masonry type.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Color: Mineral oxide pigment color as selected.
- E. Grout Aggregate: ASTM C404, fine and coarse.
- F. Water: Clean and potable.
- G. Bonding Agent: Latex type.

2.3 MIXES

A. Mortar Mixes:

1. Mortar for Structural Masonry: ASTM C270, Type M using the Performance Specification.
2. Mortar for Non-Structural Masonry: ASTM C270, Type S using the Performance Specification.
3. Pointing Mortar: ASTM C270, modified Type N, using the Performance Specification.
 - a. For pointing of historic masonry, comply with requirements of National Park Service, Technical Preservation Services – Preservation Brief 2 (see Specification Section 00 30 00).
 - b. Modified Type N Pointing Mortar: 1 part Portland cement, 1¼ parts hydrated lime, and 6¾ parts graded (80 mesh) aggregate, proportioned by volume
 - c. Stain Resistant Additives: Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.
 - d. Match color of original mortar in existing masonry by a combination of dye and crushed/ground brick additives that will act as a natural “pozzolan” effect to strengthen the mortar.

B. Mortar Mixing:

1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
2. Add mortar color and admixtures.
3. Do not use anti-freeze compounds to lower the freezing point of mortar.

C. Grout Mixes:

1. Bond Beams: 2500 psi strength at 28 days; 8 inches slump; mixed in accordance with ASTM C476 Fine grout.

D. Grout Mixing:

1. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476.
2. Do not use anti-freeze compounds to lower the freezing point of grout.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.

3.2 INSTALLATION

- A. Install mortar and grout in accordance with MSJC Specification.
- B. For pointing of historic masonry, comply with requirements of USDI National Park Service Preservation Brief 2.

3.3 FIELD QUALITY CONTROL

- A. Test mortar and grout in accordance with Section 01 00 00.
- B. Testing of Mortar Mix: In accordance with ASTM C780.
- C. Testing of Grout Mix: In accordance with ASTM C1019.

3.4 SCHEDULES

- A. Exterior Brick Wall: Brick masonry with modified Type N mortar with modified Type N pointing mortar.
- B. Exterior Pointing: Refer to pointing procedures in Specification Section 04 01 00 Masonry Grouting.
- C. Interior Bearing Walls: Concrete masonry units with Type M mortar.

...END OF SECTION 04 05 16

SECTION 04 20 00
CONCRETE UNIT MASONRY

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes face brick, concrete masonry units and reinforcement, anchorage, and accessories.
- B. Allowances: Not used.

1.2 SUBMITTALS

- A. Product Data: Submit face brick masonry units and fabricated wire reinforcement, wall ties, anchors and other accessories.
- B. Samples: Submit four samples of face brick units to illustrate color, texture and extremes of color range.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with MSJC Code (ACI 530/ASCE 5/TMS 402) and MSJC Specification (ACI 530.1/ASCE 6/TMS 602).
- B. Maintain one copy of each document on site.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Hot and Cold Weather Requirements: MSJC Specification.

2 PART 2 PRODUCTS

2.1 UNIT MASONRY ASSEMBLIES

- A. Manufacturers: Clay Brick
 - 1. Acme Brick Co.
 - 2. The Belden Brick Co.
 - 3. Canada Brick
 - 4. Elgin Butler Brick Co.
 - 5. Endicott Clay Products Co.
 - 6. General Shale Brick
 - 7. Southern Brick
 - 8. Substitutions: Permitted.
- B. Manufacturers: Concrete Masonry Units

1. Genest Concrete Works, Inc.
2. Gagne and Son Concrete Block, Inc.
3. Trenwyth Industries, Inc.
4. Substitutions: Permitted.

2.2 COMPONENTS

- A. Face Brick: ASTM C216, Type FBS, Grade SW; Danville Matte narrow flashed range.
- C. Brick Size and Shape: Nominal size of 8x4x2-2/3 inches. Furnish special units for corners, lintels, bullnosed corners.
- D. Hollow Load Bearing Concrete Masonry Units: ASTM C90, Type I - Moisture Controlled; normal weight.
- E. Solid Load-Bearing Concrete Masonry Units: ASTM C90, Type I - Moisture Controlled; normal weight.
- F. Hollow, Solid Non-Load Bearing Concrete Masonry Units: ASTM C129, Type I - Moisture Controlled; normal weight.
- G. Concrete Brick Units: same Grade, Type, and Weight as block units.
- H. Textured Concrete Masonry Units: ASTM C90, type 1 – Moisture Controlled, normal weight, with integral color, shot textured face.
 1. Pierra-Tex units as manufactured by Genest Concrete, PO Box 151, Sanford, ME 04073, or equal.
- I. Concrete Masonry Unit Size and Shape: Nominal modular size of 8x16x8 inches, or 8x16x4 inches, as indicated. Furnish special units for 90 degree corners, bond beams, lintels, and bullnosed corners.

2.3 ACCESSORIES

- A. Single Wythe Joint Reinforcement: Truss type; ASTM A 580 stainless steel wire, 3/16 inch side rods with 9 ga. cross ties.
 1. Hohmann & Barnard "Lox-All Truss-Mesh", or equal.
- B. Multiple Wythe Joint Reinforcement: Truss type; with moisture drip; adjustable type, ASTM A 580 stainless steel wire, 3/16 inch side rods with 9 ga. cross ties.
 1. Hohmann & Barnard "Cavity Truss Twin-Mesh", or equal.
- C. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, galvanized finish at exterior walls, uncoated finish at interior construction.
- D. Strap Anchors: bent steel shape, 8x2 inch size x 1/8 inch thick, hot dip galvanized to ASTM A153/A153M B2 finish.

- E. Wall Ties: Formed stainless steel wire, triangular shape, 3/16" diameter, adjustable, with 14 gage sheet metal anchor section with spacer legs, ASTM A 167 – AISI Type 304 Stainless Steel.
 - 1. Hohmann & Barnard "X-Seal Anchor", or equal.
- F. Mortar and Grout: As specified in Section 04 05 16.
- G. Copper/Kraft Paper Flashings: 5 oz/sq ft rolled sheet copper bonded to fiber reinforced asphalt treated Kraft paper.
- H. Lead Coated Copper Flashings: 16 oz lead coated copper, hemmed edge.
- J. Lap Sealant: Butyl type as specified in Section 07 90 00.
- K. Preformed Control Joints Neoprene material. Furnish with corner and tee accessories, cement fused joints.
- L. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding.
- M. Building Paper: ASTM D226, No. 30 asphalt saturated felt.
- N. Weeps: Preformed polypropylene 'maze' cells, hollow.
 - 1. Hohmann & Barnard "Quadro-Vent", or equal.
- O. Cavity Protection: Preformed HDPE or nylon mesh, 90 % open to allow passage of water and prevent mortar clogging of cavity.
 - 1. Hohmann & Barnard "Mortar Net", or equal.
- P. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials, recommended by masonry unit manufacturer.
 - 1. PROSOCO "Sure-Klean Restoration Cleaner", or equal.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

- A. Coordinate placement of anchors supplied by other sections.

3.3 INSTALLATION

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

- B. Coursing of Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

- C. Coursing of Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

- D. Cut mortar joints flush where ceramic or quarry wall tile is scheduled, cement parging is required, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, or bituminous dampproofing is applied.

- E. Placing and Bonding:
 - 1. Isolate masonry partitions from vertical structural framing members with movement joint as indicated on Drawings.
 - 2. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.

- F. Weeps and Vents: Install weeps and vents in outer wythe at 24 inches oc horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls.

- G. Cavity Wall: Do not permit mortar to drop or accumulate into cavity air space or to plug weep holes. Build inner wythe ahead of outer wythe to receive cavity insulation air/vapor barrier adhesive.

- H. Joint Reinforcement and Anchorage - Single Wythe Masonry:
 - 1. Install horizontal joint reinforcement 16 inches oc. Place joint reinforcement continuous in first and second joint below top of walls.
 - 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

- I. Joint Reinforcement and Anchorage - Masonry Veneer:
 - 1. Install horizontal joint reinforcement 16 inches oc vertically. Place joint reinforcement continuous in first and second joint below top of walls.
 - 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 - 3. Masonry Backing: Embed wall ties for bonding veneer at maximum 16 inches oc vertically and 24 inches oc horizontally.
 - 4. Stud Framed Backing: Secure wall ties and embed into masonry veneer at maximum 24 inches oc horizontally and 16 inches oc vertically at interior zones, and 16 inches horizontally and 16 inches vertically at corner zones, as indicated on structural drawings..

- J. Joint Reinforcement and Anchorages - Multiple Wythe Unit Masonry:

1. Install horizontal joint reinforcement 16 inches oc. Place joint reinforcement continuous in first and second joint below top of walls.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

K. Masonry Flashings:

1. Extend flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, at bottom of walls and turn down on outside face to form drip.
2. Turn flashing up minimum 8 inches and bed into mortar joint of masonry, seal to sheathing over wood framed back-up.
3. Lap end joints and seal watertight.
4. Turn flashing, fold, and seal at corners, bends, and interruptions.

L. Lintels:

1. Install loose steel or masonry lintels over openings as indicated.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Maintain minimum 8 inch bearing on each side of opening.

M. Grouted Components:

1. Reinforce bond beam and pilasters as detailed.
2. Support and secure reinforcing bars from displacement.
3. Place and consolidate grout fill without displacing reinforcing.
4. At bearing locations, fill masonry cores with grout for minimum 12 inches both sides of opening.

N. Control and Expansion Joints:

1. Do not continue horizontal joint reinforcement through control and expansion joints.
2. Install preformed control joint device in continuous lengths. Seal butt and corner joints.
3. Size control joint in accordance with Section 07900 for sealant performance.
4. Form expansion joint as detailed.

O. Built-In Work:

1. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, anchor bolts, plates and other items to be built in the work furnished by other sections.
2. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

Q. Cutting And Fitting:

1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.

R. Parging:

1. Dampen masonry walls prior to parging.
2. Parge masonry walls in two uniform coats of mortar to total thickness of 3/4 inch.

S. CLEANING

1. Remove excess mortar and mortar smears as work progresses.
2. Clean soiled surfaces with cleaning solution.

T. TOLERANCES

1. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
2. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

...END OF SECTION 04 22 00

Part II
Division 5

Metals

SECTION 051200 – STRUCTURAL STEEL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.
- B. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

1.03 RELATED WORK

- 1. Section 055000 - Metal Fabrications

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with latest provisions of the following, except as otherwise indicated:
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges", Latest Edition.
 - a. Exclude the word "structural" in reference to the "Design Drawings" in section 3.1 of the Code.
 - 2. AISC "Specification for Structural Steel Buildings", including "Commentary" and Supplements issued thereto.
 - 3. AISC "*Specifications for Structural Joints using ASTM A 325 or A 490 Bolts*" approved by the Research Council on Structural Connections of the Engineering Foundation.
 - 4. AISC 341, "Seismic Provisions for Steel Buildings".
 - 5. AWS D1.1 - "Structural Welding Code" - Steel.
 - 6. AWS D1.3 - "Structural Welding Code" - Sheet Steel.

7. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
 8. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."
1. Provide certification that welders to be employed in work have satisfactorily passed AWS D1.1 qualification tests and maintained a current certification. Current certification and/or continuity log shall be submitted and be available in the field.
 2. If re-certification of welders is required, retesting will be the Contractor's responsibility.
- C. Fabricator Qualifications: Fabricator must be a member of the American Institute of Steel Construction (AISC), be certified for SBD – Conventional Steel Building Structures, STD – Standard for Steel Building Structures. Fabricator shall be certified at time of bidding and for duration of project.

1.05 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working days.
- D. INCOMPLETE SUBMITTALS WILL NOT BE REVIEWED.
- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 1. Structural steel certified mill reports for each grade of steel covering chemical and physical properties and yield strengths.
 2. High-strength bolts (each type), including nuts and washers.

3. Structural steel primer paint (where applicable).
 4. Structural steel top coat paint (where applicable). (Refer to Section 09900.)
 5. AWS D1.1 Welder certifications.
 6. Expansion/Adhesive Anchors (coordinate with section 03300).
- H. Fabricator's Quality Control Procedures: Fabricator shall submit their written procedural and quality control manuals, and evidence of periodic auditing of fabrication practices by an approved inspection Agency.
- I. Fabricator's Certificate of Compliance: At completion of fabrication, fabricator shall submit a certificate of compliance stating that the work was performed in accordance with the construction documents.
- J. Shop Drawings:
1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
 - a. Review of the shop drawings will be made for the size and arrangement of the members and strength of the connections. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. **Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.**
 - b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings indicating all members, braced frames, moment frames and connections. **Incomplete submittals will not be reviewed.**
 2. Alternate Connection Design: Connections for all beam, column, braced frame, and moment connections not tabulated in the AISC "Manual of Steel Construction" (ASD or LRFD) have been designed and detailed in the drawings. Alternate connection design shall be allowed only with prior approval of the Structural Engineer. If such approval is granted, all redesigned connections shall be designed by the fabricator's engineer, registered in the State of Maine. Calculations for redesigned connections shall be signed and sealed.
 3. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place, in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Steel materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS:

- A. Structural Steel Shapes, Plates and Bars (U.N.O): ASTM A 36 minimum, higher strength steel is acceptable.
- B. Structural Steel Hot Rolled Wide Flange Shapes: ASTM A 992 Grade 50 (ASTM A572 Grade 50 with special requirements per AISC Technical Bulletin #3, dated March 1997)
- C. Steel Tube: ASTM A 500, Grade B, $F_y = 46$ ksi.
- D. Steel Pipe: ASTM A 53, Grade B.
- E. Anchor Bolts: ASTM F1554, Grade 36 weldable steel, unless noted otherwise on drawings. Anchor rods that are to be exposed to weather, located in unheated enclosures, or in contact with pressure treated lumber shall be hot dipped galvanized. All anchor bolts shall be headed or double nutted. "J" or "L" type anchor bolts are not permitted.
- F. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts. Provide hexagonal heads and nuts for all connections.
- G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325 or ASTM A490. Refer to drawings for diameter.
 - 2. Direct tension indicator washers or bolts may be used at Contractor's option.
 - 3. Provide hot-dipped galvanized fasteners at relieving angles.
- H. Electrodes for Welding:
 - 1. Minimum 70 ksi electrodes. Filler material shall meet the grouping requirements per AWS D1.1 Table 3.1 for matching strength of connected materials.
- I. Non Shrink Cement-Based Grout: See Section 03300

- J. Drilled Anchors: Expansion and adhesive by HILTI, SIMPSON or POWERS/RAWL as indicated on the drawings.

2.02 FABRICATION:

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
 - 1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.
- B. Connections: Weld or bolt shop connections, as indicated.
 - 1. Provide field bolted connections, except where welded connections or other connections are indicated.
 - 2. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
- C. High-Strength Bolted Connection: Install high-strength threaded fasteners in accordance with AISC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts". Unless otherwise indicated, all bolted connections are to be tightened to the snug tight condition as defined by AISC.
- D. Welded Construction: Comply with AWS Codes for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
- F. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. Fabricator, Erector and General Contractor shall coordinate safety requirements for the project, in accordance with OSHA Part 1926. Provide all necessary pieces and fabrications as required to safely erect and access the structure for the duration of project construction.
- H. Camber, if any, is indicated on the drawings. Camber indicated is the required camber at time of erection. Contractor shall survey camber prior to placing metal deck.

2.03 STRUCTURAL STEEL COATINGS

- A. Coordinate coating requirements with the Architect, and with Division 9 of the specifications.
- B. To the greatest extent possible, structural steel coatings shall be shop applied.

- C. Galvanizing, priming and painting for structural steel permanently exposed to view shall meet the requirements of Section 10 of the Code of Standard Practice, "Architecturally Exposed Structural Steel".
- D. Provide venting/drainage holes in closed tubular members to be hot-dipped galvanized. Holes shall be provided in a location hidden from view in the final condition and in a manner that will not reduce the strength of the member. Hole locations shall be clearly indicated on the Shop Drawings and are subject to review by the Architect.
- E. Follow manufacturer's installation and safety instructions when applying coatings. Adhere to recoat time recommendations set forth by manufacturer.
- F. General: Shop priming of structural steel is not required for heated, interior steel not exposed to view unless noted otherwise.
- G. Steel which is to receive spray-on fireproofing shall not to be primed or painted, unless specified by the Architect.
- H. Coatings: All exterior steel and/or steel permanently exposed to view shall receive a coating. Unless noted otherwise, refer to Division 9 specifications for products and surface preparation requirements.
- I. Brick masonry loose lintels and relieving angle assemblies, including fasteners, shall be hot dipped galvanized, unless noted otherwise on the Architectural Drawings
- J. Unheated structural steel to be enclosed with architectural finishes, including but not by limitation, canopy members and/or roof pop-up members shall be primed with rust inhibitive alkyd primer, Tnemec Series 349 unless noted otherwise. Follow manufacturer's instructions for surface preparation and application. Substitution shall be equal to the above specified products, and shall be submitted for review.
- K. Steel Embedded in Concrete/Below Grade: Steel which is embedded in concrete, below grade/slab level, or as otherwise indicated on the drawings, shall be field painted with cold-applied asphalt emulsion complying with ASTM D 1187. Paint embedded areas only. Do not paint surfaces which are to be welded until welding is complete.
- L. Field Touch-up: Touch-up all paint and galvanizing damage, including but not by limitation, damage caused during shipping, erection, construction damage, and field welded steel. See Division 9 specifications for additional requirements.

PART 3 EXECUTION

3.01 ERECTION:

- A. General: Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- B. Erection Procedures: Comply with "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- C. Surveys: Employ a Registered Land Surveyor to verify elevations of concrete bearing surfaces, and locations of anchor bolts and similar devices, before erection work

proceeds, and report discrepancies to Architect and Structural Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been approved by Structural Engineer of Record. Additional surveys required to verify out-of-alignment work and/or corrective work shall be performed at the contractor's expense.

- D. Temporary Shoring and Bracing: This is the sole responsibility of the Contractor. Provide temporary shoring and bracing members with connections of sufficient strength to support imposed loads. Remove temporary members and connections when all permanent members are in place, and all final connections are made, including the floor and roof diaphragms. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Comply with OSHA Standard referenced previous. Retain the services of a Specialty Structural Engineer (Not the Engineer of Record) to design specialty shoring and bracing.
- E. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
1. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 2. Welding to anchor bolts for corrective measures is strictly prohibited without prior written approval from the Engineer.
- F. Setting Plates and Base Plates:
1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Refer to division 3 of the project Specifications for anchor bolt installation requirements in concrete.
 2. Clean concrete bearing surfaces of bond-reducing materials. Clean bottom surface of setting and bearing plates.
 3. Set loose and attached base plates for structural members on wedges or other adjusting devices.
 4. Pack non-shrink grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.
- G. Concrete slabs that are part of elevated floors framing systems shall achieve 28-day design strength prior to the application of any superimposed loads such as curtain walls, masonry veneer, mechanical equipment and stairs. Additional testing beyond that specified in division 3 required to verify the concrete strength prior to application of superimposed loads shall be done at the Contractor's expense.
- H. When installing expansion bolts or adhesive anchors, the contractor shall take measures to avoid drilling or cutting any existing reinforcement or damaging adjacent concrete. Holes shall be blown clean with compressed air and/or cleaned per manufacturer's recommendations prior to the installation of anchors.

- I. Field Assembly:
 - 1. Set structural frames accurately to lines and elevations indicated.
 - 2. Align, adjust, level and plumb members of complete frame in to the tolerances indicated in the AISC Code of Standard Practice and in accordance with OSHA regulations.
 - 3. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly.
 - 4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 5. Splice members only where indicated and accepted on shop drawings.
 - 6. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- J. Coat columns, base plates, and brace elements encased in concrete and/or below grade with cold-applied asphalt emulsion. Coordinate coating with concrete work.
- K. Erection bolts: Remove erection bolts. On exposed welded construction fill holes with plug welds and grind smooth at exposed surface.
- L. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as accepted by the Engineer of Record. Finish gas-cut sections equal to a sheared appearance when permitted.
- M. Field Cut Beam Web Penetrations:

1. Field cut beam web penetrations are not permitted without written approval from the Structural Engineer.
 2. Gas cutting torches are not permissible for cutting beam web penetrations without written approval from the Structural Engineer.
 3. Beams with field cut beam web penetrations may require reinforcement, subject to the evaluation by the Structural Engineer.
 4. The evaluation of field cut web penetrations by the Structural Engineers for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be compensated by the General Contractor or Design-Build Subcontractor.
 5. The cost of executing field cut web penetrations and the associated beam reinforcement for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be paid for by the General Contractor or Design-Build Subcontractor.
 6. Field cut beam web penetrations may not be permitted in certain locations, subject to the evaluation by the Structural Engineer.
- N. Welders shall have current evidence of passing and maintaining the AWS D1.1 Qualifications test available in the field.
- O. Welding electrodes, welding process, minimum preheat and interpass temperatures shall be in accordance with AISC and AWS specifications. Any structural steel damaged in welding shall be replaced.

3.02 QUALITY CONTROL:

- A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.
1. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.
- B. Testing: Owner shall engage an Independent Testing Agency to inspect all high-strength bolted and welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.
1. Testing agency shall conduct tests and state in each report which specific connections were examined or tested, whether the connections comply with requirements, and specifically state any deviations therefrom.
 2. Contractor shall provide access for testing agency to places where structural steel work is being fabricated, produced or erected so that required inspection and testing can be accomplished. Testing agency may inspect structural steel at plant before shipment. The Engineer, however, reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.

- C. Inspection Requirements (to be performed by the Independent Testing Agency):
1. Bolted Connections: Inspect all bolted connections in accordance with procedures outlined in the AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts.
 2. Snug Tight Bolted Connections:
 - a. The inspector shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.
 - b. If the inspector does not monitor the installation of bolts, he shall visually inspect the connection to determine that all plies of connected material have been drawn together and conduct tests on a sampling connection bolts to determine if they have been tightened to the snug tight condition. The test sample shall consist of 10% of the bolts in the connection, but not less than two bolts, selected at random. If more than 10% of the tested bolts fail the initial inspection, the engineer reserves the right to increase the number of bolts tested.
 3. Field Welded Connections: inspect and test during fabrication of structural steel assemblies, and during erection of structural steel all welded connections in accordance with procedures outline in AWS D1.1. Record types and location of defects found in work. Record work required and performed to correct deficiencies.
 - a. Certify welders and conduct inspections and tests as required. Submit welder certifications to Engineer of Record. Perform visual inspection of all welds. Primary and secondary welds, including fillet welds, full penetration welds, and deck puddle welds, applied in the field and/or shop, shall be visually inspected.
 - b. Welds deemed questionable by visual inspection shall receive non-destructive testing. Non-destructive testing methods include the following:
 1. Radiographic Inspection (RT): ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
 2. Ultrasonic Inspection (UT): ASTM E 164.
 3. Magnetic Particle (MT) inspection procedures may be utilized at the inspectors discretion in addition to RT or UT inspection. MT procedures shall not replace RT or UT procedures without permission from the Structural Engineer.
 - c. All welds deemed unacceptable shall be repaired and retested at the Contractor's expense.
- D. Inspector shall verify that all ferrules are removed when applicable and that metal deck is free of debris prior to concrete placement.
- E. Testing and inspection reports shall be submitted to the Owner, Architect and Engineer within 48 hours of completion of each test or inspection.

- F. Nonconforming Work: Contractor shall be responsible for correcting deficiencies in structural steel work which inspections laboratory test reports have indicated to be not in compliance with requirements. Additional tests and/or surveys shall be performed, at the Contractor's expense, as may be necessary to show compliance of corrected work. Any costs associated with the Engineer's review and disposition of faulty works shall be borne by the Contractor.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

1 PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shop fabricated ferrous metal items, galvanized and prime painted.
2. Steel stair frame of structural sections, with pan to receive concrete fill stair treads and landings.
3. Balusters and handrailing.
4. Steel bollards.

1.2 SYSTEM DESCRIPTION

- A. Design stair assembly to support live load of 100 lb/sq ft with deflection of stringer or landing framing not to exceed 1/240 of span.
- B. Design handrail, guardrail, and attachments to resist forces as required by applicable building code. Apply loads non-simultaneously to produce maximum stresses.
1. Guard Top Rail and Handrail Concentrated Load: 200 pounds applied at any point in any direction.
 2. Guard Top Rail Uniform Load: 50 plf applied in any direction.
 3. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 pounds applied to 1 sf area.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.4 QUALITY ASSURANCE

- A. Finish joints in accordance with NOMMA Guideline 1.
- B. Design stairs and guardrails under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

2 PART 2 PRODUCTS

2.1 COMPONENTS

- A. Steel Sections: ASTM A36/A36M.

- B. Steel Plate: ASTM A36/A36M.
- C. Tubing: ASTM A513, Type 5, minimum 50 ksi yield strength.
- D. Hollow Structural Sections: ASTM A500, Grade B.
- E. Steel Pipe: ASTM A53/A53M, Grade B Schedule 40.
- F. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality with galvanized coating.
- G. Bolts: ASTM A307; Grade A or B; ASTM A325; Type 1.
 - 1. Finish: Unfinished at interior applications. Hot dipped galvanized at exterior applications.
- H. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Unfinished at interior applications. Hot dipped galvanized at exterior applications.
- I. Washers: ASTM F436; Type 1.
 - 1. Finish: Unfinished at interior applications. Hot dipped galvanized at exterior applications.
- J. Handrail Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast or machined steel.
- K. Anchor Rods: ASTM F1554; Grade 55, weldable.

2.2 ACCESSORIES

- A. Welding Materials: AWS D1.1.
- B. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic.
- D. Concrete and Reinforcement for Treads and Landings: Mesh type, Portland cement, as specified in Section 03 30 00 .

2.3 FABRICATION

- A. General:
 - 1. Fit and shop assemble items in largest practical sections, for delivery to site.
 - 2. Continuously seal joined members by continuous welds.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
 - 4. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, consistent with design of component.
 - 5. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication.

6. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.
7. Exposed Welded Joints: NOMMA Guideline 1 Joint Finish 1.

B. Pan Stairs and Landings:

1. Fabricate stairs and landings with closed open risers and treads of metal pan construction, ready to receive concrete.
2. Form treads, landings, and risers with sheet steel stock.
3. Secure tread pans to stringers with clip angles; welded in place.
4. Form stringers with rolled steel channels. Weld facial plates to channels using steel sheet across channel toes.
5. Prime paint interior components.

C. Handrails:

1. Fit and shop assemble components in largest practical sizes, for delivery to site.
2. Grind exposed joints flush and smooth with adjacent finish surface.
3. Accurately form components to suit stairs and landings, to each other and to building structure.
4. Form balusters with ½ inch diameter square steel sections, welded to stringers.

2.4 FINISHES

- A. Prepare surfaces in accordance with SSPC SP 2
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Shop prime items with one coat. Do not prime surfaces in direct contact with concrete or where field welding is required.
- D. Galvanizing for Components: ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.
- E. Galvanizing for Fasteners, Connectors, and Anchors:
 1. Hot-Dipped Galvanizing: ASTM A153/A153M.
 2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

- A. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- B. Supply items required to be cast into concrete or embedded in masonry with setting

templates, to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads and provide temporary bracing to maintain indicated alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1.
- D. Obtain approval prior to site cutting.
- E. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

3.4 FIELD QUALITY CONTROL

- A. Welding: Inspect welds in accordance with AWS D1.1.

...END OF SECTION 05 50 00

Part II
Division 6

Woods & Plastics

061000 ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, and without limiting the generality thereof furnish and install the following:
 - 1. Wood framing, including joists, rafters, outriggers, scab-ons, headers, stringers, posts, studs, plates, truss bracing and similar members.
 - 2. Wood grounds, nailers, blocking and sleepers.
 - 3. Wood furring.
 - 4. Floor, roof and wall sheathing.
 - 5. Miscellaneous carpentry as indicated or required and not specified under other Sections of the Specifications.
 - 6. Fasteners and accessories as indicated and required for rough carpentry.
 - 7. Treated wood as specified.
- B. Related Work Specified Elsewhere:
 - 1. Finish carpentry: Section 062000.
 - 2. Metal studs: Section 054000.
 - 3. Gypsum wall sheathing: Division 9.
 - 4. Underlayments: Division 7
 - 5. Furnishing and installing of doors and frames: Division 8.

1.03 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:
1. International Building Code, 2003 Edition – International Code Council
 2. ANSI/AF&PA (American Forest & Paper Association) – NDS National Design Specification for Wood Construction – Latest Edition
 3. AHA (American Hardboard Association) A135.4 – Basic Hardboard.
 4. ALSC (American Lumber Standards Committee) – Softwood Lumber Standards.
 5. ANSI A208.1 – Mat-Formed Wood Particleboard.
 6. APA (American Plywood Association).
 7. AWPA (American Wood Preservers Association) C1-All Timber Products – Preservative Treatment by Pressure Process.
 8. AWPA (American Wood Preservers Association) C20-Structural Lumber Fire Retardant Treatment by Pressure Process.
 9. NELMA (New England Lumber Manufacturer's Association).
 10. NLGA (National Lumber Grades Authority)
 11. NIST (National Institute of Standards and Technology, U. S. Department of Commerce [DOC])
 12. NFPA (National Forest Products Association)
 13. NFPA (National Fire Protection Association)
 14. SPIB (Southern Pine Inspection Bureau).
 15. WCLIB (West Coast Lumber Inspection Bureau).
 16. WWPA (Western Wood Products Association).
 17. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).
- B. Lumber shall be supplied in accordance with the following agencies:
1. Lumber Grading Agency: Certified by NLGA for structural framing.
 2. Sheathing Grading Agency: Certified by APA or ICBO approved certification agency. For non-APA rated plywood, provide ICC ES Evaluation report.

3. Grading stamp shall be on lumber and plywood.
 4. Submit manufacturer's certificate certifying that products meet or exceed specified requirements.
- C. Panelized/Prefabrication plant inspection: Prefabrication plant is subject to plant inspection completed by the Engineer-of-Record or an approved Third Party Inspection Agency. Inspections shall be performed at the Contractor's expense. Plant inspection does not relieve the Contractor of the obligation to perform work in accordance with the Construction Documents or from implementing their own shop and field quality control program.

1.04 SUBMITTALS

- A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.
- B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.
- C. All submittals shall be reviewed and returned to the Architect within 10 working days.
- D. Incomplete submittals will not be reviewed.
- E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in sections Division 1 have been complied with.
- F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.
- G. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards). Product data shall include ICC/ICBO Evaluation Reports indicating conformance to standards specified here within.
 1. Engineered Wood Products
 2. Pressure Treated Lumber
 3. Sheathing
 4. Samples of Exposed to View Wood Members: Submit two samples, 6 inches long, illustrating wood grain, stain, and finish.
 5. Hangers, Hardware and Accessories

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Protect materials from warping or other distortion by stacking to resist movement.
- B. Follow manufacturer's recommendations for storage of Engineered Wood Products and connection hardware.

PART 2 PRODUCTS

2.01 LUMBER MATERIALS

- A. Lumber, General: Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
- B. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide seasoned lumber with 19% maximum moisture content at time of dressing.
- C. For structural framing (4" and wider and from 2" to 4" thick), provide the following grade and species:
 - 1. Spruce-Pine-Fir (SPF) #1/2 or better, NLGA Graded, unless noted otherwise on Structural Drawings, Minimum Design Stresses:
 - a. Fb: 875 psi
 - b. Ft: 450 psi
 - c. Fv: 135 psi
 - d. Fc_⊥: 425 psi
 - e. Fc: 1,150 psi
 - f. E: 1,400,000 psi
 - 2. Pressure treated lumber: Southern Yellow Pine #2 or better. Minimum Design Stresses:

- a. Fb: 1,300 psi
 - b. Ft: 775 psi
 - c. Fv: 175 psi
 - d. Fc_L: 565 psi
 - e. Fc: 1,650 psi
 - f. E: 1,400,000 psi
3. See structural drawings for grades and bending stress at specific locations.
- D. Miscellaneous Lumber: Provide wood for support or attachment of other work including cant strips, bucks, nails, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:
- 1. Moisture content: 19% maximum for lumber items not specified to receive wood preservative treatment.
 - 2. Grade: Construction Grade light framing size lumber of any species or board size lumber as required. Provide construction grade boards (NELMA, NLGA or WCLB) or No.2 boards (SPIB, NLGA, NELMA, or WWPA).

2.02 SHEATHING LOCATIONS

- A. Roof Sheathing: NIST/DOC PS-1 or PS-2 rated, Exposure 1, 5/8 inch thick, 48 x 96 inch sized sheets, square edges, unless noted. Provide H-clips per the manufacturer's recommendations.
- B. Floor Sheathing: NIST/DOC PS-1 or PS-2 rated, Exposure 1, 3/4 inch thick, 48 x 96 inch sized sheets, tongue and groove.
- C. Wall Sheathing: NIST/DOC PS-1 or PS-2 rated, Exposure 1, 1/2 inch thick, 48 x 96 inch sized sheets, square edges.
- D. Wall Sheathing at Shear Walls: DOC PS-1 or PS-2 rated, Exposure 1, 48 x 96 inch sheets, square edges, unless noted otherwise.
- E. Thicknesses indicated are nominal.
- F. Sheathing shall be stamped with grading agency stamp
- G. Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels where required per Code requirements. Paint as required by electrical code.

2.03 ENGINEERED WOOD PRODUCTS

- A. General: Provide engineered wood products acceptable to authorities having jurisdiction

and for which, current model code research or evaluation reports exist that evidence compliance with building code in effect for Project. Provide depths and widths as indicated.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 2. Source and Species: Unless otherwise indicated, lumber sources in Engineered Wood Products shall be of single source and species.
 3. Adhesives shall be exterior type, complying with ASTM D2559.
 4. Substitutions: Substitutions of Engineered Wood Products other than those specified will be permitted only with written certification from the manufacturer that the substituted items "meets or exceeds" all properties of the specified product, including engineering, serviceability, aesthetic and durability characteristics. Substitutions shall not be made without written approval of the Architect and Engineer.
- B. Laminated-Veneer Lumber (LVL): Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D 2559 to produce members with grain of veneers parallel to their lengths and complying with the following requirements:
- Boise Cascade $F_b = 3080 \text{ psi}$, $E = 2.0 \times 10^6$
I-Level: $F_b = 2600 \text{ psi}$, $E = 1.9 \times 10^6$
- C. Parallel-Strand Lumber (PSL): Lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with grain of strands parallel to their lengths and complying with the following requirements:
- I-Level : $F_{c||} = 2,900 \text{ psi}$, $F_b=2900 \text{ psi}$, $E = 2.0 \times 10^6$
- D. I-Joists: Meet manufacturer's standards for all properties and stiffness, for I-Joist series indicated.
- Boise Cascade: BCI Series, as indicated on the drawings
I-Level: TJI Series, as indicated on the drawings
- E. Laminated Strand Lumber (LSL): Lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with laminations of strands parallel to their lengths and complying with the following requirements:
- I-Level: $F_b = 1,700 \text{ psi}$, $E = 1.3 \times 10^6$ (depths to 8 5/8")
 $F_b=1,700 \text{ psi}$, $E = 1.7 \times 10^6$ (depth 9 1/4" and up)

2.04 ACCESSORIES

A. Fasteners, Anchors, Connectors and Hardware:

1. Fasteners (for wood framing): Nail fasteners shall meet requirements of ASTM F1667. Unless noted otherwise, nails referenced on drawings are to be Common Nails with dimensions as follows:
 - a. 6d: 2" long by 0.113" diameter shank with 0.266" diameter head
 - b. 8d: 2 1/2" long by 0.131" diameter shank with 0.281" diameter head
 - c. 10d: 3" long by 0.148" diameter shank with 0.312" diameter head
 - d. 12d: 3 1/4" long by 0.148" diameter shank with 0.312" diameter head
 - e. 16d: 3 1/2" long by 0.162" diameter shank with 0.344" diameter head
 - f. 20d: 4" long by 0.192" diameter shank with 0.406" diameter head
 - g. 30d: 4 1/2" long by 0.207" diameter shank with 0.438" diameter head
 2. Anchor Bolts: ASTM A307 headed and SSTB Anchor Bolts by Simpson StrongTie, unless noted otherwise. "J" or "L" type anchor bolts shall not be substituted.
 3. Screw fasteners (where indicated on drawings or required to install connection hardware):
 - a. SD & SDS Screws by Simpson Strong Tie
 - b. RSS Screws by GRK Fasteners, (800) 263-0463
 - c. Timberlok Screws by Fasten Master.
 - d. Wood Screws: ANSI/ASME Standard B18.6.1
 4. Lag Screws: ANSI/ASME Standard B18.2.1. Provide lead hole per NDS Chapter 11.
 5. Through Bolts: ANSI/ASME Standard B18.2.1:
 - a. Holes for through bolts shall be a minimum of 1/32nd and a maximum of 1/16th larger than bolt diameter.
 - b. A standard cut washer shall be provided between the wood and bolt head, and wood and nut, unless noted otherwise.
- B. Structural Framing Connectors, Hardware or Joist Hangers: As indicated on the drawings or sized to suit framing conditions, manufactured by Simpson or approved alternate.
1. Unless noted, fill all nail holes to achieve manufacturer's maximum reaction rating.

2. Use nail diameter and length as specified by connector manufacturer. Substitutions of pneumatic nails or "joist hanger" (non standard length) nails shall not be made without written authorization of the Engineer.
- C. Construction Adhesive: APA AFG-01, approved for use with type of construction panel indicated by both adhesive and panel manufacturer.
- D. ALL ANCHORS, CONNECTORS AND FASTENERS IN CONTACT WITH PRESSURE TREATED LUMBER, ND/OR AT EXTERIOR EXPOSURE SHALL HAVE COATINGS AS FOLLOWS, UNLESS NOTED OTHERWISE:
 1. Anchor Bolts/Bolts/Lag Bolts: Hot Dipped Galvanized, ASTM A123
 2. Connection Hardware, unless otherwise noted: Simpson Strongtie Z-Max (G185 per ASTM A653) or Hot Dipped Galvanized (HDG, ASTM A123). Use hot dipped galvanized fasteners, ASTM A153 with these hangers.
 3. Nails and Fasteners, unless otherwise noted: Hot Dipped Galvanized, ASTM A153. Use type 304 or 316 stainless steel fasteners with stainless hardware
 4. Proprietary coatings used in conjunction with pressure treated fastener coatings will be permitted with written permission from the Architect and Engineer.

2.05 FACTORY WOOD TREATMENT

A. PRESSURE TREATED LUMBER (P. T.)

1. Wood Preservative (Pressure Treatment): AWWA Treatment, ACQ-C (amine formulated), ACQ-D or CA-B, ammonia free.
2. The use of ACZA and CCA treated lumber is strictly prohibited.
3. Retention:
 - a. Above Ground Use: ACQ: 0.25 pcf, CA-B: 0.10 pcf
 - b. Ground Contact Use: ACQ: 0.40 pcf, CA-B: 0.21 pcf.
4. See Section the "Fasteners, Anchors, Connectors and Hardware" portion of this specification for fastener, anchor and hardware requirements for use with pressure treated lumber.
5. Pressure treated lumber shall not contain ammonia unless authorized by the Architect and Engineer. Ammonia content shall be verified with the Pressure Treatment manufacturer.

PART 3 EXECUTION

3.01 FRAMING

- A. Set members level and plumb, in correct position.

ROUGH CARPENTRY

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- B. Unless noted otherwise, wall top plates shall be doubled. Install top plates with overlapping corners and at intersections with adjoining partitions. End joints in double top plates shall be offset at least 48 inches.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members, crown side up.
- E. Construct load bearing framing members full length without splices.
- F. Double members at openings over 24 inches wide and as indicated. Space short studs over and under opening to stud spacing.
- G. Double joists under partitions that run parallel to joist framing.
- H. Posts and columns shall be blocked at floor and/or roof levels with framing matching or exceeding post dimensions down to supporting foundation.
- I. Place sill gasket directly on cementitious foundation. Puncture gasket clean and fit tight to protruding foundation anchor bolts.
- J. Coordinate installation of wood decking, joist members, rafter members and/or prefabricated wood trusses.
- K. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- L. Coordinate curb installation with installation of decking and support of deck openings, and roofing vapor retardant.
- M. Rough Carpentry Fastening Schedule: Unless otherwise indicated on the drawings, provide minimum nailing and fastening per IBC Table 2304.9.1.

3.02 SHEATHING

- A. Secure roof sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing provide gap between panels as recommended by manufacturer. Utilize H-clips at panel edges per manufacturer's recommendations or as indicated. Provide blocking where indicated on the Drawings.
- B. Secure floor sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing. Secure tongue in groove per manufacturers instructions. Glue and nail/screw as indicated. Provide blocking where indicated on the Drawings. Floor sheathing shall be laid out in a manner to prevent squeaks.
- C. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.

- D. Install telephone and electrical panel backboards with plywood sheathing material where required. Size as indicated, 6 inch larger than panel space required or per local Code requirements.

3.03 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Fasteners Driving Tolerance: Unless noted otherwise, fastener heads shall be driven flush with attached framing member or sheathing. Maximum indentation tolerance from flush shall be 1/16 inch.

END OF SECTION

SECTION 06 20 00

FINISH CARPENTRY

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SUMMARY

- A. Finish carpentry items, other than shop prefabricated casework; hardware and attachment accessories.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Quality Standards, Custom Grade.

2 PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Softwood Lumber: PS 20; Graded in accordance with AWI Custom; clear Poplar species, plain sawn, maximum moisture content of 11 percent.
- B. Hardwood Lumber: Graded in accordance with AWI Custom; Red Oak species, plain sawn, maximum moisture content of 11 percent; of quality suitable for transparent finish.
- C. Molded Shapes: Stock molded shapes, solid clear Poplar, Brosco, or equal.

2.2 ACCESSORIES

- A. Fasteners: Size and type to suit application; hot dipped galvanized steel for exterior, high humidity and treated wood locations, plain finish elsewhere.
- B. Primer: Alkyd primer sealer type.

2.3 FABRICATION

- A. Fabricate to AWI Custom standards.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Prime paint back surfaces of items or assemblies, and cut ends of exterior items, before installation. Where transparent finish is scheduled, back prime with spar varnish.

3.2 INSTALLATION

- A. Install work in accordance with AWI Custom quality standard.
- B. Set and secure materials and components in place, plumb and level.
- C. Install trim by nails.

3.3 PREPARATION FOR FINISH

- A. Sand work smooth and set exposed fasteners. Apply wood filler in exposed fastener indentations.

3.4 SCHEDULE

- A. Exterior:
 - 1. Exposed Wood Trim: Eastern White pine, select grade, primed and back primed, prepare for paint finish.
- B. Interior:
 - 1. Window Sills: Clear $\frac{3}{4}$ " Birch faced plywood with $\frac{3}{4}$ " solid wood edge band, prepare for paint finish.
 - 2. Moldings, Bases, Casings, and Miscellaneous Trim: Clear solid Eastern White Pine, prepare for paint finish. Where indicated as Oak, prepare for transparent finish.
 - 3. Wall Caps: Red Oak, prepare for transparent finish.

...END OF SECTION 06 20 00

SECTION 06 60 00
PLASTIC FABRICATIONS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cellular PVC Trim Boards for corner boards, soffits, fascias, battens, door pilasters, frieze boards, rake boards, spandrel panels, architectural millwork and door/window trim.

1.2 RELATED SECTIONS

- A. N/A

1.3 REFERENCES

- A. ASTM D792 - Density and Specific Gravity of Plastics by Displacement.
- B. ASTM D570 - Water Absorption of Plastics.
- C. ASTM D638 - Tensile Properties of Plastics.
- D. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- E. ASTM D1761 - Mechanical Fasteners in Wood.
- F. ASTM D5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by means of a Striker Impacted by a Falling Weight.
- G. ASTM D256 - Determining the Pendulum Impact Resistance of Plastics.
- H. ASTM D696 - Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer.
- I. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
- J. ASTM E84 - Surface Burning Characteristics of Building Materials.
- K. ASTM D648 - Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- L. ASTM D3679 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) Siding.

1.4 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit product data, manufacturer's catalogs, SPEC-DATA® product Sheet, for specified products.

- C. Samples: Submit three material samples representative of the texture, thickness and widths shown and specified herein.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Check with Local Building Code for installation requirements.
- B. Allowable Tolerances:
 - 1. Variation in component length: $-0.00 / +1.00$ "
 - 2. Variation in component width: $\pm 1/16$ "
 - 3. Variation in component thickness: $\pm 1/16$ "
 - 4. Variation in component edge cut: $\pm 2^\circ$
 - 5. Variation in Density $-0\% + 10\%$
- C. Workmanship, Finish, and Appearance:
 - 1. Cellular PVC that is homogeneous and free of voids, holes, cracks, and foreign inclusions and other defects. Edges must be square, and top and bottom surfaces shall be flat with no convex or concave deviation.
 - 2. Uniform surface free from cupping, warping, and twisting.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Trim materials should be stored on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product edges and corners. Store materials under a protective covering to prevent jobsite dirt and residue from collecting on the boards.

1.7 WARRANTY

- A. Provide manufacturer's 25 year warranty against defects in manufacturing that cause the products to rot, corrode, delaminate, or excessively swell from moisture.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Acceptable products: Versatex® Trimboards and Beadboard soffits manufactured by Wolfpac Technologies, Inc., 111 Leetsdale Industrial Drive, Unit 101, Leetsdale, PA, or equal.
- B. Material: Expanded rigid poly vinyl chloride material with a small-cell microstructure and density of $.55 \text{ grams/cm}^3$.
 - 1. Material shall have a minimum physical and performance properties specified in the following Section C.

C. Performance and physical characteristic requirements:

Property	Units	Value	ASTM Method
PHYSICAL			
Density	g/cm ³	0.55	D 792
Water Absorption	%	<0.70	D 570
MECHANICAL			
Tensile Strength	psi	1889	D 638
Tensile Modulus	psi	107,000	D 638
Flexural Strength	psi	4019	D 790
Flexural Modulus	psi	164,200	D 790
Nail Hold	Lbf/in of penetration	108	D 1761
Screw Hold	Lbf/in of penetration	442	D 1761
Staple Hold	Lbf/in of penetration	69	D 1761
Gardner Impact	in-lbs	98	D5420
Notched Izod Impact	ft-lbs/inch	0.250	D256
THERMAL			
Coefficient of Linear Expansion	in/in/°F	3.25 x 10 ⁻⁵	D 696
Burning Rate	In/min	Failed to Ignite	D 635
Flame Spread Index	--	25	E 84
Heat Deflection Temp (264 psi)	°F	153	D648
Oil Canning(@140°F)	°F	Passed	D 648

2.2 ACCESSORY PRODUCTS

- A. Fasteners: Use only stainless steel fasteners recommended by manufacturer.
1. Install fasteners in accordance with manufacturer's recommendations.
 2. Do not use staples, small brads, wire nails, fine threaded wood screws and ring-shank fasteners.
- B. Adhesives:
1. Bonding Versatex to Itself: Bond joints with PVC cement or cellular PVC adhesives approved by manufacturer.
 2. Bonding Versatex to Various Substrates: Bond with construction adhesives recommended by manufacturer.
 3. Use scarf joint cuts in running trim.
 4. Secure bonded joints with fasteners on each side of joint.

- C. Sealants:
 - 1. Use urethane, polyurethane or acrylic based sealants that do not contain silicone.
- D. Flashing:
 - 1. Provide .032 aluminum at head of all exposed trim pieces.

2.3 FINISHES

- A. Preparation:
 - 1. Clean, Dry surface
 - 2. Finish nail holes with a polyurethane or acrylic based caulk.
 - 3. For painted surfaces, use only 100% acrylic latex paint system.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Manufacturers instructions: Comply with manufacturer's product catalog installation instructions and product technical bulletin instructions.
- B. Cutting: Cut sheets and boards with standard saws and carbide tipped blades used for wood. Do not use fine tooth metal cutting blades.
- C. Drilling: Drill using standard woodworking drill bits. Do not use drill bits made for rigid PVC.
- D. Milling: Mill with standard woodworking milling or moulding machines of various types. Relief Angle 20° to 30°; Cutting speed to be optimized with the number of knives and feed rate.
- E. Routing: Rout with standard carbide tipped routers used in woodworking.
- F. Edge Finishing: Various sanding, grinding or filing tools. Do not allow excessive frictional heat to build up.
- G. Nail Location: Standard nailing patterns are recommended. Use two fasteners at each framing member for trimboard applications. Use additional fasteners for trimboards wider than 10 inches and sheet. Install fasteners no more than two inches from the end of boards.
- H. Linear Thermal Expansion and Contraction: When properly fastened, allow for 3/16" movement for each 18' board. When butting boards together it is recommended that the butt joint is glued with PVC cement. This will eliminate any separation at the joint. The gap can be accommodated at the ends of the run.

...END OF SECTION 06 60 00

Part II
Division 7

Thermal & Moisture Protection

SECTION 07 14 00

FLUID-APPLIED WATERPROOFING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of each type of fluid-applied waterproofing work is indicated on drawings.
- B. Types of fluid-applied waterproofing required for project include the following:
 - 1. Urethane based type.
- C. Provide the following foundation drain accessories:
 - 1. Foundation Drainage System at locations indicated on drawings.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: A firm which has specialized in installation of types of waterproofing required for project for not less than 3 years and which is acceptable to manufacturer(s) of primary materials.
- B. Assign work closely associated with waterproofing, including (but not limited to) waterproofing accessories, and flashings used in conjunction with waterproofing, expansion joints in membrane, insulation and protection course on membrane, to installer of waterproofing, for single, undivided responsibility.
- C. Source Quality Control: Obtain primary waterproofing materials of each type required from single manufacturer with not less than 3 years of successful experience in supplying principal materials for fluid-applied waterproofing work. Provide secondary materials only as recommended by manufacturer of primary materials.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations for each waterproofing material required.

1.5 JOB CONDITIONS:

- A. Substrate: Proceed with work of this section only after substrate construction and penetrating work have been completed.
- B. Weather: Proceed with work of this section only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

- C. Ventilation: Provide adequate ventilation to prevent accumulation of hazardous fumes during application of solvent-based components in enclosed spaces, and maintain ventilation until coatings have thoroughly cured.

2 PART 2 PRODUCTS

2.1 MATERIALS:

- A. General Compatibility: Provide products which are recommended by manufacturer to be fully compatible with indicated substrates, including modification by additives and similar proven compounding provisions.
- B. Urethane Based Waterproofing: Polyurethane rubber based liquid membrane material, self-bonding to normal substrates, compounded specifically for application method to be used and for slope of substrate. Provide membrane with not less than 92% solids, tested by manufacturer to comply with requirements of ASTM C 836.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a. LM-60V; Gaco Western, Inc.
 - b. One-Kote System; Karnak Corporation.
 - c. Vulkem; Mameco International.
 - d. Perma-Gard; Neogard.
 - e. Hydrocide Liquid Membrane 5000; Sonneborn Div./ChemRex Inc.
 - f. Tremproof 60; Tremco.
- C. Miscellaneous Materials:
 - 1. Primer/Filler/Sealer: As recommended by manufacturer of waterproofing.
 - 2. Flashings, Cant Strips, and Accessories: As recommended by manufacturer of waterproofing.
 - 3. Protection Course: As recommended by manufacturer of waterproofing.
- D. Accessory Materials:
 - 1. Foundation Drainage System: MIRAFLI "MiraDrain" G-Series Model G100N, or equal. Install as per manufacturer's recommendation.

3 PART 3 EXECUTION

3.1 PREPARATION OF SUBSTRATE:

- A. Clean substrate of projections and substances detrimental to work; comply with instructions of prime materials manufacturer.
- B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.

- C. Fill voids, seal joints, and apply bond breakers as recommended by prime materials manufacturer, with particular attention at construction joints.
- D. Mask off adjoining surfaces not to receive fluid-applied water-proofing to prevent spillage or overspray of liquid materials outside membrane area.

3.2 INSTALLATION:

- A. General: Comply with manufacturer's instructions, except where more stringent requirements are shown or specified.
- B. Start installation of waterproofing membrane only in presence and with advice of manufacturer's technical representative.
- C. Apply uniform coating of waterproofing to substrate and adjoining surfaces indicated to receive membrane.
- D. Apply coating either by hand or machine spray, complying with recommendations of manufacturer.
- E. Provide 60-mil (average) coating.
- F. Permit membrane to cure under conditions which will not deteriorate waterproofing material. Protect membrane from physical damage.
- G. Protection Course:
- H. Install protection course on cured membrane without delay, so that period of membrane exposure will be minimized. Comply with waterproofing manufacturer's recommendations for application.

3.3 PERFORMANCE REQUIREMENTS:

- A. It is required that fluid applied waterproofing membrane be watertight and not deteriorate in excess of limitations published by manufacturer.

...END OF SECTION 07 14 00

SECTION 07 18 00

TRAFFIC-BEARING WATERPROOF DECK SURFACING

1 PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the waterproof elastomeric traffic-bearing roof deck surfacing as scheduled on the drawings and/or specified herein.

1.3 RELATED WORK

- A. Concrete - Section 03 30 00.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Submit manufacturer's technical data, application instructions and general recommendations for the waterproof elastomeric traffic-bearing roof deck surfacing specified herein.
- C. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors and finishes available.
 - 1. Submit 2-1/2" x 4" samples of color chips from color chart selection designated by the Architect.
- D. Material certificates signed by manufacturer certifying that the waterproof elastomeric traffic-bearing roof deck surfacing complies with requirements specified herein.
- E. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer or applicator who has specialized in installing waterproof deck covering system types similar to that required for this Project and who is acceptable to manufacturer of primary materials.

- B. Single-Source Responsibility: Obtain waterproof elastomeric traffic-bearing roof deck surfacing materials, including primers, resins, hardening agents, and finish or sealing coats, from a single manufacturer.
- C. Pre-Qualified Suppliers: Submit any request for alternative products for review to Architect prior to bid date. Any request for alternate products received after this date will not be considered.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage and mixing with other components.
- B. Comply with manufacturer's directions for materials storage to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with waterproof elastomeric traffic-bearing roof deck surfacing manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect work.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Troweled waterproof elastomeric traffic-bearing roof deck surfacing shall be Dex-O-Tex Elastatex 500 as manufactured by Crossfield Products Corp., Rancho Dominguez, California; Rosette Park, New Jersey and Burr Ridge, Illinois. Equivalent products from alternate manufacturers may be accepted as judged solely by Architect.
- B. The trowel-applied waterproof elastomeric traffic-bearing roof deck surfacing system shall be composed of a primer, moisture-cured polyurethane rubber binder with SBR, ABR and natural rubber aggregate basecoat, polyurethane top coat, and shall conform to the following standards:

2.2 PROPERTIES

- A. Colors: As indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standard colors.
- B. Physical Properties: Provide a waterproof deck covering system that meets or exceeds the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses.

1. Weight: 0.46 lbs. per sq. ft.
2. Accelerated Weathering: (ASTM G-23): (Atlas Twin-Arc Weatherometer – 2,000 hrs.): No cracking, blistering, delamination, chalking, crazing or color change
3. Accelerated Aging: (ASTM D-756): No cracking, blistering, delamination, chalking, crazing or color change
4. Freeze-Thaw: (ASTM C-67): No breakage or weight loss
5. Percolation: (ICBO standard): Complies
6. Water Absorption: (ASTM D-570): <6.09%, no warping or cracking
7. Adhesion: (ASTM D-903): 175 psi
8. Hardness: (ASTM 2240): 60-70 Durometer "A"
9. Crack Bridging and Low Temperature Flexibility (ASTM C-836): Complies
10. Tensile Strength (ASTM D-412): 1,050 psi
11. Elongation (ASTM D-412): 500%
12. Chemical Resistance:
 - a. Industrial Detergent: No change in texture or color
 - b. Salt (20%): No change in texture or color
 - c. Ammonia Solution (5%): No change in texture or color
 - d. Muriatic Acid (10%): No change in texture or color
 - e. Chlorine (10%): No change in texture or color
 - f. Kerosene: No change in texture or color
 - g. Turpentine: Slight temporary softening of surface
 - h. Paint Thinner: Slight temporary softening of surface

2.3 SUPPLEMENTAL MATERIALS

- A. Optional Decorative Finishes: Type recommended or produced by manufacturer of waterproof elastomeric traffic-bearing roof deck surfacing system to achieve desired color and texture.
- B. Flashings: Galvanized steel, 26 ga, with baked enamel finish, compatible with deck coating system, color as selected.

3 PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where the waterproof elastomeric traffic-bearing roof deck surfacing is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Evaluate level of moisture in the substrate to determine that moisture levels are acceptable for application of specified waterproof deck covering system.

3.2 PREPARATION

- A. Substrate: Perform preparation and cleaning procedures according to waterproof deck covering manufacturer's instructions for particular substrate conditions involved, and as specified. Provide clean, dry and neutral substrate for application of waterproof deck covering.

- B. Materials: Mix aqueous emulsions and aggregate when required as per manufacturer's instructions. Prepare materials according to waterproof deck covering system manufacturer's instructions.

3.3 APPLICATION

- A. General: Apply each component of waterproof elastomeric traffic-bearing roof deck surfacing system according to manufacturer's directions to produce a uniform, monolithic surface of thickness indicated.
- B. Install flashings as recommended by manufacturer. Embed in full bed of mastic compatible with deck coating.
- C. Apply primer bondcoat over entire surface to be coated with the deck surfacing. Apply in thin, even coating. Do not allow primer bondcoat to puddle. Apply subsequent coats within 48 hours of application of primer bondcoat.
- C. Apply reinforced membrane detail coat at all vertical junctures, transitions, cracks, or joints. Embed polypropylene fabric into polyurethane membrane liquid. Overlap all seams a minimum of 2 inches.
- D. Trowel-apply the Elastatex 500 urethane bodycoat over the entire surface. Take care to provide a uniform thickness and avoid trowel marks.
- E. Broadcast rubber aggregate into the wet urethane bodycoat; allow to cure.
- F. Remove all excess rubber aggregate. Inspect surface to insure a completely monolithic, seamless surface.
- G. Roller apply two coats of final-finish dressing to a uniform finish.
- H. Finished elastomeric traffic-bearing roof deck surfacing shall be a nominal 1/16 inch thick, uniform in color and texture.

3.4 CURING, PROTECTION AND CLEANING

- A. Cure waterproof elastomeric traffic-bearing roof deck surfacing materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area to traffic for a minimum of 24 hours.

END OF SECTION

SECTION 07 21 00
BUILDING INSULATION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Board thermal insulation at foundation wall perimeter.
- B. Batt thermal insulation and vapor retarder in exterior wall and roof construction.

1.3 SYSTEM DESCRIPTION

- A. System performance to provide continuity of thermal barrier and vapor retarder at building enclosure elements.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Install insulation adhesives in accordance with manufacturer's instructions.

2 PART 2 PRODUCTS

2.1 INSULATION MATERIALS

- A. Extruded Polystyrene Insulation: ASTM C578, cellular type, conforming to the following:
 - 1. Thermal Resistance: R of 5.0 per inch.
 - 2. Thickness: 2" R-10, 24" wide, as part of exterior wall system.
 - 3. Compressive Strength: Minimum 30 psi .
 - 4. Water Absorption: In accordance with ASTM D2842 0.3 percent by volume maximum.
 - 5. Edges: Square edges.
 - 6. Accessories: 2" Z-Furring Channels and 16ga Cold Rolled Channels by US Gypsum, or equal, where indicated.
 - 7. Air seal all vertical and horizontal edges with product acceptable to manufacturer.
 - 8. Provide approved Ignition Barrier at all locations of exposed foam insulation.
- B. Spray in Fiber Exterior Wall Insulation: 100% boron treaded fungicide resistant spray-in-place recycled paper insulation, Nu-Wool, or equal:
 - 1. Thermal Resistance: 5 1/2" R-21 for exterior walls (2x6 cavities).
- C. Spray in Fiber Attic Insulation: 100% boron treaded fungicide resistant spray-in-place recycled paper insulation, Nu-Wool, or equal of 8" (R of 30) over existing fiberglass batt insulation (R of 38 of 12" preformed glass fiber batts between attic truss bottom cords,

un-faced, may reduce insulation value with addition of Spray in Fiber). Total System insulation value = R-49 minimum.

- D. Blown in Fiberglass Existing Interior Wall Sound Insulation: Fill cavity of existing interior walls scheduled for blown in sound insulation: 100% boron treated fungicide resistant spray-in-place recycled paper insulation, Nu-Wool, or equal.
- E. Non-Expansive Spray Foam Insulation: spray applied high-performance non-expansive foam insulation system:
 - 1. Thermal Resistance: R-3 minimum per inch, provide to seal and fill gaps at all door and window jamb rough openings, between panelized wood framing and where indicated. Provide window and door manufacture acceptance of product.
- F. Ventilation Baffles: Formed plastic used with attic insulation.
- G. Sill Seal Insulation: Between concrete/wood structural floor systems and sill plates where indicated, ¼" x 3 ½" or 5 ½" as indicated, Owens Corning FoamSealR Sill Plate Gasket, or equal.
- H. Under Slab Insulation/Vapor Retarder: (Specified in Section 31 21 13 – Radon Mitigation Systems)
- I. Batt Insulation: ASTM C665, preformed glass fiber batt of varying thicknesses (3 ½", 5 ½", 8", 9 ½") as indicated on drawings, conforming to the following:
 - 1. Thermal Resistance: R of 19 for exterior walls, 49 for ceilings and interior wall locations.
 - 2. Facing: Unfaced.

2.2 SPRAY-IN-PLACE FOAM INSULATION MATERIALS

- A. Polyurethane: Spray applied polyurethane, ASTM D 1622, closed cell insulation, 2.5 lbs./sf density, aged (180 days) R-value of 6.2 per inch, DEMILEC HeatLoc Soy, Corebond II, or equal. Provide approved Ignition Barrier at all locations of exposed foam insulation.
 - 1. Thermal Resistance of new Spray-in-Place Foam Insulation as required to supplement existing insulation systems as indicated on drawings to achieve the following minimum R-values: Sloped Ceilings of R-49, Exterior Walls of R-21.

2.3 ADHESIVES

- A. Adhesive: Type recommended by insulation manufacturer for application.

2.4 ACCESSORIES

- A. Vapor Retarder: Clear polyethylene film, 6 mil thick.
- B. Tape: Polyester self-adhering type.
- C. Ignition Barrier: Spray applied fire protection intumescent coating applied to all exposed foam insulation locations: DEMILEC BlazeLok IB, TPR² Fireshell F1E, or equal

compatible with insulation substrate and as approved as an Ignition Barrier by authority having jurisdiction.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.

3.2 INSTALLATION - FOUNDATION PERIMETER BOARD INSULATION

- A. Apply adhesive and install boards on foundation perimeter. Stagger joints. Butt edges and ends tight to adjacent board and to protrusions.
- B. Place insulation boards under slab edge.

3.3 INSTALLATION - INSULATION

- A. Install insulation, ventilation baffles and vapor retarder in accordance with insulation manufacturer's instructions.
- B. Install in exterior walls and ceiling spaces without gaps or voids.
- C. Fit insulation tight in spaces. Leave no gaps or voids.
- D. Install friction fit insulation tight to framing members, completely filling prepared spaces.
- E. Place vapor retarder on warm side of insulation by securing in place. Extend vapor retarder tight to full perimeter of adjacent window and door frames, and behind all interior partitions where they meet exterior walls and at other items interrupting the plane of membrane. Tape seal in place.

...END OF SECTION 07 21 00

SECTION 07 27 00

AIR BARRIER

1 PART 1 GENERAL

1.1 SUMMARY:

A. Includes but not limited to:

1. Furnish and install over exterior of wall sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing and interior walls.

1.2 REFERENCES:

- A. AATCC – 127
- B. TAPPI T – 460 (sec/100cc)
- C. ASTM E 96 (g/m² –24 hr.)

1.3 SUBMITTALS:

- A. General: Submit each item in this Article according to the conditions of the Contract and Division I Specifications Sections.
- B. Product Data: Submit product specifications, technical data and installation instructions of manufacturer equaling or exceeding those specified.

2 PART 2 PRODUCTS

2.1 AIR INFILTRATION BARRIER/SECONDARY WEATHER RESISTIVE MEMBRANE:

- A. Spun-bonded olefin, Non-woven, Non-perforated.
- B. Performance Requirements
 1. Water penetration resistance of 210 cm in accordance with AATCC – 127
 2. Air infiltration at 300 seconds in accordance with TAPPI T – 460 (sec/100cc)
 3. Water vapor transmission of 58 perms in accordance with ASTM E 96 Method B(g/m² – 24 hr.)
 4. Basis weight of 2.5oz/yd in accordance with TAPPIT- 410
- C. Membrane shall be free from holes and breaks other than those created by fasteners and construction system due to attachment
- D. Approved Manufacturer:
 1. DuPont Tyvek® Commercial Wrap® by DuPont Company, Wilmington, Delaware
 2. No Alternates or Substitutions

2.2 SEALING TAPE/FASTENERS

- A. Approved Tape Manufacturers:
 - 1. DuPont Contractor Tape, by DuPont Company, Wilmington Delaware
- B. Recommended Fasteners for Wood Framed construction:
 - 1. Nails with large Heads or plastic washers.
- C. Recommended Fasteners for Steel Framed Construction:
 - 1. Rust resistant screws with washers
- D. Recommended Fastening to Masonry:
 - 1. Polyurethane or elastomeric adhesives

3 PART 3 EXECUTION

3.1 AIR INFILTRATION BARRIER

- A. Install Air Infiltration Barrier over exterior side of exterior wall sheathing.
- B. Install Air Infiltration Barrier after sheathing is installed and before windows and doors are installed. Install lower level barrier prior to upper layers to ensure proper shingling of layers.
- C. Overlap Air Infiltration Barrier at corners of building by a minimum of 12 inches.
- D. Overlap Air Infiltration Barrier vertical seams by a minimum of 6 inches.
- E. Ensure barrier is plumb and level with foundation, and unroll extending Air Infiltration Barrier over window and door openings.
- F. Attach Air Infiltration Barrier to wood, insulated sheathing board or exterior gypsum with plastic cap nails every 12" to 18" on vertical stud line with wood stud framing, and screws with washers to metal stud framing.
- G. Prepare window and door rough openings as follows:
 - 1. Prepare each window rough opening by cutting a modified "I" pattern in the Air Infiltration Barrier. This is done as follows:
 - a. Horizontally cut Air Infiltration along bottom of header.
 - b. Vertically cut Air Infiltration Barrier down the center of window openings from the top of the window opening down to 2/3 of the way to the bottom of the window openings.
 - c. Diagonally cut Air Infiltration Barrier from the bottom of the vertical cut to the left and right corners of opening.
 - d. Fold side and bottom flaps into window opening and fasten every 6 inches. Trim off excess.

2. Prepare each rough door opening by cutting a standard "I" pattern in the Air Infiltration Barrier. This is done as follows:
 - a. Horizontally cut Air Infiltration Barrier along bottom of door frame header and along top of sill.
 - b. Vertically cut Air Infiltration Barrier down the center of door openings from the top of the door opening (header) down to the bottom of the door opening (sill).
 - c. Fold side flaps inside around door openings and fasten every 6 inches. Trim off excess.
- H. Tape all horizontal and vertical seam of Air Infiltration Barrier.
- I. Tape a patch over all tears and cuts in Air Infiltration Barrier.

...END OF SECTION 07 27 00

SECTION 07 31 13

ASPHALT SHINGLES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Granular surfaced asphalt shingle roofing, underlayment, eave, valley, and ridge protection, metal flashings.

1.3 SUBMITTALS

- A. Product Data: Provide data indicating material characteristics, and limitations.
- B. Samples: Shingle color samples for selection.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with NRCA Steep Roofing Manual.
- B. Contractor shall verify the color uniformity of roofing shingles. Visible variations in uniformity deemed unacceptable shall be removed and replaced.

1.5 WARRANTY

- A. Provide warranty under provisions of Section 01 00 00.
 - 1. Lifetime, limited transferable warranty
 - 2. 10-year SureStart™ warranty (100% replacement and labor costs due to manufacturing defects)
 - 3. 10-year StreakFighter™ warranty against streaking and discoloration caused by airborne algae
 - 4. 10-year, 90 mph wind-resistance warranty

2 PART 2 PRODUCTS

2.1 ASPHALT SHINGLES

- A. Manufacturers:
 - 1. IKO
 - 2. CertainTeed
 - 3. Georgia Pacific
 - 4. BPCO
- B. Asphalt Shingles: ASTM D225, Type I uniform non-uniform thickness laminated shingles; UL Rating of C and Wind Resistance Label, fiberglass felt base, mineral granule surfaced

type; 245lb/100 sq. ft. weight; self sealing type; two-piece shadow style; color as selected: CertainTeed "Woodscape Premium", or equal.

2.2 SHEET MATERIALS

- A. Eave (Ice Dam) Protection: Sheet barrier of rubberized asphalt bonded to sheet polyethylene, 40 mil total thickness; with strippable treated release paper; Ice & Water Shield manufactured by WR Grace. Substitutions: Not permitted.
- B. Underlayment: No. 15 unperforated asphalt saturated felts.

2.3 ACCESSORIES

- A. Nails: Standard hot dipped zinc coated steel type, of sufficient length to penetrate roof sheathing. Staples will not be accepted.
- B. Plastic Cement: Asphalt type with mineral fiber components.
- C. Attic Roof Vent: Pop Vent model PV-12-W6 Attic Ventilation Products, Inc., net free ventilation area 113 square inches, painted finish color as selected by architect, or equal.

2.4 FLASHING MATERIALS

- A. Sheet Flashings: ASTM B209; 0.040 inch thick aluminum.
- B. Drip Edge: 0.040 inch thick aluminum, 5" width.

2.5 FLASHING FABRICATION

- A. Form flashings to profiles indicated on Drawings, and to protect roofing materials from physical damage and shed water.
- B. Brake form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
- C. Form step flashings with minimum 6" vertical and horizontal legs.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that plumbing stacks and roof penetrations are flashed to deck surface.
- B. Verify deck surfaces are dry, free of ridges, warps, or voids. Broom clean surfaces.
- C. Fill knot holes and surface cracks with latex filler at areas of bonded eave protection.

3.2 INSTALLATION - EAVE ICE DAM PROTECTION

- A. Place eave and gable edge metal flashings tight with fascia boards. Weather lap joints and seal with plastic cement. Secure flange with nails.

- B. Apply rubberized asphalt/polyethylene sheet eave protection in accordance with manufacturer's instructions.
- C. Extend eave protection membrane minimum 4 ft upslope beyond interior face of exterior wall (minimum two courses).
- D. Extend protection membrane a minimum of 18" up face of walls and on roof surface at wall/roof intersections
- E. Extend protection membrane a minimum of 36" from roof edge at rakes and 36" each side of valleys.

3.3 INSTALLATION - PROTECTIVE UNDERLAYMENT

- A. Place one ply of underlayment over area not protected by eave protection, with ends and edges weather lapped and nailed. Stagger end laps of each consecutive layer.
- B. Install perpendicular to slope of roof.
- C. Weather lap and seal watertight with plastic cement, items projecting through or mounted on roof.

3.4 INSTALLATION - VALLEY PROTECTION

- A. Center rubberized asphalt/polyethylene sheet protection membrane in valleys and extend protection membrane minimum 4-1/2 ft upslope beyond center of valley (minimum three courses across valley).
- B. Extend shingles on both slopes across valley in a weave pattern and fasten. Extend shingles beyond valley centerline to achieve woven valley, concealing the valley protection. (Provide closed-cut valley for 30-year shingles)

3.5 INSTALLATION - METAL FLASHING

- A. Weather lap joints and seal weather tight with plastic cement. Secure in place with concealed fastenings. Extend bottom of step flashings to daylight.
- B. Flash and seal work projecting through or mounted on roofing with plastic cement, weather tight.

3.6 INSTALLATION - ASPHALT SHINGLES

- A. Install shingles in accordance with manufacturer's instructions. Staples are NOT an acceptable means of fastening.
- B. Provide double course of shingles at eaves.
- C. Place shingles in straight coursing pattern with required weather exposure to produce double thickness over full roof area.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Cap hips and ridges with individual shingles, maintaining weather exposure. Place to avoid exposed nails.
- F. Complete installation to provide weather tight service.

3.7 INSTALLATION – RIDGE VENT

- A. Install ridge vent in accordance with manufacturer's instructions.
- B. Center ridge vent over continuous 2" opening in sheathing and secure to sheathing.
- C. Cap ridge vent with shingles.

...END OF SECTION 07 31 13

SECTION 07 46 46

MINERAL FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Siding panels.

1.2 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Framing and Sheathing.
- B. Section 06 60 00 – Plastic Fabrications.
- C. Section 07 90 00 - Sealants.
- D. Section 09 90 00 - Paints and Coatings.

1.3 REFERENCES

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C 1186 - Standard Specification for Flat Non-Asbestos Fiber Cement Sheets; 1999.
- D. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- F. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.
- G. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C; 1999.
- H. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer; 1995.
- I. ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.

1.4 SUBMITTALS

- A. Make submittals under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods, including nailing patterns.
 4. Applicable model code authority evaluation report (ICBO, BOCA, IBC, etc.)
- C. Siding manufacturer's requirements for vapor retarders, primer, paint, etc., to be installed by others.
- D. Maintenance and periodic inspection recommendations.
- 1.5 QUALITY ASSURANCE
- A. Installer: Provide installer with not less than three years of experience with products similar to those specified.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store products off the ground, on a flat surface, and under a roof or separate waterproof covering.
- 1.7 WARRANTY
- A. Register manufacturer's warranty, made out in Owner's name, with copy to Owner.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. CertainTeed Corporation, Siding Products Group, P.O. Box 860, Valley Forge, Pennsylvania 19482. ASD. Tel: (800) 233-8990 (professional).
- B. Requests for substitutions will be considered in accordance with provisions of Section 01001.

2.2 PANELS

- A. Fiber Cement Board Panels - General: Cement and cellulose fiber formed under high pressure into boards with integral surface texture; complying with ASTM C 1186 Type A Grade II; machined edges; for nail attachment.
1. Surface Burning Characteristics: Flame spread index of 0, smoke developed index of 6, maximum; when tested in accordance with ASTM E 84 (Class I/A).
 2. Flammability: Noncombustible, when tested in accordance with ASTM E 136.
 3. Flexural Strength: At least 1450 psi (10 MPa) when in equilibrium condition, and at least 1015 psi (7 MPa) when in wet condition, tested in accordance with ASTM C 1185.
 4. Coefficient of Thermal Expansion: Less than 1×10^{-5} /inch/inch/degree F (0.5×10^{-5} /degree C), when tested in accordance with ASTM E 228.
 5. Water Vapor Transmission: Less than 7.0 perm-inch (10 ng/(Pa s m)), when tested in accordance with ASTM E 96.
 6. Freeze Thaw Resistance: At least 80 percent flexural strength retained, when tested in accordance with ASTM C 1185.
 7. UV Resistance: No cracking, checking, or erosion, when tested for 2000 hours in accordance with ASTM G 26.
 8. Water Tightness: No water droplets on underside, when tested in accordance with ASTM C 1185.

- B. Simulated Lap Siding: Certaineed Weatherboards FiberCement Siding Shapes
 1. Thickness: 5/16" nominal
 2. Style: Smooth Lap, 4" exposure 5 1/4" x 12" long, nominal.
- B. Finish: Sealed with FiberTect sealer/primer and manufacturer's standard acrylic factory prefinish, color as selected.

2.3 ACCESSORIES

- A. Trim: Solid PVC as per architectural details and 06 60 00.
- B. Provide the following trim:
 1. Starter strip for lap siding.
 2. Outside corners, butted to siding.
 3. Outside corners, overlapping siding.
 4. Fascia board.
- C. Sealant: Paintable, 100 percent acrylic latex caulk complying with ASTM C 920.
- D. Sheet Metal Flashing: Minimum .032" aluminum.
- E. Nails: Length as required to penetrate minimum 1-1/4 inch (32mm) into solid backing; hot-dipped galvanized or stainless steel.
- F. Building Paper: Per 07 27 00 "Air Barriers".
- G. Field Finish Paint: 100 percent acrylic latex as specified in Section 09 90 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to commencing installation, verify governing dimensions of building and condition of substrate.

3.2 PREPARATION

- A. Examine, clean, and repair as necessary any substrate conditions that would be detrimental to proper installation.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and drawing details.
 1. Read warranty and comply with all terms necessary to maintain warranty coverage.
 2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
 3. Use trim details indicated on drawings.
 4. Touch up all field cut edges before installing.
 5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into

studs.

- C. Allow space between both ends of siding panels that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.
- D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- E. Install sheet metal flashing above door and window casings and horizontal trim in field of siding.
- F. Do not install siding less than 6 inches (150 mm) from surface of ground nor closer than 1 inch (25 mm) to roofs, patios, porches, and other surfaces where water may collect.
- G. After installation, seal all joints except lap joints of lap siding. Seal around all penetrations. Paint all exposed cut edges.
- H. Finish Painting: Specified in Section 09 90 00.
- I. Finish Painting: Within 24 months after installation, paint siding and trim with one coat finish paint.

3.4 CLEANING

- A. At completion of work, remove debris caused by siding installation from project site.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07 53 00

ELASTOMERIC MEMBRANE ROOFING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Elastomeric Sheet Membrane Conventional EPDM (black) and TPO (white) Roofing System, insulation, roofing membrane expansion joints, mechanically attached or fully adhered, VOC limited to Maine Housing Design Guidelines.

1.3 SYSTEM DESCRIPTION

- A. Elastomeric sheet membrane roof assembly including structure and ceiling under to conform to requirements for a UL Class A fire rated assembly, and FM I 90 requirements for wind uplift resistance.

1.4 DESIGN REQUIREMENTS

- A. Low Slope Membrane Roof Edge Securement: Conform to SPRI ES-1 for wind speeds determined from applicable code.

1.5 SUBMITTALS

- A. Product Data: Provide characteristics on membrane materials, flashing materials, insulation and walkway pads.
- B. Roof Inspection Report: Submit inspection report by roofing membrane manufacturer's representative following completion of installation.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with UL 790 (Underwriters Laboratories Inc.) Class A Fire Hazard Classification. FM 4470 (Factory Mutual Engineering Corporation) - Roof assembly Classification wind uplift requirement of I-90, FM Construction Bulletin 1-28, Class 1 A Construction.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install membrane during inclement weather or when air temperature may fall below 40 degrees F.

1.8 WARRANTY

- A. Provide twenty (20) year warranty under provisions of Section 01 00 00 including coverage of materials and installation and resulting damage to building resulting from failure to resist penetration of moisture.

2 PART 2 PRODUCTS

2.1 MEMBRANE MATERIALS

- A. Manufacturers:
 - 1. Carlisle Syntec Systems.
 - 2. Celotex Corp.
 - 3. Dunlop Construction Products Co.
 - 4. Firestone Building Products Co.
 - 5. Goodyear Tire and Rubber Co.
 - 6. Schuller Roofing Systems.
- B. Membrane: EPDM and TPO; 0.060 inch thick, reinforced, colors: black and white as scheduled.
- C. Seaming Materials: As recommended by membrane manufacturer.

2.2 MEMBRANE FASTENING

- A. Insulation Adhesive: Type recommended by insulation manufacturer, VOC limited to MaineHousing Design Guidelines.
- B. Mechanical Fasteners: Manufacturer's standard type for application intended.

2.3 INSULATION MATERIALS

- A. Manufacturers:
 - 1. As approved by manufacturer of roofing membrane.
- B. Insulation: ASTM C 1289-95 Type II, polyisocyanurate closed cell foam core with manufacturer's standard facing; thicknesses as indicated, square edges, R value of 6.0 per inch thickness. Provide tapered sections as required to ensure positive drainage to roof drains.
- C. Separation Sheet: As recommended by roofing membrane manufacturer for application intended.
- D. Insulation Adhesive: As recommended by insulation manufacturer, VOC limited to MaineHousing Design Guidelines.

2.4 ACCESSORIES

- A. Flexible Flashings: Same material as membrane, color to match membrane; manufactured by roofing membrane manufacturer.
- B. Roof Edge/Fascia: two part interlocking aluminum fascia system meeting requirements for wind uplift rating, with Kynar finish, color as selected by Architect.
- C. Prefabricated Control or Expansion Joint Flashing: Sheet EPDM and TPO with foam filler, and metal edge flashings: Schuller Expand-O-Flash or equal.
- D. Fiber Cant Strips: Asphalt impregnated wood fiberboard.

- E. Roofing Fasteners: Galvanized or non-ferrous type as recommended by membrane manufacturer.
- F. Sealants: As recommended by membrane manufacturer, VOC limited to MaineHousing Design Guidelines.
- G. Walkway Pads: As recommended by membrane manufacturer.

3 PART 3 EXECUTION

3.1 PRE ROOFING CONFERENCE

- A. Conduct pre-roofing conference with all trades affected by roofing installation, Owner and Architect. Record discussions and distribute to all parties.

3.2 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work; deck is clean and smooth, free of snow or ice; properly sloped to drains.
- B. Verify roof openings, curbs, and protrusions through roof are solidly set; wood cant strips and reglets are in place.
- C. Verify adjacent precast concrete roof members do not vary more than 1/4 inch in height. Verify grout keys are filled flush.

3.3 PREPARATION

- A. Fill concrete surface honeycomb and variations with latex filler.

3.4 INSULATION APPLICATION

- A. Embed into insulation adhesive (VOC limited to MaineHousing Design Guidelines) and mechanically fasten insulation to deck in accordance with insulation manufacturer's instructions.
- B. Lay second layer of insulation with joints staggered from first layer.
- C. Minimum Total Insulation Thickness: As required to achieve an average insulation R-value of 49 for overall roof assembly (see drawings).
- D. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

3.5 MEMBRANE APPLICATION

- A. Apply membrane and mechanical attachment devices in accordance with manufacturer's instructions.
- B. Roll out membrane. Work out air bubbles, wrinkles, and fish mouths.
- C. Overlap edges and ends and solvent seal watertight.

- D. Install mechanical fasteners in accordance with manufacturer's instructions and UL and FM ratings.
- E. Seal membrane to adjoining surfaces.
- F. Shingle joints on sloped substrate in direction of drainage. Apply joint sealant.
- G. Continue membrane up vertical surfaces minimum 8 inches unless otherwise noted. Reinforce membrane with multiple thickness of membrane material over joints.
- H. Seal items penetrating membrane with counter flashing membrane material. Install membrane flashings. Seal watertight to membrane.
- I. Place walkway units at locations indicated.

3.6 FLASHINGS AND ACCESSORIES

- A. Apply flexible flashings to seal membrane to vertical elements.
- B. Install roof edge trim/fascia in accordance with manufacturer's instructions. Seal to roof membrane.
- C. Install prefabricated roofing expansion control joints to isolate roof into areas as indicated in accordance with manufacturer's instructions.
- D. Coordinate installation of roof drains sumps and related flashings.
- E. Seal flashings and flanges of items penetrating membrane.

3.7 INSPECTION

- A. Conduct inspection of completed installation with representative of roofing membrane manufacturer. Identify any deficiencies and make corrections as directed by representative. Submit reports to Architect/Engineer and Owner.

...END OF SECTION 07 53 00

SECTION 07 61 00

SHEET METAL ROOFING, FLASHING, AND TRIM

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes flashings and counterflashings, gutters and downspouts and fabricated sheet metal items.
 - 1. Provide precast concrete splash pads.

1.2 SYSTEM DESCRIPTION

- A. Sheet Metal System: Conform to criteria of SMACNA "Architectural Sheet Metal Manual", and/or as appropriate, Copper Development Association "Copper in Architecture - Handbook".
 - 1. Gutters: SMACNA Details
 - 2. Downspouts: SMACNA Details
 - 3. Flashings: SMACNA Details
- B. Gutters and Downspouts: Size components for rainfall intensity determined by storm occurrence of 1 in 100 years, 60 min. duration, in accordance with Maine State Internal Plumbing Code requirements.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, termination, and installation details.
- B. Samples: Submit two samples of each type of formed metal flashing illustrating typical seam, external corner, internal corner, material, color, and finish.

1.4 WARRANTY

- A. Furnish five year manufacturer warranty for finishes.

2 PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

- A. Fabricators:
 - 1. Cheney Flashing Co
 - 2. Keystone Flashing Co.
 - 3. Metal-Era Inc.
 - 4. Substitutions: Permitted

- B. Product Description: Flashing and sheet metal; unfinished or prefinished, including gutters, downspouts, and accessories.

2.2 COMPONENTS

- A. Pre-Finished Aluminum Sheet: ASTM B209; 3003 alloy, H14 temper; 0.040 inch thick; mill finish shop pre-coated with silicone polyester two coat top coat; color as selected from manufacturer's standard.
- B. Copper: ASTM B370; H00 temper, 16 oz/sq ft; natural finish.
- C. Lead Coated Copper Sheet: ASTM B101; O60 temper, 16 oz/sq ft.

2.3 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Gutter and Downspout Anchorage Devices: In accordance with SMACNA requirements.
- C. Gutter Supports: Brackets
- D. Downspout Supports: Brackets.
- E. Underlayment: ASTM D226; Type II, No. 30 unperforated asphalt felt.
- F. Protective Backing Paint: Zinc molybdate alkyd.
- G. Slip Sheet: Rosin sized building paper.
- H. Sealant: Exterior metal lap joint butyl or polyisobutylene sealant as specified in Section 07 90 00
- I. Plastic Cement: ASTM D4586, Type I.
- J. Reglets: Surface mounted.

2.4 FABRICATION

- A. Gutter Accessories: Profiled to suit gutters and downspouts.
- B. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
- C. Form components to shape indicated on Drawings, accurate in size, square, and free from distortion or defects. Form pieces in longest practical lengths.
- D. Fabricate cleats and starter strips of same material as sheet, to interlock with sheet.
- E. Hem exposed edges on underside 1/2 inch; miter and seam corners. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

- G. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Fabricate corners in one piece, 18 inch long legs; seam for rigidity, seal with sealant.
- I. Form sheet metal pans with upstand, and flanges.

2.5 SHOP FINISHING

- A. Silicone polyester coating: Baked enamel system conforming to AAMA 2603.
- B. Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Install starter and edge strips, and cleats.
- B. Install surface mounted reglets. Seal top of reglets with sealant. Insert flashings to form tight fit. Seal flashings into reglets with sealant.
- C. Secure flashings, gutters and downspouts in place using [concealed] fasteners.
- D. Apply plastic cement compound between metal work and felt flashings.
- E. Fit components tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- F. Install sheet metal pans surrounding roof penetrations. Fill pans watertight with plastic cement.
- G. Slope gutters 1/4 inch per foot minimum.
- H. Set splash pads under downspouts.
- I. Seal joints watertight.

J. Install snow guards as indicated on Drawings.

...END OF SECTION 07 62 00

SECTION 07 84 00

FIRESTOPPING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Firestopping materials and accessories.

1.3 SYSTEM DESCRIPTION

- A. Firestopping Materials: Complete systems of materials tested under ASTM E119, ASTM E814, UL 263, UL 1479 to achieve a fire rating as noted on Drawings.
- B. Surface Burning: ASTM E84, UL 723 with a flame spread / smoke developed rating of 0/0
- C. Firestop all interruptions to fire rated assemblies, materials and components.

1.4 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance and limitation criteria.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Schedule: Provide a schedule of openings and penetrations requiring firestopping and firesafing. Correlate with products submitted, fire ratings, and testing agency test results.

2 PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

- A. Manufacturers:
 - 1. Hilti USA
 - 2. Isolatek International (Cafco Products).
 - 3. Specified Technologies Inc.
 - 4. 3M Fire Protection Products.
 - 5. United States Gypsum Co.
 - 6. Substitutions permitted.

- B. Firestopping Material: Mineral fiber stuffing insulation.
 - 1. USG Thermafiber Safing Insulation.
 - a. Density: 4.0 lb/cu ft.
- C. Firestopping Material: Single component mortar compound.
 - 1. Hilti CP 637 Firestop Mortar
 - 2. Cafco TPS Mortar.
 - 3. SpecSeal Fire Rated Mortar SSM
 - 4. USG Firecode Compound.
- D. Firestopping Material: Single component elastomeric compound.
 - 1. Cafco TPS Type C.
 - 2. Hilti FS-One High Performance Sealant
 - 3. SpecSeal Latex Sealant LC150
 - 4. 3M Fire Barrier CP 25WB+ Caulk.
 - 5. USG Smoke-Seal Compound.

2.2 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces.
- B. Dam Material: Permanent:
 - 1. As required by manufacturer to meet system listing.
- C. Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify openings are ready to receive the work of this section.
- B. Clean substrate surfaces of matter which may effect bond of firestopping material.
- C. Install backing materials to arrest liquid material leakage.

3.2 APPLICATION

- A. Apply primer and materials in accordance with manufacturer's instructions.
- B. Apply firestopping material in sufficient thickness to achieve rating, in manner consistent with tested and listed assemblies.
- C. Install material at openings and edge of floor slabs requiring firestopping.
- D. Install material at walls or partition openings which contain penetrating sleeves, piping, duct work, conduit and other items, requiring firestopping.
- E. Protect installed firestopping from damage during construction operations.

...END OF SECTION 07 84 00

SECTION 07 90 00

JOINT PROTECTION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Provide only materials that comply with MSHA Green Standards, including the following VOC limits in grams per liter per South Coast Rule #1168 by the South Coast Air Quality Management District:

1.	Architectural Sealants	250
2.	Other Sealants	420
3.	Architectural Primers – nonporous	250
4.	Architectural Primers – porous	775
5.	Other Primers	750

1.3 SUBMITTALS

- A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, color availability.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

2 PART 2 PRODUCTS

2.1 SEALANTS

- A. Type A - General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses NT, M, G, A and O; single component; Sonneborn Sonolastic NP 1, or equal.

1. Color as selected.
2. Applications: Use for:
 - a. Joints between concrete and other materials.
 - b. Joints between brick and other materials.
 - c. Joints between metal frames and other materials.
 - d. Joints between siding and other materials.

- e. Joints between exterior wall wood framing members, including studs, plates, band joists.
 - f. Other exterior joints for which no other sealant is indicated.
- B. Type B - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, ASTM C 1311, nondrying, non-skinning, non-curing; DAP Butyl-Flex, or equal.
- 1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Bedding for door thresholds.
- C. Type C - General Purpose Interior Sealant: Siliconized Acrylic emulsion latex; ASTM C834, single component, paintable; DAP Alex Plus, or equal.
- 1. Colors as selected.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Interior joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- D. Type D - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses NT, G and A; single component, mildew resistant; Sonneborn Sonolastic Omniplus, or equal.
- 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- E. Type E - Acoustical Sealant: Butyl or acrylic sealant; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
- 1. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud plate and structure and between bottom stud plate and floor.
- F. Type F - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component; Sonneborn Sonolastic SL1, or equal.
- 1. Colors as selected.
 - 2. Applications: Use for:
 - a. Expansion joints in floors.
- G. Type G - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, M and A; single component; Sonneborn Sonolastic SL1, or equal.
- 1. Color as selected.
 - 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.
- H. Type H – Insulating Foam Sealant: Latex foam sealant, non expanding, paintable; DAPtex Plus, or equal.

1. Applications: Use for concealed locations only:
 - a. Joints around windows and doors in exterior walls.
- I. Type I – Elastomeric Latex Sealant: Acrylic polymer sealant, ASTM C 920, Type S, Grade NS, Class 25, low odor, mildew resistant, paintable; DAP Dynaflex 230, or equal.
 1. Applications: Use for concealed locations only:
 - a. Joints between exterior extruded polystyrene insulation boards.

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant, ASTM C 1330, Type C, closed cell polyethylene foam oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.
- C. Remove loose materials and foreign matter which might impair adhesion of sealant.
- D. Clean and prime joints in accordance with manufacturer's instructions.
- E. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

3.2 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker where joint backing is not used.

- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.

...END OF SECTION 07 90 00

Part II
Division 8

Doors & Windows

SECTION 08 11 00

METAL DOORS AND FRAMES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Steel doors panels and frames; non-rated and fire rated

1.3 SUBMITTALS

- A. Shop Drawings: Indicate door and frame elevations, internal reinforcement, cut-outs for glazing, and finishes.
- B. Product Data: Indicate door and frame configurations, location of cut-outs for hardware reinforcement.

1.4 QUALITY ASSURANCE

- A. Conform to the following:
 - 1. SDI-100 - Standard Steel Doors and Frames.
 - 2. DHI - Door Hardware Institute - The Installation of Commercial Steel Doors and Metal Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 - 3. Fire Rated Door Panel and Frame Construction: ASTM E152. NFPA 252. UL 10B. NFPA 80.
 - 4. Handicapped: ANSI A117.1, ADA.
- B. Warranty: 10 year warranty against defects in materials and workmanship.

2 PART 2 PRODUCTS

2.1 DOORS AND FRAMES

- A. Manufacturers:
 - 1. Amweld Building Products
 - 2. Brockway Smith Co.; BROSCO Perma-Door Royal
 - 3. Ceco Door Products
 - 4. Curries Co
 - 5. Flemming Door Products
 - 6. General Products Co. Inc.; Benchmark
 - 7. Lake Shore Industries Inc.; Therma-Tru
 - 8. Peachtree Doors Inc.; Avanti
 - 9. Pease Doors Inc.; Ever-Strait
 - 10. Republic Builders Products

11. Stanley Works
 12. Steelcraft Manufacturing
- B. Provide metal frames for doors and other openings as shown on the Drawings and Schedules. Conceal all fastenings unless otherwise shown. Countersink exposed screws using Phillips flat head screws.
- C. Door Frames: Level 3, nominal 16 gauge sheet steel (14 gauge galvanized steel at exterior door frames). Frames shall be combination type with integral stop. Reinforce each miter joint internally with 18 gauge channel shaped reinforcements. Equip frames with one welded-in floor anchor in each jamb. Provide three field inserted steel lock-in anchors (maximum of 24" oc.) at each jamb. Anchor to construction involved (i.e. wood frame, masonry, concrete or steel stud). Fabricate all frames to fit surrounding wall construction snugly; no plastic, vinyl, or other fillers will be accepted.
1. Frames for Masonry Openings: Provide self-aligning tabs and slots for secure locking and miter and continuously arc-weld on the frame face (spot weld at corners) to form a one-piece neat mitered corner assembly.
 2. Frames for Drywall Openings: Provide for installation after the wall is erected. Supply head frame with an oval countersunk head sheet metal screw, located out of view, for securing the header and jambs. Provide headers and jambs with mating tabs and slots for alignment of the assembly. Provide neat mitered joints at all corners. Provide two welded-in steel stiffeners at each jamb member to maintain a tight grip on the wall and equip with welded-in sill anchors.
- C. Exterior Doors: (Insulated) 1-3/4" thick, level 2, heavy duty, embossed design, galvanized to ASTM A653 G60.
- D. Interior Doors: (Fire Rated) 1-3/4" thick, level 1, standard duty, embossed design.
- E. Door Core:
1. Exterior Doors: polyurethane foam.
 2. Fire Rated Doors: mineral core.
- F. Thermal Insulated Door: Total insulation R value of not less than 10.

2.2 ACCESSORIES

- A. Lights: Tempered insulating glass, Low-E at exterior doors, 1/4" tempered float glass at interior non-fire rated doors, 1/4" wired float glass at interior fire rated doors..
- B. Silencers: Resilient rubber fitted into drilled hole.
- C. Weatherstripping; Integral compression type at jambs and head, bulb and fin at bottom.
- D. Primer: Zinc chromate type.

2.3 FABRICATION - DOORS

- A. Astragals for Double Doors (If required): Aluminum, T shaped, specifically for double doors. Provide units with fire rating at fire rated double doors.
- B. Fabricate doors with hardware reinforcement welded in place.
- C. Attach appropriate label to each fire rated door. DO NOT PAINT OVER LABELS

2.4 FABRICATION - FRAMES

- A. Fabricate steel frames knock-down for field assembly. .
- B. Fabricate wood frames fully assembled with prehung doors.
- C. Fabricate frames with hardware reinforcement plates welded in place.
- D. Prepare frame for silencers and install.
- E. Attach appropriate label to each fire rated frame.

2.5 FINISH

- A. Steel Sheet: Galvanized to ASTM A525 G60).
- B. Primer: Air dried.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with SDI-100.
- B. Coordinate installation of doors and frames with installation of hardware specified in Section 08 71 00.
- C. Coordinate with gypsum board wall construction for frame anchor placement.
- D. Install door louvers plumb and level.

3.2 TOLERANCES

- A. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

...END OF SECTION 08 11 13

SECTION 08 14 00

WOOD DOORS

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Wood doors and frames, non-rated and fire rated.
- B. Aluminum Clad Sliding Patio Doors.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate door elevations.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with the following:
 - 1. NWWDA I.S.1.
 - 2. Fire Door Construction: Conform to NFPA 252, UL 10B.
 - 3. Installed Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.5 WARRANTY

- A. Section 01 00 00 - Basic Requirements: Provide a five year warranty to include coverage:
 - 1. Interior Doors: Five (5) years.
 - 2. Exterior Doors: Twenty (20) year limited.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction.

2 PART 2 PRODUCTS

2.1 DOOR TYPES

- A. Manufacturers:
 - 1. Blount Lumber Co.
 - 2. Brockway Smith Co.
 - 3. Eggers Industries
 - 4. Jeld-Wen Inc.
 - 5. Eagle Windows
 - 6. The Maiman Co.
 - 7. Marshfield Door Systems Inc.
 - 8. Millennium Doors.

9. Mohawk Flush Doors Inc.

- B. Interior Doors: 1-3/8 inch thick hollow core and 1-3/4 inch solid core construction; as indicated on Door Schedule.
- C. Jeld Wen Sliding Patio Doors: Premium Wood - Siteline EX 300 Series, Energy Star rated metal clad (.050" frame and .060" panels) with a baked-on finish, standard sliding patio door handle, natural wood (Pine AuraLast) interior to be field primed and painted, factory-applied exterior brick mould, optional multipoint locking system, tempered LoE³-366 Argon insulating glazing, exterior sliding screen with tough 18x16 Charcoal fiberglass mesh, integral nailing fin, U-VALUE = .31, structural performance DP rating = LC50, or approved equal.

2.2 INTERIOR DOOR CONSTRUCTION

- A. Core (Solid, non-rated): NWWDA I.S.1-A-97, PC-5 or PC-7, Type Solid particle board mat-formed, bonded core, Jeld Wen ProCore, or approved equal.
- B. Core (Solid, Fire-Rated): NWWDA I.S.1-A-97, FD-5 or FD-7, Type Solid mineral core, bonded.

2.3 INTERIOR DOOR FACING

- A. Face Panel: Hardboard, embossed six panel design two sides (Arlington smooth surface with beaded stickling), smooth, tempered, 1/8 inch (3 mm) thick; ANSI/AHA A-135.4, Jeld Wen ProCore, or approved equal.
- B. Adhesive: NWWDA, Type II - water resistant.

2.4 ACCESSORIES

- A. Glass Stops: Wood type: conform to UL requirements.
- B. Exterior Sliding Doors: Provide flashed molded PVC sill pan.

2.5 WOOD FRAMES

- A. Exterior Door Frames: Solid wood doors: Solid Double Rabbeted jamb wood frames suitable for paint finish with BROSCO 8710 casings inside, integral brick mold exterior. Refer to Door Schedule
- B. Interior Door Frames: Solid core doors: Solid Double Rabbeted jamb wood frames suitable for paint finish with BROSCO 8710 casings both sides. Refer to Door Schedule.
- C. Interior Door Frames, Fire Rated Doors: Solid Double Rabbeted jamb wood frames, fire rated, suitable for paint finish with BROSCO 8710 casings both sides. Refer to Door Schedule.

2.6 FABRICATION

- A. Fabricate doors with hardware reinforcement blocking in place.
- B. Factory machine doors for finish hardware.
- C. Factory fit doors for frame opening dimensions identified on shop drawings.

2.7 FINISH

- A. Field finish inside face of exterior doors with a transparent finish as specified in specification Section 09 91 23.
- B. Factory prime and field finish faces of interior doors with a paint finish as specified in specification Section 09 91 23.
- C. Seal door top and bottom edge with finish to match door facing.
- C. Color as selected by Architect from manufacturer's complete color line.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and NWWDA I.S.1 requirements.
- B. Coordinate installation of doors with installation of metal frames specified in Section 08 11 00 and hardware specified in Section 08 71 00, glass specified in Section 08 80 00.
- C. Adjust door for smooth and balanced door movement.

3.2 INSTALLATION TOLERANCES

- A. Conform to NWWDA requirements for fit and clearance tolerances and maximum diagonal distortion.
- B. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

...END OF SECTION 08 14 00

SECTION 08 31 00

ACCESS PANELS

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing access panels.
- C. Related work:
 - 1. Section 09 21 00, gypsum wallboard.
 - 2. Section 09 91 13, exterior painting; field paint finish.
 - 3. Section 09 91 23, interior painting

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data for access panels and GWB specialties.

1.3 DELIVERY

- A. Package, handle, deliver and store access panels at the project site in a manner that will avoid damage.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Fire-Rated Access Doors and frames to conform to U.L. and Warnock Hersey requirements.

2 PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. Access Panels listed as follows as provided by Larsen's Manufacturing Company, or equal.

2.2 MATERIAL:

- A. In accordance with Non-Rated Flush Access Panel for Wall Board Surfaces (Larsen L-DWC Series), provide where penetrating non-fire rated assemblies.
 - 1. 16 Gauge cold rolled steel frame
 - 2. 14 Gauge cold rolled steel door.

3. Phosphate dipped with baked on rust inhibitive gray prime finish
4. 22 Gauge galvanized steel drywall bead
5. Concealed spring pin hinge
6. Frames are provided with .25" mounting holes
7. Flush screwdriver operated cam latch (provided additional cams for panels 18" x 18" and greater in size"

A. In accordance with Fire-Rated Flush Access Panel for Wall Board Surfaces (Larsen L-FRAP Series), provide where penetrating fire rated assemblies.

1. 16 Gauge cold rolled steel frame
2. 20 Gauge cold rolled steel door.
3. Phosphate dipped with baked on rust inhibitive gray prime finish
4. 22 Gauge galvanized steel drywall bead
5. Concealed spring pin hinge
6. Frames are provided with .25" mounting holes
7. Flush screwdriver operated cam latch (provided additional cams for panels 18" x 18" and greater in size"
8. 2" thick fire rated mineral fiber

2.3 FABRICATION

A. Furnish as necessary each access panel assembly manufactured complete with all parts ready for installation.

3 PART 3 EXECUTION

3.1 INSPECTION

A. Verify that wall and ceiling openings are correctly dimensioned to receive access panel.

3.2 INSTALLATION

A. Install according to manufacturers instruction.

3.3 ADJUST AND CLEAN

A. Adjust latch and lock mechanisms to operate smoothly

...END OF SECTION 08 31 00

SECTION 08 51 00

METAL WINDOWS

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes aluminum windows, factory glazing, and framed insect screens.

1.2 PERFORMANCE STANDARDS

- A. The following Minimum Window Requirements performance standards published in the MaineHousing Green Building Standards apply to this project:

1. Overall Window U Value of less than .35
2. Glazing Solar Heat Gain Coefficient (SHGC) or .35 or higher
3. Overall Window Air Leakage Rate (AL) of .30 or less

1.3 SYSTEM DESCRIPTION

- A. Metal Windows: Factory fabricated, factory finished, vision glass, related flashings, anchors, and attachment devices.
- B. Configuration: Conform with ANSI 101 Designations for windows required for Project; H-hung sash, A-awning sash.
- C. Certification: Provide only windows certified by NFRC.
- D. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall to a minimum design pressure of 27 psi and as tested in accordance with ASTM E330.
- E. Air Infiltration: Limit air leakage through assembly to 0.3 cfm/sq ft of wall area, measured at reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.
- F. Water Leakage: None when measured in accordance with ASTM E331.
- G. System Internal Drainage: Drain water entering framing system to exterior.

1.4 SUBMITTALS

- A. Compliance Certification - Provide one of the following prior to acceptance of the product and award of bid:
1. Letter certifying that the submitted window products comply with the MaineHousing Green Building Standards published herein, stating the actual performance standards and how the submitted product meets the specification; or
 2. Letter certifying and stating a) the submitted window products' actual performance standards and a complete list of deficiencies from the specification,

and b) a statement, which backup documentation, as to how the submitted window products, despite their deficiencies, exceed the performance standards as a whole. Note that acceptance of products submitted under this second option will be made at the owner's discretion and may be cause for rejection.

- B. Shop Drawings: Submit shop drawings, including typical unit elevations at 1/4 inch scale, and half size detail sections of every typical composite member. Indicate opening dimensions, framed opening tolerances, affected related work; and installation requirements. Show anchors, hardware, operators and other components as appropriate if not included in manufacturer's standard data. Include glazing details and standards for factory glazed units.
- C. Product Data: Provide manufacturer's specifications, recommendations and standard details for aluminum window units, component dimensions, anchorage and fasteners, and glass.
- D. Samples:
 - 1. Submit one sample of each required aluminum finish, on 3 x 3 inch long sections of extrusion shapes or aluminum sheets as required for window units.
 - 2. Submit additional samples, if and as directed by Architect, to show fabrication techniques, workmanship of component parts, and design of hardware and other exposed auxiliary items.
- E. Certifications: Submit certified test laboratory reports by independent laboratory substantiating performance of system.

1.5 QUALITY ASSURANCE

- A. Manufacturer and Installer: Companies specializing in manufacturing commercial window units with minimum three years documented experience.
- B. Perform Work in accordance with the following:
 - 1. Metal Windows: Fabricate and label window assemblies in accordance with AAMA 101 for types of windows required.

1.6 WARRANTY

- A. Furnish five year manufacturer warranty for insulated glass units and factory finishes.

2 PART 2 PRODUCTS

2.1 METAL WINDOWS AND SLIDING DOORS

- A. Manufacturers:
 - 1. EFCO Corp.-Aluminum Windows.
 - 2. Graham Architectural Products.
 - 3. Kawneer Co. Inc.-Aluminum Windows.
 - 4. St. Cloud Windows Inc.-Aluminum Windows.

5. Traco-Aluminum Windows.
6. Universal Window and Door LLC.
7. Wausau Metals-Aluminum Windows.
8. Substitutions: Permitted.

B. Product Description:

1. Hung Windows: Double hung (with top sash fixed w/ maintenance operation for cleaning only), tilt wash operation, triple-glazed, with half-screens at operable (lower) sash, equal sight lines for upper and lower sash, simulated exterior divided light historical muntins with spacers between glass panes, factory applied metal panning and trim at exterior as per details, break metal clad sill. Universal Windows and Door LLC 400 Series, or equal.
 - a. AAMA 101 Window Classification: HC 45.
2. Awning Windows: Outward projecting operation, top hinged, with screens at operable sash, triple-glazed, simulated exterior divided light historical muntins with spacers between glass panes, factory applied metal panning and trim at exterior as per details, break metal clad sill.
 - a. AAMA 101 Window Classification: AP-HC 100.
3. Fixed Picture: Non-operating, triple-glazed, simulated exterior divided light historical muntins with spacers between glass panes, factory applied metal panning and trim at exterior as per details, break metal clad sill. Universal Windows and Door LLC 700 Series, or equal.
 - a. AAMA 101 Window Classification: AP-HC 80.
4. Window Frame: Thermally broken hollow aluminum extrusions with interior portion of frame insulated from exterior portion, flush glass stops of snap-on type, frame depth as indicated.

2.2 COMPONENTS

- A. Extruded Aluminum: Alloy and temper recommended by window manufacturer for strength, corrosion resistance and application of required finish, but not less than 22,000 psi ultimate tensile strength, a yield of 16,000 psi. Comply with ASTM B221.
- B. Glass and Glazing Materials in Windows:
 1. Insulated glass, SIGMA sealed triple pane float glass with clear outer pane, Double Low-E coating on clear inner pane, argon gas filled, total thickness 1 inch.
- C. Compression Glazing Strips and Weatherstripping: At manufacturer's option, provide neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC415, PVC gaskets complying with ASTM D2287, or expanded neoprene gaskets complying with ASTM C 509, Grade 4.
- D. Sealant:

1. Provide elastomeric type as recommended by window manufacturer for joint size and movement, to remain permanently elastic, non-shrinking and non-migrating. Provide product complying with AAMA Specification 803 and 808.
 2. Refer to Division 7 for perimeter sealants between window units and surrounding construction.
- E. Anchors, Clips and Window Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate units of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with ASTM A 123.
- F. Window Hardware: Manufacturer's standard hardware based on following requirements.
1. Single Hung Sash: Ultra-lift balances, each sash, each jamb.
 2. Single Hung Sash Lifts: As selected from manufacturer's options.
 3. Projected Sash: Heavy duty stainless steel hinge assemblies with manufacturer's standard limit hardware.
 4. Sash lock: Stainless steel lever handle with cam lock.
- G. Insect Screen Frames: Half-screens shall have extruded aluminum frames securely joined at the corners, and finish will match that of the window frame. Screens are of fiberglass screen cloth 18x16 mesh held into the frame with a vinyl spline. Screens are re-wirable and easily removable by side compression of two springs.
- H. Panning: Custom formed prefinished aluminum brake metal, 0.040" minimum thickness. Form head and jamb panning to match existing brickmold profile, and sill panning to match profile of existing wood sills. Match finish of windows.
- I. Muntin Grid Applications: 7/8" external muntin with internal sculptured grid between outer and middle panes, finish matching windows internal/external colors and configuration as indicated on drawings.
- J. Bituminous Paint: Asphaltic coating.

2.3 FABRICATION

- A. General: Provide manufacturer's standard fabrication and accessories which comply with specifications. Include complete system for assembly of components and anchorage of window units and provide complete pre-glazing at the factory.
- B. Fabricate framing, mullions and sash members of hollow extruded aluminum with reinforced corners and joints. Supplement frame with internal reinforcement where required for structural rigidity.
- C. Permit internal drainage weep holes and channels to encourage moisture migration to exterior.
- D. Form glass stops, exterior sills, closures, weather stops, and flashings of same material as window frame.
- E. Fit insect screen frames with four spring loaded pin retainers.
- F. Double weatherstrip operable units.

- G. Apply asphaltic paint to concealed metal surfaces in contact with cementitious surfaces or dissimilar metals.

2.4 SHOP FINISHING

- A. Exterior Surfaces: 50% Fluoropolymer coating, AAMA 2604, color as selected from full range of Manufacturer's options.
- B. Interior Surfaces: 50% Fluoropolymer coating, AAMA 2604, color as selected from full range of Manufacturer's options.
- C. Concealed Steel Items: Galvanize to 2.0 oz/sq ft.
- D. Apply bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify rough openings are correctly sized and located, and in accordance with approved shop drawings.

3.2 PREPARATION

- A. Prepare opening to permit correct installation of frame and achieve continuity of air and vapor retarder seal.

3.3 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work. In no case shall attachment to structure or to components of the window system be through or affect the thermal barriers of the window units.
- B. Set units plumb, level and true to line, without warp or rack of frames or sash. Anchor securely in place. Maintain assembly dimensional tolerances, aligning with adjacent work. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action.
- C. Coordinate attachment and seal of air and vapor retarder materials. Install non-expanding foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- D. Set sill members and other members in bed of compound, or with joint fillers or gaskets, to provide weathertight construction. Seal units following installation and as required to provide weathertight system.
- E. Coordinate installation of perimeter sealants and backing materials with Section 07900.

3.4 ADJUST AND CLEAN

- A. Adjust operating sash and hardware to provide tight fit at contact points and at weatherstripping, for smooth operation and weathertight closure.
- B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and moving parts.
- C. Clean glass promptly after installation of windows. Remove glazing and sealant compound, all labels, dirt and other substances.

3.5 SCHEDULES

- A. Refer to Window Schedules on the Drawings for window types, sizes and configurations.

...END OF SECTION 08 51 00

SECTION 08 58 10

CUSTOM STORM WINDOWS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removable panel storm windows for exterior application.

1.2 RELATED SECTIONS

- A. Section 07 90 00 - Joint Sealers.

1.3 REFERENCES

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 1998.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 1998.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 00 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Show dimensions, layout, profiles and product components; details of anchoring and fastening; sealants and weatherstripping; and recorded field measurements.
- D. Finish Samples: Submit color samples, for approval by Architect, that represent the allowable range of finish established from production material specified.
- E. Component Samples: If requested by Architect, submit samples of anchors, fasteners, hardware, assembled corner sections and other materials and components.
- F. Operation and Maintenance Data: Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
- G. Executed warranty documents specified.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store inside, if possible, in a clean, well-drained area free of dust and corrosive fumes.

2. Stack vertically or on edge so that water cannot accumulate on or within materials. Use non-staining wood or plastic shims between components to provide water drainage and air circulation.
3. Cover materials with tarpaulins or plastic hung on frames to provide air circulation.
4. Keep water away from stored assemblies.

1.6 WARRANTY

- A. Manufacturer's Warranty: Submit warranty against defects in materials and workmanship for period of 5 years from the date of Substantial Completion.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Allied Window, Inc., which is located at: 11111 Canal Rd. ; Cincinnati, OH 45241-1861; Toll Free Tel: 800-445-5411; Tel: 513-559-1212; Email: [request info \(info@alliedwindow.com\)](mailto:request_info@alliedwindow.com); Web: www.alliedwindow.com
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 00 00.

2.2 STORM WINDOWS

- A. Storm Windows - General: Provide units that fit existing windows without gaps of more than 1/8 inch (3 mm) in each unit.
 1. Verify actual measurements of openings by field measurement before fabrication; show recorded measurements on shop drawings.
 2. Allow for out-of-square and irregular conditions.
 3. Verify frame and sill conditions of each opening before fabrication; provide appropriate fabrication details to suit existing conditions.
- B. Removable Panel Storm Windows: Aluminum framed removable panel(s) in aluminum master frame, Allied Window One Lite (AOL).
 1. Frame and Sash Sightline: 1-3/4 inch (44 mm) maximum, except that any glazing muntin would be 1-1/4 inches (31 mm). Provide with:
 - a. Visible swivel clips.
 2. Frame Thickness: 7/16 inch (11 mm).
 3. Style: Single removable panel (AOL-A).
 4. Removable Panels: Easily removable, held in place with cam-action clips providing positive seal between master frame and panel frame; with full width bottom rail lift handle.
 5. Mounting: Exterior.

2.3 COMPONENTS

- A. Master Frame and Panel and Sash Frame Members: Extruded aluminum with wall thickness not less than 0.062 inches (1.6 mm); miter corners and join with corner keys.
 1. Aluminum: 6063-T5 alloy and temper with minimum ultimate strength of 22,000 psi (152 MPa) and yield strength of 16,000 psi (110 MPa).
 2. Corner Keys: Extruded aluminum.

3. Sill Expander: Where necessary to fit existing sloping sill, provide H-shaped member below master frame with weep holes.
4. Finish: Baked acrylic enamel, complying with AAMA 2603, electrostatically applied; 15 year warranty.
 - a. Color: Beige.
- B. Type: Annealed float glass with Low-E pyrolytic hard coating.
 1. Thickness: 5/32 inch (4 mm).
- C. Glazing Gaskets: Removable and reusable virgin vinyl glazing splines with neatly mitered corners.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 62 00
SKYLIGHTS WINDOWS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Production fabricated wood manually operated ventilating and fixed skylight and exterior maintenance free cladding with manually operated accessories as indicated on window schedule.

1.2 REFERENCE STANDARDS

- A. ANSI/ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
- B. ANSI/ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- C. ANSI/ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Static Air Pressure Difference.
- D. ANSI/ASTM E 1886 – Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials. (impact glazing only)
- E. ANSI/ASTM 1996 – Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes. (impact glazing only)
- F. AAMA/WDMA 1600/IS7 - Voluntary Specifications for Skylights.
- G. ICBO Evaluation Services Acceptance Criteria AC 17 – Acceptance Criteria for Sloped Glass Glazing in Solariums, Patio Covers and Prefabricated Skylights.
- H. National Evaluation Service Committee Report No. NER-216.
- I. National Fenestration Rating Council, NFRC – 100, Procedure for Determining Fenestration Product U-factors.
- J. National Fenestration Rating Council, NFRC – 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.
- K. National Fenestration Rating Council, NFRC 300, Procedures for Determining Solar Optical Properties of Simple Fenestration Products.
- L. Occupational Safety & Health Administration, OSHA (Standards – 29 CFR 1910.23, Guarding Floor and Wall Openings and Holes.

1.3 QUALITY ASSURANCE

- A. Wood fixed skylight with exterior maintenance free cladding and all accessories and components required for complete and weatherproof installation shall be manufactured to the highest standards of quality and craftsmanship in accordance with VELUX Manufacturing Standards.

1.4 SYSTEM DESCRIPTION

- A. Fixed Skylight: Wood frame, exterior maintenance free cladding, production fabricated, flashings, glass and glazings, and anchorage; Configuration: Fixed.
- B. Manually Operated Venting Skylight: Wood frame and sash, exterior maintenance free cladding, production fabricated flashings, glass and glazings, and anchorage; outward opening, top hinged, production-installed manual chain operator. Sash removable for installation; Operation: Manual crank handle.

1.5 PERFORMANCE REQUIREMENTS

- A. Model FS fixed skylight to withstand dead and live loads caused by pressure and uplift of wind acting normal to plane of roof as tested to AAMA/WDMA 1600/IS7 to an exterior pressure of 2.30 – 7.13 KPa (48 -149 psf) and an interior pressure of 2.68 – 7.95 KPa (58 - 166 psf) and measured in accordance with ANSI/ASTM E 330.
- B. Model VS manually operated venting skylight to withstand dead and live loads caused by pressure and uplift of wind acting normal to plane of roof as tested in accordance with National Evaluation Services, Inc. to a design pressure of 575 – 8714 Pa (12-182 psf) and an uplift pressure of 1053 – 4597 Pa (22-96 psf) as measured in accordance with AAMA/WDMA 1600/IS7 and ANSI/ASTM E 330.
- C. Limit member deflection to flexure limit of glass with full recovery of glazing materials.
- D. System to accommodate, without damage to components or deterioration of seals, movement between I.G. unit and perimeter framing.
- E. Air leakage through assembly limited to 0.25 L/s/m² (0.05 cfm/ft²) of total unit inside perimeter, measured at a reference differential pressure across assembly of 75 Pa (1.57 psf) as measured in accordance with AAMA/WDMA/1600/IS7 and ANSI/ASTM E 283.
- F. Water infiltration: No water penetration noted when measured in accordance with AAMA/WDMA/1600/IS7 and ANSI/ASTM E 331 with a test pressure differential of 290 Pa (6.0 psf).
- G. Gasketing designed to drain water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system, to exterior by drainage network.
- H. Thermal Performance: Tested and certified in accordance with NFRC 100 and 200 procedures.
- I. Model FS and VS with impact glazing (0099 69): Tested and certified in accordance with ANSI/ASTM E 1886 and ANSI/ASTM E 1996-01.

- J. Fall Protection: Model FS and VS with laminated glass (0074) tested to meet or exceed the intent of OSHA 29 CFR 1910.23(e)(8) for fall protection. Model FS tested to 1400 ft/lbs with no glass breakage.

1.6 SUBMITTALS

- A. Manufacturer's unit dimensions, rough opening and finished framing dimensions, affected related work, and installation requirements are shown in manufacturer's installation instructions.
- B. Product Data: For Model FS fixed skylight and VS manually operable skylight, glazing options, accessories and manual control options of accessories are indicated in manufacturer's printed material.

1.7 DELIVERY, HANDLING, STORAGE

- A. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
- B. Store and protect products in accordance with manufacturer's recommendations.

2 PART 2 PRODUCTS

2.1 MANUFACTURER

- A. VELUX America Inc. product Model FS fixed skylight and flashing systems as specified in this section and as manufactured by VELUX America Inc.

2.2 MATERIALS

A. Model FS Fixed Skylight

1. Wood: Kiln-dried, laminated Nordic Pine (Specific Gravity 0.51), temporarily treated for mold and mildew for transparent or opaque interior finish.
2. Maintenance free exterior cladding: Roll formed 0.65 mm aluminum pre-finished production engineered and fabricated to fit exterior exposed surfaces (Alloy AA 3003 H12 and AA 3003 H16).
3. Fasteners: #8x1 washerhead, Phillips, 1/1, stainless steel, black for exterior maintenance free cladding.

B. Model VS Manual Operable Skylight

1. Wood: Kiln-dried, laminated Nordic Pine (Specific Gravity 0.51), temporarily treated for mold and mildew for transparent or opaque interior finish applied after installation.
2. Maintenance free exterior cladding: Roll formed 0.65 mm aluminum frame coverings, 0.57 mm aluminum sash coverings, 0.55 mm copper frame coverings, 0.50 copper sash coverings prefinished, production engineered, and fabricated to fit exterior exposed surfaces (Alloy AA 3003 H12 and AA 3003 H16).

3. Fasteners: #8 x 1" wood screw, Phillips recess, washer headed, full threaded, black lacquered stainless steel for exterior aluminum cladding. Number 8 x 1/2" pan head, Phillips recess, stainless steel with black lacquer for top covers.

2.3 COMPONENTS

A. Model FS Fixed Skylight

1. Weather stripping: Factory applied neoprene weather stripping throughout entire frame, profiled to effect weather seal.
2. Fittings: Surface treatment with electro-galvanized, chromate passivated yellow.
3. Mounting brackets: Factory installed stamped steel, surface treatment electro-galvanized, chromate passivated yellow.
4. Fasteners: 1/4" galvanized ring shank nail for mounting brackets, six per bracket.

B. Model VS Manual Operable Skylight

1. Weather stripping: Factory applied neoprene weather stripping throughout entire frame and sash, profiled to effect weather seal.
2. Screen: Aluminum screen profile, spring metal clip attachment, 0.28 mm glass fiber thread with PVC coating, charcoal in color.
3. Fittings: Surface treatment with electro-galvanized, chromate passivated yellow.
4. Mounting brackets: Factory installed stamped steel, surface treatment electro-galvanized, chromate passivated yellow.
5. Fasteners: #8 x 1 3/16" wood screws, Phillips recess, countersunk, yellow passivated chromate steel for mounting bracket attachment to frame, two per bracket. 1/4" galvanized, ring shank drive fasteners for attachment to roof deck, three per bracket.

2.4 GLASS AND GLAZING MATERIALS

- A. Standard 5/8" overall dual sealed insulated glass unit with 9.1 mm (0.358") air space. Stainless steel spacer with desiccant, primary seal polyisobutylene, secondary seal silicone.
- B. Gasketing: Each I.G. unit dry glazed with chloroprene gasket, no sealants.
- C. Description of glazing options:

Type 74 Laminated Low-E Gas Filled: Exterior lite 3 mm (1/8") clear tempered with Low-E² coating on surface #2, 11.1 mm (0.44") air space filled with argon gas, interior lite two plies of 2.3 mm (0.090") heat-strengthened laminated with 0.76 mm (0.030") vinyl interlayer.

2.5 HARDWARE

- A. Model VS Manual Operable Skylight
 - 1. Sash: Top hinged, hinges allow for sash removal.
 - 2. Manual chain operator: Factory installed. The chain is fitted to the sash with clip, pin and limit stops, removable pins allow for sash separation.

2.6 FLASHING

- A. Type EDL Flashing is a prefabricated step flashing system, designed for use with roofing materials less than 3/4" thick and for slopes of 3:12 (15 degrees) to 85 degrees.
- B. Type EDW Flashing is a prefabricated gutter flashing system designed for use with roofing material greater than 3/4" thick, or high profile material, and for roof slopes of 3:12 (15 degrees) to 85 degrees. Sill flashing section consists of corrugated apron to allow form fit of high profile material.
- C. Type EDM Flashing is a prefabricated flashing system designed for use with metal roofing materials and for roof slopes of 3:12 (15 degrees) to 85 degrees. Sill flashing section consists of corrugated apron to allow form fit of roofing material profile.
- D. Type ECX/EMX Curb Flashings are flashing systems designed for use on flat and low-pitched roof slopes of 0 degrees to 3:12 (15 degrees). The ECX/EMX curb flashings should be used with rolled roofing.

2.7 FABRICATION

- A. Fabricate frame with slip joint/lock corners glued and nailed for hairline, weather tight fit.
- B. Fabricate frame components within minimum tolerances enabling installation and movement of frame and dynamic movement of perimeter weather stripping.
- C. Permit external drainage channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through gasketing.
- D. All units factory glazed with chloroprene gasketing.

2.8 FINISHES

- A. Exterior surfaces: Exposed exterior wood surfaces to be covered with roll-formed maintenance free cladding pieces. Aluminum has umber grey, Kynar® 500 polyvinylidene fluoride resin finish.
- B. Maintenance free flashing: Roll formed aluminum, umber grey, baked on polyester polyamid primer and finish coats.
- C. Interior surface: All exposed interior wood surfaces to be clear unfinished wood. Prime and paint as per specification Section 09 91 23.

- D. Screens: Frames - light gray, mesh –charcoal.
- E. Operator - concealed beneath light gray covers.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify rough opening dimensions and proper orientation of skylight.

3.2 INSTALLATION

- A. Install skylight in accordance with manufacturer's installation instructions.
- B. Align skylight level, free of warp or twist; maintain dimensional tolerances.
- C. Attach skylight to roof sheathing with manufacturer's brackets with screws and nails to accommodate construction tolerances and other irregularities.
- D. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.
- E. Coordinate attachment and seal of perimeter air and vapor barrier material.
- F. Install sash and connect operator (Model VS).
- G. Install manufacturer's engineered perimeter flashing in accordance with manufacturer's installation instructions to achieve weather tight installation.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SUMMARY

- A. Hardware for wood, hollow steel, doors.
- B. Closers, door operators, electric strikes.
- C. Thresholds, weatherstripping, seals, door gaskets, viewers and protection plates.

1.3 SUBMITTALS

- A. Hardware Schedule: Indicate hardware components in sets correlated to door schedule.
- B. Product Data: Submit data for hardware components illustrating style, operating features, color, and finish.
- C. Operating and Maintenance Instructions: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.4 QUALITY ASSURANCE

- A. Hardware Supplier: Company specializing in supplying commercial door hardware with 5 years documented experience approved by manufacturer.

1.5 COORDINATION

- A. Coordinate work of this section with other directly affected sections requiring any integral reinforcement for door hardware.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually. Label and identify package with door opening code to match schedule.
- B. Deliver keys to Owner.

1.7 MAINTENANCE

- A. Provide manufacturer's maintenance services on door closers and locksets for one year from Date of Substantial Completion.
- B. Provide special wrenches and tools applicable to each different or special hardware component.

2 PART 2 PRODUCTS

2.1 SUPPLIERS

A. Suppliers: Products of one or more manufacturers are listed in the Hardware Schedule to establish quality and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.

1. Manufacturers of Locksets:

- a. Corbin
- b. Sargent.
- c. Schlage.

2. Manufacturers of closers:

- a. LCN.
- b. Norton.
- c. Rixson.
- d. Sargent.

3. Manufacturers of hinges:

- a. Hager.
- b. McKinney.
- c. Stanley.

4. Manufacturers of thresholds and weatherstripping.

- a. National Guard Products.
- b. Pemko.
- c. Reese.
- d. Zero.

5. Manufacturers of panic sets:

- a. Sargent.
- b. Von Duprin

6. Manufacturers of door trim and accessories:

- a. Hiawatha.
- b. Ives.
- c. Rockwood.

2.2 ELECTRONIC ACCESS SYSTEM

A. Proximity Card Access System: Provide stand alone proximity access control system for main entrance door. Provide products with non-volatile memory. Provide products offering credential of Keycodes and Proximity with a minimum of 1,000 users and provide audit trail for the last 1,000 events.

- B. Provide 50 proximity cards, proximity reader and interface with door operator and electric strike.

2.3 KEYING

- A. Door Locks: Master keyed with high security keying system. Include construction keying.
- B. Supply 3 change keys for each lock and 5 master keys, each tagged. Provide keys of nickel silver only.
- C. Provide 1 Key Cabinet: Sheet steel construction, enamelled finish, hinged door with key lock, internal hooks for 30 keys, identification labeling.

2.4 MATERIALS AND FABRICATION

- A. Provide products complying with ANSI A 156.1 standards.
- B. Name Plates: Do not provide products with manufacturers name or trade name displayed in a visible location except in conjunction with required UL labels.
- C. Provide hardware manufactured to conform to templates with machine screw installation. Do not provide hardware prepared for self-tapping screws.
- D. Fasteners: Provide Phillips flat head screws except as otherwise indicated. Finish screws to match adjacent hardware finish.
- E. Lever Handles: Provide lever handles at all doors except bifold and sliding bypass.

2.5 FINISHES

- A. Finishes are identified in the Hardware Schedule at end of this section.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that doors and frames are ready to receive work and dimensions are as instructed by the manufacturer.
- B. Verify that electric power is available to power operated devices and is of the correct characteristics.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Install hardware at fire rated doors in accordance with NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Adjust hardware and door control devices for proper operation, and to comply with ADA requirements.

...END OF SECTION 08 71 00

Munjoy Commons Apartments											
SHAILER APARTMENT											
Door Schedule											
Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.											
Notes:											
1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.											
2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.											
3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.											
4. All steel doors as per specification Thermo Tru or equal (T.T.).											
5. Wood Doors Based on Jeld-Wen Arlington or Equal.											
6. Provide soldered copper pan flashing below sill at all new exterior doors.											
7. Provide solid wood blocking at all locations of wall mounted door stops.											
8. See Floor Plans for total number of doors.											
Inches											
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes
Basement Level Doors											
001	Sprinkler room										
002	Boiler Room	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Kickplate		
003	Not Used										
004	Elec. Room	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	kickplate		
005A	Community Room	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Panic Exit device	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
005B	Community Room	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Panic Exit device	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
006A	Existing Stair #1	36	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
006B	Existing Stair #1	36	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
007A	Stair #2	36	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
007B	Stair #2	36	80	1 3/4	Steel	D	Hollow metal	Panic Exit device	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
008	Computer Room	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Class Room	Closer, kickplate	20 Min.	See door elev. dwg A4.0A for door type
009	Not Used										
010	Bike / Storage	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
011	Bathroom	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Privacy 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
012	Elev Machine Rm	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 min.	See door elev. dwg A4.0A for door type
013	Closet	30	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Kickplate		See door elev. dwg A4.0A for door type
014	Elevator door										
015	Tenant Storage	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
016	Laundry room	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
017	Manager's Office	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Lockset 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
018	Exist. Meter Room	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
019	New Stair # 4	36	80	1 3/4	Steel	D	Hollow metal	Panic Exit device	Closer, Kickplate	1 Hr	See door elev. dwg A4.0A for door type
020	Not Used										
021	Not Used										
022	Existing Stair #3 (Exterior)	36	80	1 3/4	Insulated Steel door	E	Existing	Panic Exit device	Threshold, Closer, Kickplate, weatherstripping		See door elev. dwg A4.0A for door type

Munjoy Commons Apartments											
SHAILER APARTMENT											
Door Schedule											
Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.											
Notes:											
1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.											
2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.											
3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.											
4. All steel doors as per specification Thermo Tru or equal (T.T.).											
5. Wood Doors Based on Jeld-Wen Arlington or Equal.											
6. Provide soldered copper pan flashing below sill at all new exterior doors.											
7. Provide solid wood blocking at all locations of wall mounted door stops.											
8. See Floor Plans for total number of doors.											
Inches											
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes
First Floor Doors											
106A	Stair #1 (Exterior)	Ex	Ex	Ex	Ex	Ex	Ex	Vestibule 1	Threshold, Closer, Kickplate, weatherstripping, electric strike, buzzer w/ speaker,		EX = Existing door and frame to remain
106B	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
106C	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Storeroom 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
107A	Stair #2 (Exterior)	Ex	Ex	Ex	Ex	Ex	Ex	Panic exit device	Threshold, Closer, Kickplate, weatherstripping	Exist.	EX = Existing door and frame to remain
107B	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
107C	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Panic exit device	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
108	Jan. Closet	36	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
109	Closet	(2) 48"	80	1 3/4	SC molded Pro core	A	Drywall	3" Wire Pull	Bifold door	20 Min.	See door elev. dwg A4.0A for door type
110	Corridor	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
111	Storage	30	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
112	Entry Lobby (Exterior)	Ex	Ex	Ex	Ex	Ex	Ex	Panic exit device	Threshold, Closer, Kickplate, weatherstripping, electric strike, door operator, push pad, and key pad		EX = Existing door and frame to remain
113	Corridor	36	80	1 3/4	Solid Core Molded w/ half glass	C	Hollow metal	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
114A	Elevator										
114B	Elevator										
115	Not Used										
116	Toilet	36	80	1 3/4	SC molded Pro core	A	Existing	Privacy 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
117	Toilet	32	80	1 3/4	SC molded Pro core	A	Existing	Privacy 1	Kickplate	20 Min.	See door elev. dwg A4.0A for door type
118A	Community Partners	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Panic exit device	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
118B	Community Partners	36	80	1 3/4	SC molded Pro core w/ half glass	C	Existing	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
119	Trash Room (Exterior)	36	80		Insulated Steel door	E	Welded Hollow metal	Storeroom 1	Closer, Threshold, Kickplate, weatherstripping		See door elev. dwg A4.0A for door type
120	Office	36	80	1 3/4	SC molded Pro core	A	Existing	Lockset 1	Kickplate		
121	Not Used										
122A	Existing Stair #3	Ex	Ex	Ex	Ex	Ex	Ex	Vestibule 1	Closer, Kickplate	Exist.	
122B	Existing Stair #3	Ex	Ex	Ex	Ex	Ex	Ex	Panic exit device	Closer, Kickplate	Exist.	

Munjoy Commons Apartments											
SHAILER APARTMENT											
Door Schedule											
Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.											
Notes:											
1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.											
2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.											
3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.											
4. All steel doors as per specification Thermo Tru or equal (T.T.).											
5. Wood Doors Based on Jeld-Wen Arlington or Equal.											
6. Provide soldered copper pan flashing below sill at all new exterior doors.											
7. Provide solid wood blocking at all locations of wall mounted door stops.											
8. See Floor Plans for total number of doors.											
Inches											
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes
Second Floor Doors											
206	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
207	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
208A	Laundry Room	36	80		SC molded Pro core w/ half glass	C	Existing	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
208B	Laundry Room	18	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Kickplate		See door elev. dwg A4.0A for door type
Third Floor Doors											
309	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
310	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist.	EX = Existing door and frame to remain
311	Laundry Room	36	80	1 3/4	SC molded Pro core w/ half glass	C	Hollow metal	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
312	Not used										
313	Fire Escape Stair	24	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, Kickplate	1 Hr	See door elev. dwg A4.0A for door type
314	Fire Escape Stair	24	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, Kickplate	1 Hr	See door elev. dwg A4.0A for door type
315	Storage	24	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate		See door elev. dwg A4.0A for door type
316	Storage	24	80	1 3/4	SC molded Pro core	A	Hollow metal	Storeroom 1	Closer, Kickplate		See door elev. dwg A4.0A for door type
Notes:											
Install viewers at HC units at 48 and 60 inches A.F.F.											

Munjoy Commons Apartments															
EMERSON APARTMENT															
Door Schedule		Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.													
Notes:															
		1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.													
		2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.													
		3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.													
		4. All steel doors as per specification Thermo Tru or equal (T.T.).													
		5. Wood Doors Based on Jeld-Wen Arlington or Equal.													
		6. Provide soldered copper pan flashing below sill at all new exterior doors.													
		7. Provide solid wood blocking at all locations of wall mounted door stops.													
		8. See Floor Plans for total number of doors.													
		Inches													
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes				
Apartment UNITS															
01	Apartment Entrance	36	80	1 3/4	SC embossed hardboard	A1	Existing	Entrance - Single locking	Kickplate, Spring Hinges, One Way Viewer	20 min.	See door elev. dwg A4.0A for door type				
02	Closet	30	80	1 3/8	SC molded pro core	A	Existing	Passage 2			See door elev. dwg A4.0A for door type				
03	Bathroom	32	80	1 3/8	SC molded pro core	A	Existing	Privacy 2			See door elev. dwg A4.0A for door type				
04	Bedroom #1	32	80	1 3/8	SC molded pro core	A	Existing	Privacy 2			See door elev. dwg A4.0A for door type				
05	Bedroom Closet	(2) 24	80	1 3/8	SC molded pro core	A	Hollow metal	Dummy Trim			Provide magnetic door latches.				
06	Bedroom #2	32	80	1 3/8	SC molded pro core	A	Existing	Privacy 2			See door elev. dwg A4.0A for door type				
07	Bedroom #3	32	80	1 3/8	SC molded pro core	A	Existing	Privacy 2			See door elev. dwg A4.0A for door type				
08	Bedroom Closet	(2) 30	80	1 3/8	SC molded pro core	A	Hollow metal	Dummy Trim			Provide magnetic door latches.				
09	Coat Closet	30	80	1 3/8	SC molded pro core	A	Existing	Passage 2			See door elev. dwg A4.0A for door type				
10	Unit Entry (Exterior)			1 3/8	Insulated Steel door	A	Existing	Entrance - Single locking	Closer, kickplate, weatherstripping, threshold		See door elev. dwg A4.0A for door type				
11	Linen Closet	18	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
12	Linen Closet 2	30	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
13	Coat Closet	(2) 27	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
14	Bedroom Closet	(2) 21	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
15	Coat Closet	32	80	1 3/8	SC molded pro core	A	Existing	Passage 2			See door elev. dwg A4.0A for door type				
16	Linen Closet	24	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
17	Coat Closet	30	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
18	Pantry	28	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
19	Closet	24	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
20	Fire Escape Stair	24	80	1 3/8	SC molded pro core	A	Hollow metal	Entrance - Single locking	Closer, kickplate, contact switch alarm	1 Hr	See door elev. dwg A4.0A for door type				
21	Pantry	24	80	1 3/8	SC molded pro core	A	Hollow metal	Passage 2			See door elev. dwg A4.0A for door type				
22	Not used										See door elev. dwg A4.0A for door type				
23	Living / Dining (Exterior)	(2) 30	78	1 3/4	Clad sliding 300 series door by Jeld-Wen	B	See dtl A4.2B	Lockset 2	sliding patio doors		See door elev. dwg A4.0A for door type				

Munjoy Commons Apartments											
EMERSON APARTMENT											
Door Schedule											
Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.											
Notes:											
1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.											
2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.											
3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.											
4. All steel doors as per specification Thermo Tru or equal (T.T.).											
5. Wood Doors Based on Jeld-Wen Arlington or Equal.											
6. Provide soldered copper pan flashing below sill at all new exterior doors.											
7. Provide solid wood blocking at all locations of wall mounted door stops.											
8. See Floor Plans for total number of doors.											
Inches											
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes
Basement Level Doors											
002	Spunker Entrance (Exterior)	32	44 1/2	1 3/4	Insulated Steel Door	E	Hollow metal	Storeroom 1			See door elev. dwg A4.0A for door type
003	Stair #2	36	80	1 3/4	Steel	D	Hollow metal	Storeroom 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
004	Not Used										
005	Tenant Storage	36	80	1 3/4	SC molded pro core	F	Raise exist. Wood frame	Storeroom 1	kickplate		See door elev. dwg A4.0A for door type
006A	Bike Storage (Exterior)	42	80	1 3/4	Insulated Steel Door	E	Hollow metal	Vestibule 1	Threshold, Kickplate, weatherstripping		See door elev. dwg A4.0A for door type
006B	Bike Storage	36	80	1 3/4	SC molded pro core	F	Modify existing door frame	Passage 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
007	Trash Storage (Exterior)	36	80	1 3/4	Insulated Steel Door	E	Existing	Storeroom 1	Threshold, Closer, Kickplate, weatherstripping		See door elev. dwg A4.0A for door type
008	Maintenance / Storage room	36	80	1 3/4	SC molded pro core	F	Existing	Storeroom 1	Closer, kickplate	20 Min.	See door elev. dwg A4.0A for door type
009A	Stair #1	36	80	1 3/4	Steel	D	Hollow metal	Passage 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
010	Boiler Room	36	80	1 3/4	SC molded pro core	F	Existing	Storeroom 1	Closer, kickplate	1 Hr	See door elev. dwg A4.0A for door type
011	Office	36	80	1 3/4	SC molded pro core	C	Hollow metal	Lockset 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
012	Not Used										
013	Bathroom	36	80	1 3/4	SC molded pro core	F	Hollow metal	Privacy 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type
015	Closet	18	80	1 3/4	SC molded pro core	F	Existing	Storeroom 1	Closer, kickplate	20 Min.	See door elev. dwg A4.0A for door type
016	Pump Room	36	80	1 3/4	SC molded pro core	F	Hollow metal	Passage 1	kickplate		See door elev. dwg A4.0A for door type
First Floor Doors											
107	Vestibule (Exterior)	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Threshold, Closer, Kickplate, weatherstripping		EX = Existing door and frame to remain
108	Vestibule (Exterior)	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Threshold, Closer, Kickplate, weatherstripping		EX = Existing door and frame to remain
109A	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Vestibule 1	Closer, Kickplate, electric strike 1, buzzer w/ speaker,	Exist	EX = Existing door and frame to remain
109B	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist	EX = Existing door and frame to remain
109C	Stair #1	36	80	1 3/4	Steel	D	Hollow Metal	Storeroom 1	Closer, Kickplate	1 Hr.	See door elev. dwg A4.0A for door type
110A	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Vestibule 1	Closer, Kickplate	Exist	EX = Existing door and frame to remain
110B	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist	EX = Existing door and frame to remain
110C	Stair #2	36	80	1 3/4	Steel	D	Hollow Metal	Storeroom 1	Closer, Kickplate	1 Hr.	See door elev. dwg A4.0A for door type
112	Laundry room	32	80	1 3/4	SC molded pro core	C	Existing	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type

Munjoy Commons Apartments																
EMERSON APARTMENT																
Door Schedule		Interior Door types based on Jeld-Wen designations unless noted otherwise. See spec for acceptable alternate mfrs.														
Notes:		<p>1. Provide concave wall mounted door stops at all doors opening against an adjacent wall or door. Ives No. 406 1/2 or equal.</p> <p>2. Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal.</p> <p>3. Provide floor stops at all doors where wall stops or roller stops are not appropriate. Ives No. 436 or 438.</p> <p>4. All steel doors as per specification Thermo Tru or equal (T.T.).</p> <p>5. Wood Doors Based on Jeld-Wen Arlington or Equal.</p> <p>6. Provide soldered copper pan flashing below sill at all new exterior doors.</p> <p>7. Provide solid wood blocking at all locations of wall mounted door stops.</p> <p>8. See Floor Plans for total number of doors.</p>														
		Inches														
No.	Location	W	H	T	Door Material	Door Type	Frame Type	Lock Function	Hardware	Label	Notes					
Second Floor Doors																
207	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist	EX = Existing door and frame to remain					
208	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate	Exist	EX = Existing door and frame to remain					
210	Laundry Room	32	80	1 3/4	SC molded pro core	C	Ex	Vestibule 1	Closer, Kickplate	20 Min.	See door elev. dwg A4.0A for door type					
Third Floor Doors																
309	Stair #1	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate		EX = Existing door and frame to remain					
310	Stair #2	Ex	Ex	Ex	Ex	Ex	Ex	Passage 1	Closer, Kickplate		EX = Existing door and frame to remain					
312	Fire Escape Stair	24	80	1 3/4	Steel	D	Hollow Metal	Storeroom 1	Closer, Kickplate	1 Hr	See door elev. dwg A4.0A for door type					
Notes:																
		Install viewers at HC units at 48 and 60 inches A.F.F.														

Item/function	Manufacturer	Model No.	Finish	Remarks
Shailer Apartments Portland, Maine Hardware Schedule				
Entrance, Single locking	Schlage	H110 F95	(619 - unit side, 613 - hallway side)	
Lockset 1	Schlage	ND 50PD ATHENS	613	Public
Lockset 2	Schlage	ND53PD ATHENS	619	Residence
Storeroom 1	Schlage	ND80PD ATHENS	613	Storeroom Lock
Lockset 1	Schlage	ND 50PD ATHENS	613	Public
Lockset 2	Schlage	ND53PD ATHENS	619	Residence
Privacy 1	Schlage	ND40S ATHENS	613	Public
Privacy 2	Schlage	F40N JAZZ	619	Residence Privacy
Passage 1	Schlage	ND10S ATHENS	613	Public Passage
Passage 2	Schlage	F10N JAZZ	619	Residence Passage
Vestibule 1	Schlage	ND60PD ATHENS	613	Public
Dummy Trim	Schlage	F170N JAZZ	619	Single Dummy Trim, One Per Door Leaf
Class Room	Schlage	ND70PD ATHENS	613	Public Classroom
Closer	Dorma	7600	613	ADA compliant
Threshold 1	National Guard	425	Alum	ADA compliant - maximum 1/2" height
Hinges	Hager	Full mortise	613 public, 619 unit	Provide ball bearing hinges at doors with closers.
Floor Stop	Ives	436	613 public, 619 unit	See plans for locations
Wall Stop	Ives	406 1/2	613 public, 619 unit	See plans for locations
Roller Bumper	Ives	471	613 public, 619 unit	See plans for locations
Kickplate	Ives	8400	St Steel	
Spring Hinges	Stanley	RD2060R	613 public, 619 unit	1 1/2 Pairs - Provide spring hinges required for door operation
Magnetic Latch	Stanley	SP45	619	Mount @ Door head, 1 Per Door Leaf
One Way Viewer	Ives	696	619	Provide one at each unit entry door at 60" aff except HC Units at 48" and 60".
Electric Strike 1	Schlage	10-201 Eu series	613 (oil rubbed bronze)	Coordinate w/ electrical dwg
Automatic Door Operator	Horton	4100 LE	613 (oil rubbed bronze)	w/ push and key pad @ door # 112
Latching Floor Stop	Ives	FS451	613 public, 619 unit	
Panic Exit Device	Sargent	12 8813 ETB	613	Exit device, key outside Unlocks/locks trim
Notes				
Provide masterkey system, with construction keying system. Consult with Owner for instructions on keying. Provide key removable core at all hardware with locking function.				
Products of one or more manufacturers are listed to establish quality and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.				
Acceptable Manufacturers				
Locksets:	Sargent, Schlage, Corbin			
Closers:	Sargent, Dorma, LCN, Norton, Rixson			
Hinges:	Hager, Stanley			
Thresholds:	National Guard Products, Pemko, Reese, Zero			
Locksets:	Sargent, Schlage, Corbin			
Closers:	Sargent, LCN, Norton, Rixson			
Hinges:	Hager, McKinney, Stanley			
Thresholds:	National Guard Products, Pemko, Reese, Zero			
Accessories:	Ives, Rockwood, Hiawatha			

Item/function	Manufacturer	Model No.	Finish	Remarks
Emerson Apartments Portland, Maine Hardware Schedule				
Entrance, Single locking	Schlage	S210PD ATHENS	(619 - unit side, 613 - hallway side)	
Lockset 1	Schlage	ND 50PD ATHENS	613	Public
Lockset 2	Schlage	ND53PD ATHENS	619	Residence
Storeroom 1	Schlage	ND80PD ATHENS	613	Storeroom Lock
Privacy 1	Schlage	ND40S ATHENS	613	Public
Privacy 2	Schlage	F40N JAZZ	619	Residence Privacy
Passage 1	Schlage	ND10S ATHENS	613	Public Passage
Passage 2	Schlage	F10N JAZZ	619	Residence Passage
Vestibule 1	Schlage	ND60PD ATHENS	613	Public
Dummy Trim	Schlage	F170N JAZZ	619	Single Dummy Trim, One Per Door Leaf
Class Room	Schlage	ND70PD ATHENS	613	Public Classroom
Closer	Dorma	7600	619	ADA compliant
Threshold 1	National Guard	425	Alum	ADA compliant - maximum 1/2" height
Hinges	Hager	Full mortise	613 public, 619 unit	Provide ball bearing hinges at doors with closers.
Floor Stop	Ives	436	613 public, 619 unit	See plans for locations
Wall Stop	Ives	406 1/2	613 public, 619 unit	See plans for locations
Roller Bumper	Ives	471	613 public, 619 unit	See plans for locations
Kickplate	Ives	8400	St Steel	
Spring Hinges	Stanley	RD2060R	613 public, 619 unit	1 1/2 Pairs - Provide spring hinges required for door operation
Magnetic Latch	Stanley	SP45	619	Mount @ Door head, 1 Per Door Leaf
One Way Viewer	Ives	696	619	Provide one at each unit entry door at 60" aff except Type "A" Units at 48" and 60"
Electric Strike 1	Schlage	10-201 Eu series	613 (oil rubbed bronze)	Coordinate w/ electrical dwg
Latching Floor Stop	Ives	FS451	613 public, 619 unit	
Panic exit device	Sargent	12 8813 ETB	613	Exit device, key outside Unlocks/locks trim
Notes				
Provide masterkey system, with construction keying system. Consult with Owner for instructions on keying. Provide key removable core at all hardware with locking function. Products of one or more manufacturers are listed to establish quality and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.				
Acceptable Manufacturers				
Locksets:	Sargent, Schlage, Corbin			
Closers:	Sargent, Dorma, LCN, Norton, Rixson			
Hinges:	Hager, Stanley			
Thresholds:	National Guard Products, Pemko, Reese, Zero			
5.) Provide a door mounted roller bumper at all doors opening against an opposite hand door (1 per pair). Ives No. 471 or equal. Mount at top of door.				
Acceptable Manufacturers				
Locksets:	Sargent, Schlage, Corbin			
Closers:	Sargent, LCN, Norton, Rixson			
Hinges:	Hager, McKinney, Stanley			
Thresholds:	National Guard Products, Pemko, Reese, Zero			
Accessories:	Ives, Rockwood, Hiawatha			

Part II
Division 9

Finishes

SECTION 09 21 00

PLASTER AND GYPSUM BOARD ASSEMBLIES

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes gypsum board with joint treatment; metal stud wall framing; metal channel ceiling framing; and acoustic insulation.

1.2 SYSTEM DESCRIPTION

- A. Acoustic Attenuation for Identified Interior Partitions: 50 STC in accordance with ASTM E90.

1.3 SUBMITTALS

- A. Product Data: Submit data on metal framing, gypsum board, joint tape; acoustic accessories and joint compound.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840, GA-201 - Gypsum Board for Walls and Ceilings, GA-214 - Recommended Specification: Levels of Gypsum Board Finish, GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board, GA-600 - Fire Resistance Design Manual.
- B. Furnish framing materials in accordance with SSMA - Product Technical Information.
- C. Fire Rated Construction: Rating as indicated on Drawings.
 - 1. Tested Rating: Determined in accordance with ASTM E119.
 - 2. Fire Rated Partitions: Listed assembly by UL, WH, GA File.
 - 3. Fire Rated Ceilings and Soffits: Listed assembly by UL, WH, GA File.
 - 4. Fire Rated Structural Column Framing: Listed assembly by UL, WH, GA File.
 - 5. Fire Rated Structural Beam Framing: Listed assembly by UL, WH, GA File.
 - 6. Fire Rated Shaft Wall Requirements: two hour in accordance with UL listed assembly.

2 PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

- A. Manufacturers:
 - 7. Celotex Building Products
 - 8. Domtar Gypsum, Inc.
 - 9. G-P Gypsum Corp
 - 10. National Gypsum Co

2.2 COMPONENTS

- A. Studs and Tracks: ASTM C645, GA-216 and GA-600; galvanized sheet steel, 0.021 and 0.036 inch thick, C shape.
- B. Furring, Framing, and Accessories: ASTM C645, GA-216 and GA-600.
- C. Gypsum Board Materials: ASTM C1396/C1396M [; Type X fire resistant where indicated on Drawings].
 - 1. Standard Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges.
 - 2. Moisture Resistant Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges.
 - 3. Gypsum Sheathing Board: 5/8 inch thick, maximum available size in place; ends square cut, square edges; water repellent paper faces.
 - 4. Gypsum Shaftliner: ASTM C442, 1 inch thick, maximum available size in place; square edges, ends square cut.
- D. Tile Backer Boards:
 - 1. Cementitious Backing Board: High density, glass fiber reinforced, 1/2 inch thick; 2 inch wide, coated glass fiber tape for joints and corners.

2.3 ACCESSORIES

- A. Acoustic Insulation: ASTM C665, preformed glass fiber, friction fit type, unfaced, 2.5 inch thick.
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Gypsum Board Accessories: ASTM C1047; metal; corner beads, edge trim, and expansion joints.
 - 1. Metal Accessories: Galvanized steel.
 - 2. Plastic Accessories: PVC plastic.
 - 3. Edge Trim: Type LC, L bead.
- D. Joint Materials: ASTM C475, GA-201 and GA-216, reinforcing tape, joint compound, adhesive, and water.
- D. Fasteners: ASTM C1002; Type S; length to suit application.
- E. Adhesive: ASTM C557, GA-216.
- F. Gypsum Board Screws: ASTM C954, ASTM C1002; length to suit application.
 - 1. Screws for Steel Framing: Type S.
 - 2. Screws for Wood Framing: Type W.
- G. Noise Barrier: Illbruck 1/8" vinyl noise barrier. Install as per manufacturers recommendations.

2 PART 2 EXECUTION

2.1 EXAMINATION

- A. Verify site conditions are ready to receive work.

2.2 INSTALLATION

A. Metal Studs:

1. Install studs in accordance with ASTM C754, GA-216 and GA-600.
2. Metal Stud Spacing: 16 inches oc.
1. Partition Heights: Full height to structure above. Install additional bracing for partitions extending above ceiling.

B. Wall Furring:

1. Erect free standing metal stud framing tight to concrete, masonry walls; attached by adjustable furring brackets. Erect vertically.
2. Space furring channels maximum 16 inches oc, not more than 4 inches from floor and ceiling lines, abutting walls.
3. Install insulation between furring channels attached to masonry and [concrete walls.
2. Install furring as required for fire resistance ratings indicated.

C. Ceiling Framing:

1. Install in accordance with ASTM C754, GA-216.
2. Coordinate location of hangers with other work. Install ceiling framing independent of walls, columns, and above ceiling work.
3. Reinforce openings in ceiling suspension system interrupting main carrying channels or furring channels, with lateral channel bracing.
4. Laterally brace entire suspension system.

D. Acoustic Accessories:

1. Install resilient channels at maximum 24 inches oc. [Locate joints over framing members.]
2. Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.
3. Install acoustic sealant within partitions.

E. Gypsum Board:

1. Install gypsum board in accordance with GA-216 and GA-600.
2. Fasten gypsum board to furring or framing with screws.
3. Place control joints consistent with lines of building spaces as recommended by gypsum board manufacturer and as directed by Architect/Engineer.]
4. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
3. Seal cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

F. Joint Treatment:

1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

2. Feather coats onto adjoining surfaces so camber is maximum 1/32 inch.
- G. Tolerances: Maximum Variation from Flat Surface: 1/8 inch in 10 feet in any direction.

...END OF SECTION 09 21 00

SECTION 09 51 00
ACOUSTICAL CEILINGS

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Provide acoustical ceilings where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01001.
- B. Product data: Within 20 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
 - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01001.

1.5 EXTRA STOCK

- A. Deliver to the Owner for his use in future modifications, an extra stock of 2 unopened boxes of each type of acoustic tile used.

2 PART 2 PRODUCTS

2.1 SUSPENSION SYSTEM

- A. Provide a complete system of supporting members, anchors, wall cornices, adapters for light fixtures and grilles, and accessories of every type required for a complete suspended "T" grid system of the arrangements shown on the Drawings, in color or colors selected by the Architect from standard colors of the approved manufacturer, and complying with pertinent requirements of Underwriters Laboratories, Inc., and the governmental agencies having jurisdiction.
- B. Acceptable Products:
 - 1. Exposed tee grid 24 inch by 24 inch shall be Donn DX System as manufactured by USG Interiors, Inc., Chicago, IL or Chicago Metallic 200 Snap Grid, Armstrong Prelude 15/16", or approved equal. Components shall be formed from commercial quality cold-rolled steel, electro-galvanized coated and prepainted. Exposed finish shall be low sheen satin white.
 - 2. Exposed extruded aluminum straight perimeter trim, prefinished, low sheen, satin white
 - a. Chicago Metallic "Infinity"
 - b. Armstrong "Axiom"

2.2 ACOUSTICAL CEILING PANELS

- A. Acceptable products:
 - 1. Non-Fire Rated Assemblies - Acoustic panels in common areas and apartments: Armstrong Cirrus, Tegular, fine texture, beveled tegular edge, 24 inches by 24 inches by 3/4 inch. Finish color: Cream, 9/16" Suprafine Suspension System.
 - 2. Fire Rated Assemblies - Acoustic panels in common areas as part of fire rated assemblies: Armstrong Cirrus, Tegular, fine texture, beveled tegular edge, Fire Guard, 24 inches by 24 inches by 3/4 inch. Finish color: Cream, 9/16" Suprafine XL Fireguard Suspension System.
 - 3. All ceiling materials shall be 100% free of asbestos.

2.3 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not

proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION, GENERAL

- A. Except as modified by requirements of governmental agencies having jurisdiction, recommendations of the manufacturer as approved by the Architect, or specific directions of the Architect, install in accordance with ASTM C636 and the pertinent UL design requirements.
- B. Lateral Bracing:
 - 1. Provide lateral bracing as required by pertinent codes and regulations.
 - 2. Secure lateral bracing to structural members. Secure at right angles to the direction of the partition and four ways in large ceiling areas.
- C. Provide hold-down clips for ceiling boards only when so required by governmental agencies having jurisdiction.
- D. Make all grid level within a tolerance of one in 1000 and straight within a tolerance of one in 1000.
- E. Install the suspension system in accordance with the layout indicated on drawings. Layout tile from center of areas in both directions, except where otherwise shown on Drawings. Provide proper openings for the installation of electrical fixtures, mechanical items, etc. Any field conditions interfering with the installation of the ceiling shall be called to the attention of the Architect for solution before proceeding with work.
- F. Provide approved type inserts and fastenings as required for the suspension system.
- G. Suspension system shall be of sufficient strength to support lighting fixtures, supply diffusers, return grilles, and acoustic panels with a maximum deflection of 1/360 of the span. All extra supports shall be provided wherever required to maintain alignment of suspension system due to installation of mechanical and electrical trade components.
- H. Units abutting vertical surfaces shall be provided with metal wall molding.

3.3 INSTALLATION OF ACOUSTICAL MATERIALS

- A. Suspension System Hangers - Fasten 12 gauge galvanized steel wire hangers to structural framing at not more than 3 feet apart for the length of main runners. Support of each hanger shall be a galvanized eye fitting fastened to structural support. Provide all supports for main tees.
- B. Main Runners - Erect main runners 48" o.c. for exposed grid; loop hanger wire through wire support and secure by twisting on drop not less than 3 turns. Lower end of hanger wire shall be looped through tab on main runner and secured by twisting on self not less than three turns. Provide extra wire and eye support in center of long dimension on each side of light or mechanical fixture.
- C. Cross Tees - Insert cross tees 24" apart and secure to main runners. Cross tees shall not engage main runners at joints.

- D. Borders - Install wall molding securely fastened to wall. Parallel borders shall be not less than 6" wide and equal.
- E. Acoustical - Install 24" by 24" panels in exposed grid system, with pattern of all panels running parallel to short axis of room.

3.4 CLEANING AND FINISHING

- A. Following erection and when directed by the Architect, clean all exposed surfaces of dirt, discoloration and all foreign substances. Units which are damaged or improperly installed shall be removed and replaced with whole new units as directed by the Architect, at no additional cost to the Owner.
- B. Remove all cartons, containers, rubbish and waste materials from the premises as they accumulate or as required by the Architect.

...END OF SECTION 09 51 00

SECTION 09 64 00

WOOD FLOORING

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sanding and repairing existing wood flooring and transparent floor finish.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's installation instructions and data for floor finish materials.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and maintenance materials.

1.4 QUALITY ASSURANCE

- A. Perform Work of this section in accordance with Maple Flooring Manufacturers Association (MFMA) Guide Specifications.
- B. Surface Burning Characteristics:
 - 1. Floor Finishes: Class I, minimum 0.45 watts/sq cm when tested in accordance with NFPA 253.
- C. VOC Limits: Provide products complying with state VOC limit of 350g/l.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain room temperatures of minimum of 65 degrees F for period of 2 days prior to delivery of materials.

2 PART 2 PRODUCTS

2.1 WOOD FLOORING FINISH

- A. Manufacturers:
 - 1. Waterlox Coatings.
 - 2. Substitutions: Permitted subject to compliance with requirements as judged solely by Architect.
- B. Floor Finish: Modified tung oil finish, clear, medium gloss; Waterlox Original Sealer/Finish TB6038, or equal.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.

3.2 PREPARATION

- A. Prior to applying or installing each material, broom clean substrate and ensure surface is free of oil, grease, dust, and foreign substances.
- B. Repair damaged areas of flooring with matching material.
- C. Machine sand wood flooring using best industry practices to remove existing finish down to bare wood. Use 150 grit sanding medium for final sanding.
- D. Vacuum clean wood floor after sanding is completed.
- E. Wipe floor surface clean with cloth dampened with mineral spirits.

3.3 INSTALLATION

- A. Floor Finish: Install in accordance with manufacturer's instructions and MFMA Guide Specifications.
 - 1. Apply three coats of floor finish with lambswool applicator. Allow each coat to air dry until tack free before applying next coat.
 - 2. Maintain sufficient airflow in work area to facilitate drying and curing.
- B. Protection: Prohibit traffic on finished floor for seven days.

...END OF SECTION 09 64 00

SECTION 09 65 00

RESILIENT FLOORING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Resilient vinyl sheet, plank and tile flooring, base, stair and accessories.
- B. Substrate preparation for resilient flooring and accessories.

1.3 SYSTEM DESCRIPTION

- A. Resilient Flooring: Conform to applicable code for flame/smoke rating requirements of 75/450 in accordance with ASTM E84 and critical radiant flux (CRF) of 0.45 per ASTM E648.

1.4 EXTRA MATERIAL

- A. Provide 5% of resilient flooring of each type, color and pattern.

2 PART 2 PRODUCTS

2.1 SHEET VINYL FLOORING: Refer to Interior Finish Legend for schedule of materials.

- A. Sheet Vinyl Sheet Covering with Backing, R1 ASTM F 1303
 - 1. Type (Binder Content): I, minimum binder content of 90 percent.
 - 2. Wear-Layer Thickness: Grade 1, .020 inch commercial wear layer over photographic print film design.
 - 3. Wearing Surface: Smooth
 - 4. Total Thickness: 0.080 inch.
 - 5. Backing Class: Class B (nonfoamed plastic).
 - 6. Sheet Width: 12 feet.
 - 7. Seaming Method: Heat welded.
 - 8. Colors: As indicated
 - 9. Manufacturers:
 - a. Armstrong World Industries Inc.
 - b. Congoleum Corp.
 - c. Mannington Mills Inc.
 - d. Tarkett Inc.

2.2 VINYL COMPOSITION TILE: Refer to Interior Finish Legend for schedule of materials.

- A. Vinyl Composition tile, VCT: ASTM F 1066

1. Class: 2
2. Wearing Surface: Smooth
3. Total Thickness: 0.125 inch.
4. Size: 12 by 12 inches
5. Fire – Test- Response Characteristics:
6. Colors: As indicated
7. Manufacturers:
 - a. Armstrong World Industries Inc.
 - b. Congoleum Corp.
 - c. Mannington Mills Inc.
 - d. Tarkett Inc.

2.3 SHEET VINYL PLANK FLOORING SYSTEM:

- A. Adura luxury Vinyl Plank: Refer to Interior Finish Legend for schedule of materials.
1. Size: 4" x 36" inch.
 2. Thickness: 0.3125 inch.
 3. Pattern: Timber Ridge
 4. Manufacturers:
 - a. Mannington Mills Inc.
 - b. Armstrong World Industries Inc.
 - c. Azrock Industries Inc.
- B. Acoustical Underlayment – ECOsilence (or equal) 4mm glue-down recycled rubber floor underlayment, ASTM D412 for tensile strength, D297 for density; and E2129 for sustainability. Install as per manufacturers recommendations.

2.4 CONCRETE SUBSTRATE VAPOR BARRIERS
(See 01 00 00 Basic Requirements, 1.7 CASH ALLOWANCES, D.3)

- A. Vapor Barriers: For moisture vapor emission rate (MVER) exceeding 3 lb/1000 sq. ft., employ the following strategies:
1. For moisture vapor emission rate (MVER) between 3 and 8 lb/1000 sq. ft., use one of the following products:
 - a. M-Guard V-68 Ultra Premium Commercial Adhesive by Mannington
 - b. Hydroseal by Formulators
 - i. For VCT and carpet tile use Hydroseal PSA
 - ii. For VCT, Carpet and Sheet vinyl use Hydroseal Multi
 - c. Koester VAP 1-2000 (with flooring manufacturers recommended adhesive).
 2. For moisture vapor emission rate (MVER) between 8 and 10 lb/1000 sq. ft., use the following products:
 - a. Hydroseal PSA or Hydroseal Multi with the addition of Hydroseal Primer
 3. For moisture vapor emission rate (MVER) between 10 and 12 lb/1000 sq. ft., use the following products:

- a. Hydroseal PSA or Hydroseal Multi with the addition of Hydroseal Primer and Hydroseal Membrane.
 - b. Koester VAP 1-2000 (with flooring manufacturers recommended adhesive).
4. For moisture vapor emission rate (MVER) above 12 lb/1000 sq. ft., use the following product:
- a. Koester VAP 1-2000 (with flooring manufacturers recommended adhesive).

2.5 ACCESSORIES

- A. Subfloor Filler: Type recommended by floor material manufacturer.
- B. Primers and Adhesives: Waterproof, type recommended by floor material manufacturer.
1. Flooring Adhesive: VOC emissions not to exceed 50 g/L .
 2. Cove Base Adhesive: VOC emissions not to exceed 50 g/L.
- C. Base: Vinyl Johnsonite "Millwork", Reveal MW-XX-F, or equal.
1. Height: 4 1/4 inch.
 2. Thickness: 0.25 inch thick.
 3. Finish: Color as selected from all available pallets
 4. Length: 8' lengths
 5. Manufacturers:
 - a. Armstrong World Industries Inc.
 - b. Azrock Industries Inc.
 - c. Johnsonite
 - d. Kentile Floors Inc.
 - e. Tarkett Inc.
 - f. Roppe
- D. Resilient Molding Accessories - Types Include the Following As Applicable: Carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet.
1. Manufacturer: Roppe Corporation, USA
 2. Material: Rubber or vinyl, as indicated.
 3. Profile and Dimensions: As indicated.
- E. Stair Tread/Riser Combination, R1 & R2: FS RR-T-650; one-piece tread/riser combination with contrasting marbled rubber color insert strip at the nose of the tread for visually impaired.
1. Products: Johnsonite; VIRTR; or equal from Pirelli Rubber Flooring or Roppe Corporation.
- F. Sealer and Wax: Types recommended by floor material manufacturer.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Conduct tests as required to verify that concrete floors are dry to maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, and dusting.
- B. Fill minor low spots and other defects with subfloor filler.
- C. Clean substrate.
- D. Apply primer as required to prevent "bleed-thru" or interference with adhesion by substances that cannot be removed.

3.2 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods.
- B. 48 hours before installation.
- C. During installation.
- D. 48 hours after installation.
- E. After post installation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- F. Close spaces to traffic during floor covering installation.
- G. Close spaces to traffic for 48 hours after floor covering installation.
- H. Install resilient products after other finishing operations, including painting, have been completed.

3.3 INSTALLATION – CONCRETE VAPOR BARRIERS

- A. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Prepare according to ASTM F 710.
 - 2. Repair damaged and deteriorated concrete according to resilient flooring manufacturer's written recommendations.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- b. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.
 - c. If moisture vapor emissions exceed 3lb/1000 sq. ft., application of moisture abatement product is required.
5. Verify that concrete substrates have neutral pH and that resilient flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
6. Provide written copies of test to Owner's Rep. and Architect.

3.4 INSTALLATION - SHEET AND TILE MATERIAL

- A. Install in accordance with manufacturer's instructions.
- B. Spread adhesive and set flooring in place. Press with heavy roller to attain full adhesion.
- C. Install tile flooring with joints and seams parallel to building lines, with grain running in one direction. Allow minimum 1/2 full size tile width at room or area perimeter.
- D. Install sheet flooring with seams parallel to width of room. Provide minimum of 1/3 full roll width. Double cut sheet and continuously seal with heat weld and butt joints hairline.
- E. Scribe flooring to produce tight joints at items that penetrate flooring.
- F. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, at face of tub/shower units, and where indicated. Secure resilient strips by adhesive.
- H. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

3.5 INSTALLATION - BASE MATERIAL

- A. Adhere base tight to wall and floor surfaces.
- B. Fit joints tightly and make vertical. Miter internal corners. At external corners, V cut back of base strip to 2/3 of its thickness and fold.

3.6 CLEANING

- A. Remove excess adhesive from surfaces without damage.
- B. Clean, seal, and wax surfaces in accordance with manufacturer's instructions prior to substantial completion.

...END OF SECTION 09 65 00

SECTION 09 68 00

CARPET

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Carpet stretched-in with cushion underlay and direct-glued.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, and location of edge moldings and edge bindings.
- B. Samples: Submit samples of each carpet type for selection of color and pattern.

1.4 EXTRA MATERIALS

- A. Provide 5% of carpeting of each type, color, and pattern specified.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Products of one or more manufacturers are specified to establish appearance, construction and performance characteristics. Products of other manufacturers may be accepted subject to compliance with specifications and review by Architect.

- 1. Shaw Contract Group
- 2. Armstrong World industries Inc.
- 3. Lees Carpets
- 4. Patcraft Inc.
- 5. J & J Commercial

2.2 MATERIALS

- A. Common Area Carpet : Textured Loop Graphic, 28 oz. 100% solution dyed nylon, UM44d certified. (For use in Community Partners)
 - 1. Yarn: 100% Bulked Continuous Filament Nylon
 - 2. Dye Method: Solution Dyed
 - 3. Surface Texture: Textured Loop
 - 4. Gauge: 1/10
 - 5. Tufted Stitches: 10 per inch

6. Yarn Weight: 28 oz/SY
7. Finished Pile Thickness: minimum of .1875 inch
8. Primary Backing: 100% polypropylene.
9. Secondary Backing: Unitary back with 20 lb. tuft lock.
10. Special Treatment: Soil Protection & Antimicrobial
11. Width: 12 feet (3.66m)
12. Flammability: Class 1 (ASTM E-648)
13. Smoke: Less than 450 (ASTM E-662)
14. ADA Compliance: Compliant for accessible routes
15. Warranties: 10 Years

- B. Residential Unit Carpet (see Alternate 3): Textured loop, 28 oz. 100% solution dyed nylon, UM44d certified. (For use in apartments, installed over pad in Type B units, glued down in Type A units.)

1. Yarn: 100% Bulked Continuous Filament Nylon
2. Dye Method: Solution Dyed
3. Surface Texture: Textured Loop
4. Gauge: 1/8
5. Tufted Stitches: minimum of 9.0 per inch
6. Yarn Weight: minimum of 28.0 oz/SY
7. Finished Pile Thickness: minimum of .1875 inch
8. Primary Backing: 100% polypropylene
9. Secondary Backing: Unitary back with 20 lb. tuft lock.
10. Special Treatment: Soil Protection & Antimicrobial
11. Width: 12 feet
12. Flammability: Class 1 (ASTM E-648)
13. Smoke: Less than 450 (ASTM E-662)
14. ADA Compliance: Compliant for accessible routes
15. Warranties: 10 Years

2.3 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by flooring material manufacturer.
- B. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.
- C. Carpet Cushion: 100% recycled synthetic fiber carpet cushion, 40 oz. min. weight.
- D. Seam Sealer: At all glue down applications.
- E. Moldings and Edge Strips: Vinyl color as selected by architect.
- F. Adhesives: Compatible with materials being adhered.
 1. Carpet adhesive VOC emissions not to exceed 50 g/L and meet CRI low emission label standards .

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that floor surfaces are smooth and flat within tolerances specified in Section 03001 and are ready to receive work.
- B. Verify that concrete floors for glue-down installation are ready for carpet installation by testing for moisture emission rate and alkalinity in accordance with manufacturer's instructions. Obtain instructions if test results are not within specified limits.

3.2 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Clean substrate.

3.3 INSTALLATION

- A. Install carpet and cushion in accordance with manufacturer's instructions and Carpet and Rug Institute CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials.
- B. Verify carpet match before cutting to ensure minimal variation between dye lots.
- C. Lay out carpet and locate seams in accordance with shop drawings:
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- D. Install carpet at typical apartments over cushion, stretched-in. Join seams using hot adhesive tape. Form seams straight, not overlapped or peaked, and free of gaps.
- E. Install carpet at ground floor areas by direct glue-down method.
- F. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

...END OF SECTION 09 68 00

SECTION 09 70 00

WALL COVERINGS - FRP

1 PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Fiberglass reinforced plastic wall covering.
- B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
 - 1. Section 09260 - GYPSUM BOARD ASSEMBLIES for substrate.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
 - 1. Manufacturers' product data for adhesives, including printed statement of VOC content.
- B. Samples for Verification: Full width by 36-inch-long section of wall covering from lot to be used for each type of wall covering indicated for each color, texture, and pattern required.
 - 1. Show complete pattern repeat.
 - 2. Mark top and face of material.
- C. Maintenance Data: For wall coverings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire-Growth Contribution: Wall coverings complying with acceptance criteria of the local authorities having jurisdiction.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install wall coverings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

2 PART 2 PRODUCTS

2.1 WALL-COVERING PRODUCTS

- A. General: Provide rolls of each type of wall covering from the same run number or dye lot.
- B. Fiberglass Reinforced Plastic Wall Covering:
 - 1. Products:
 - a. Glasbord-P with Surfaseal (Class C), by Kemlite Company, Inc., Joliet, IL 60434; 1.800.435.0080; www.kemlite.com, or equal.
 - b. Fire-X Glasbord with Surfaseal (Class A), by Kemlite Company, Inc., Joliet, IL 60434; 1.800.435.0080; www.kemlite.com, or equal.
Note: Provide class A only where required by code.
 - 2. Thickness: 3 /32 inches.
 - 3. Width: 48 inches.
 - 4. Colors, Textures, and Patterns: Refer to Finish Schedule.

2.2 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer[, and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Section 09900 - PAINTING, and recommended in writing by wall-covering manufacturer for intended substrate.
- C. Plastic Moldings and End Caps: As recommended in writing by wall-covering manufacturer. Color to match wall-coverings.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 - 2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity.
 - 3. Metals: If not factory primed, clean and apply metal primer.
 - 4. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
 - 5. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.
- E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION

- A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.
- C. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
- D. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.
- E. Install all related trim, moldings, end caps, and installation accessories.

3.4 CLEANING

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION

SECTION 09 91 13

EXTERIOR PAINTING AND REHABILITATION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.
- B. Preservation Brief 10 - Exterior Paint Problems on Historic Woodwork (<http://www.cr.nps.gov/hps/tps/briefs/brief10.htm>)

1.2 SECTION INCLUDES

- A. Existing paint surface treatment and removal methods.
- B. Surface preparation and field application of paints and coatings.

1.3 SYSTEM DESCRIPTION

- A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.4 SUBMITTALS

- A. Product Data: Provide data on all finishing products.
- B. Samples: Submit coating samples for selection, illustrating range of colors and textures available for each surface finishing product scheduled.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Store and apply materials in environmental conditions required by manufacturer's instructions.

1.6 EXTRA MATERIALS

- A. Provide minimum of two (2) gallons of each type and color of coating specified.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers: Products of one or more manufacturers are listed in Finish Schedules to establish appearance, performance and quality characteristics. Products of other manufacturers may be accepted subject to review by Architect.

- 1. ICI Paint Stores
- 2. Benjamin Moore and Co.
- 3. PPG Industries: Pittsburgh Paints
- 4. Pratt and Lambert

5. Sherwin Williams
 6. Sonneborn
- B. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.
- C. VOC Content: Provide coatings with low or zero VOC content to the greatest extent possible. As a minimum, comply with requirements of Green Seal GX-11:
1. Non flat 150 g/l.
 2. Flat 50 g/l.
- D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve the finishes specified, as recommended by coating manufacturer..

2.2 FINISHES

- A. Refer to exterior finish schedule at end of section for surface finish schedule.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine the condition of all existing painted wood and metal portions of existing structures. Determine the Class of paint surface conditions (Class I, Class II or Class III) at each paint location based on the standards outlined in Preservation Brief 10 - Exterior Paint Problems on Historic Woodwork.
- B. Provide treatment for each Class of existing paint surface as recommended in Preservation Brief 10 - Exterior Paint Problems on Historic Woodwork.
- C. Secure loose or damaged pieces to substrate wherever possible. Remove and replace damaged, missing or deteriorated wood pieces only where necessary.
- D. Verify that substrate conditions are ready to receive Work.
- E. Measure moisture content of porous surfaces using an electronic moisture meter. Do not apply finishes unless moisture content is less than 12 percent.
- F. Correct minor defects and clean surfaces which affect work of this section.
- G. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- H. Gypsum Board Surfaces: Fill minor defects with exterior grade latex compounds. Spot prime defects after repair.
- I. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- J. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove foreign matter. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.

- K. Uncoated Ferrous Surfaces: Remove scale by wire brushing, sandblasting, clean by washing with solvent. Apply treatment of phosphoric acid solution. Prime paint after repairs.
- L. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust, hand or power tool clean, clean surfaces with solvent. Prime bare steel surfaces.
- M. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied.

3.2 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Back prime new exterior woodwork scheduled to receive paint finish with primer paint.
- C. Minimum Coating Thickness: As recommended by manufacturer.
- D. Prime Coats: Prime material as recommended by manufacturer. Recoat primed surfaces as required to cover suction spots or unsealed areas.
- E. Pigmented Surfaces: Completely cover to achieve an opaque, smooth surface of uniform finish, color and appearance. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other imperfections will not be accepted.

3.3 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment.
- B. Remove unfinished louvers, grilles, covers, and access panels and paint separately. Paint dampers exposed behind louvers, grilles, convactor and baseboard cabinets to match face panels.
- C. Prime and paint insulated and exposed pipes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
- D. Paint exposed conduit and electrical equipment except prefinished surfaces.
- E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

- A. As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

3.5 SCHEDULE - EXTERIOR SURFACES

Surface	Finish	System	Product	Coats
Metal	Gloss	Primer	Benjamin Moore IronClad Latex Low Lustre 363	1
		Finish	Benjamin Moore Impervex Latex High Gloss 309	2
Wood	Satin	Primer	Benjamin Moore Fresh Start Acrylic Primer 023	1
		Finish	Benjamin Moore MoorGlo 096	2
Concrete	Satin	Primer	Benjamin Moore High Build Acrylic Masonry Primer 068	1
		Finish	Benjamin Moore Moorelastic 100% Acrylic Elastomeric Waterproof Coating Low Lustre 055	1
Galvanized Steel	Flat	Primer	Benjamin Moore I.M.C. Acrylic Metal Primer M04	1
		Finish	Benjamin Moore Moorlife Flat Fortified Acrylic House Paint 105	2

...END OF SECTION 09 91 13

SECTION 09 91 23
INTERIOR PAINTING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Surface preparation and field application of paints and coatings.

1.3 SYSTEM DESCRIPTION

- A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.4 SUBMITTALS

- A. Product Data: Provide data on all finishing products.
- B. Samples: Submit coating samples for selection, illustrating range of colors and textures available for each surface finishing product scheduled.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Store and apply materials in environmental conditions required by manufacturer's instructions.

1.6 EXTRA MATERIALS

- A. Provide minimum of two (2) gallons of each type and color of coating specified.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers: Products of one or more manufacturers are listed in Finish Schedules to establish appearance, performance and quality characteristics. Products of other manufacturers may be accepted subject to review by Architect.

1. Benjamin Moore and Co.
2. ICI/Dulux
3. PPG Industries: Pittsburgh Paints
4. Pratt and Lambert
5. Sherwin Williams Co.

- B. Coatings: Ready mixed except field catalyzed coatings of good flow and brushing properties, capable of drying or curing free of streaks or sags.

- C. VOC Content: Provide coatings with low or zero VOC content to the greatest extent possible. As a minimum, comply with requirements of Green Seal GS-11:
 - 1. Non flat: 150 g/l.
 - 2. Flat: 50 g/l.
- D. Quality: Manufacturer's best quality of each type of product specified.
- E. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials required to achieve the finishes specified, as recommended by coating manufacturer..

2.2 FINISHES

- A. Refer to schedule at end of section for surface finish schedule.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that substrate conditions are ready to receive Work.
- B. Measure moisture content of porous surfaces using an electronic moisture meter. Do not apply finishes unless moisture content is less than 12 percent.
- C. Correct minor defects and clean surfaces which affect work of this section.
- D. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- E. Gypsum Board Surfaces: Fill minor defects with latex compounds. Spot prime defects after repair.
- F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- G. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove foreign matter. Remove oil and grease with a solution of tri-sodium phosphate, rinse well and allow to dry.
- H. Uncoated Ferrous Surfaces: Remove scale by wire brushing, sandblasting, clean by washing with solvent. Apply treatment of phosphoric acid solution. Prime paint after repairs.
- I. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust, hand or power tool clean, clean surfaces with solvent. Prime bare steel surfaces.
- J. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- K. New Wood items Schedule to Receive Transparent Finish: Wipe off dust and grit prior to application of clear urethane products. Seal knots, pitch streaks, and sappy sections, fill nail holes and cracks as recommended by paint manufacturer. Lightly sand between coats.

- L. Existing Wood items Schedule to Receive Transparent Finish: Clean and lightly sand existing finish to provide for an attractive new finish. Confirm compatibility of paint product with existing substrate. Wipe off dust and grit prior to application of clear urethane products. Seal knots, pitch streaks, and sappy sections, fill nail holes and cracks as recommended by paint manufacturer. Lightly sand between coats.
- M. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.

3.2 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Sand transparent finishes lightly between coats to achieve required finish.
- C. Back prime interior and exterior woodwork scheduled to receive paint finish with primer paint.
- D. Back prime interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.
- E. Minimum Coating Thickness: As recommended by manufacturer.
- F. Prime Coats: Prime material as recommended by manufacturer. Recoat primed surfaces as required to cover suction spots or unsealed areas.
- G. Pigmented Surfaces: Completely cover to achieve an opaque, smooth surface of uniform finish, color and appearance. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other imperfections will not be accepted.
- H. Transparent Finishes: Provide smooth surface of uniform luster, free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes or other imperfections.

3.3 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Division 15 and Division 16 sections for schedule of color coding, identification banding of equipment, ductwork, piping, and conduit.
- B. Color code items in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
- C. Paint shop primed equipment.
- D. Remove unfinished louvers, grilles, covers, and access panels and paint separately. Paint dampers exposed behind louvers, grilles, convactor and baseboard cabinets to match face panels.
- E. Prime and paint insulated and exposed pipes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are prefinished.
- F. Paint interior surfaces of air ducts, and convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line.
- G. Paint exposed conduit and electrical equipment occurring in finished areas except prefinished surfaces.

Munjoy Commons Apartments

Renovation of Shailer and Emerson Schools

- H. Paint both sides and edges of plywood backboards.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

- A. As work proceeds, promptly remove finishes where spilled, splashed, or spattered.

3.5 SCHEDULE - INTERIOR SURFACES

Surface	Finish	System	Product	Coats
Conc. Walls	Satin	Primer	Benjamin Moore High Build Acrylic Masonry Primer 068	1
		Finish	Benjamin Moore Moorelastic 100% Acrylic Elastomeric Waterproof Coating Low Lustre 055	1
Conc. Floor	Sealer		See Specification Section 03 30 00 – 2.04.E Sealer at New Slabs + Moorlastic Elastomeric Waterproof Coating	
Drywall	Flat	Primer	Benjamin Moore Regal FirstCoat 216	1
		Finish	Benjamin Moore Pristine Eco Spec Latex Flat 219	1
Drywall	Eggshell	Primer	Benjamin Moore Regal FirstCoat 216	1
		Finish	Benjamin Moore Pristine Eco Spec Latex Eggshell 223	2
Drywall	Semigloss	Primer	Benjamin Moore Regal FirstCoat 216	1
		Finish	Benjamin Moore Pristine Eco Spec Latex Semi-Gloss 224	2
Metal	Semigloss	Primer	Benjamin Moore IronClad Latex Low Lustre 363	1
		Finish	Benjamin Moore Pristine Eco Spec Latex Semi-Gloss 224	2
Wood - Painted	Semigloss	Primer	Benjamin Moore Regal FirstCoat 216	1
		Finish	Benjamin Moore Pristine Eco Spec Latex Semi-Gloss 224	2
Wood - Transparent	Clear Satin	Finish	Benjamin Moore Benwood Acrylic Polyurethane 423	2
Hardboard Doors	Semigloss	Primer	Factory primed, touch up with Benjamin Moore Fresh Start Primer	1
		Finish	BM Pristine Eco Spec Latex Semi-Gloss 224	1
Concrete	Low Luster	Primer	Benjamin Moore Acrylic Masonry Sealer (VOC less than 250g/l)	1
		Finish	Benjamin Moore Moorlastic Elastomeric Waterproof Coating (055)	2
Concrete Block	Medium Gloss	Primer	Benjamin Moore Super Craft Latex Block Filler 285	1
		Finish	Benjamin Moore Moorcraft Super Spec Latex House & Trim Paint	2

...END OF SECTION 09 91 23

Part II
Division 10
Specialties

SECTION 10 00 00

SPECIALTIES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Postal specialties.
- D. Closet Shelving.
- E. Bicycle Storage Racks

1.3 SUBMITTALS

- A. Product Data: Provide data on Product, and accessories.
- B. Operating and Maintenance Instructions: Include relevant instructions. Include maintenance information.

1.4 QUALITY ASSURANCE

- A. Fire Extinguishers: Conform to NFPA 10.
- B. Postal Specialties: Comply with 2006 USPS Standard 4C requirements.

2 PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
 - 1. Allenco.
 - 2. Amerex.
 - 3. Ansul Fire Protection
 - 4. Bobrick Washroom Equipment.
 - 5. JL Industries.
 - 6. Larsen's Manufacturing Co.
 - 7. Potter-Roemer/Div. Smith Industries Inc.
 - 8. Walter Kidde/Div. Kidde Inc.

- B. Multi-Purpose Dry Chemical Type: Enameled steel tank, with pressure gage, 2A:10BC rating.
- C. Cabinets: Semi-recessed type, steel cabinet, full glass door with baked enamel finish. Comply with Fire Department requirements for lettering, locations and installation. Provide fire rated units where installed at fire rated walls.
- D. Brackets: Manufacturer's standard surface mounted bracket for extinguishers not indicated to have a cabinet.

2.2 POSTAL SPECIALITES

- A. Manufacturers:
 - 1. American Device Mfg. Co.
 - 2. Auth-Florence Manufacturing Co.
 - 3. Bommer Industries Inc.
 - 4. Cutler Manufacturing Corp.
- B. Mailboxes: Horizontal style, front loading, key locking, for interior application, in configuration indicated, meeting USPS Standard 4C.
 - 1. Finish: satin anodized aluminum. (Refer to interior elevations drawings for configuration.)
 - 2. Shailer: Model # (2) 4CET2-9 w/ multi-unit connector trim kit.
 - 3. Emerson: Model # (2) 4CET2-9 and (1) 4CBT6 w/ multi-unit connector trim kits.

2.3 CLOSET SHELVING

- A. Manufacturers
 - 1. Clairson International/ClosetMaid
 - 2. Schulte Corp.
- B. Shelving: Steel wire shelving with manufacturer's standard PVC or epoxy coating and standard installation hardware.
 - 1. Hanging Rod: Provide units with continuous (uninterrupted) hanging rod in clothes closets.

2.4 Bicycle Storage Racks

- A. Manufacturers
 - 1. Function First Inc.
- B. Bicycle Rack: The bike rib multiple – inverted U rack. Configurations and quantities indicated on the plans.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that surfaces and internal wall blocking are ready to receive work and opening dimensions are as instructed by the manufacturer.

3.2 INSTALLATION - FIRE EXTINGUISHERS

- A. Install extinguishers in accordance with manufacturer's instructions.
- B. Mount units to conform to ADA requirements, with center of door 48" above floor.
- C. Install units level and plumb in wall openings.

3.3 INSTALLATION – POSTAL SPECIALTIES

- A. Install new mailboxes in accordance with USPS requirements and manufacturer's instructions.
- B. Install units level and plumb in wall openings.

3.4 INSTALLATION – CLOSET SHELVING

- A. Install shelving in accordance with manufacturer's instructions.
- B. Install units level and plumb.
- C. Install closet shelving at 60" AFF, except at Handicapped Accessible units.
- D. Install closet shelving at Handicapped Accessible units at 48" AFF. Install spare clips for shelf relocation to 60" AFF.

...END OF SECTION 10 00 00

SECTION 10 14 00

SIGNS

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes the following types of signs:

- 1. Interior panel signs.

Handicapped parking signs.

Property identification sign.

Individual apartment numbering/room identification.

Fire alarm system layout diagram.

- B. Related Sections: The following sections contain requirements that relate to this section:

- 1. Division 1 Section "Temporary Facilities" for temporary project identification signs.

1.3 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.
- C. Samples: Provide samples of each sign component for initial selection of color, pattern, graphic content and surface texture as required and for verification of compliance with requirements indicated.
- D. Schedule: Coordinate schedule of apartment numbering and building room identification names with Owner.

1.4 QUALITY ASSURANCE:

- A. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

2 PART 2 PRODUCTS

2.1 MATERIALS:

- A. Acrylic: 1/8" thick sheet acrylic for exterior engraved panel signs, in colors indicated or, if not indicated, as selected by Architect from the manufacturer's standards.
- B. Aluminum: 0.080" mill finish aluminum sheet, for exterior signs.
- C. Reflective sheet: 3M "Scotchlite" reflective sheeting for exterior panel sign backgrounds.

2.2 PANEL SIGNS:

- A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
 - 1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.
- C. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with the following requirements:

- 1. Edge Condition: Square cut.

Corner Condition: Rounded corners.

Graphic Content and Style: Provide sign copy that complies with the requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices. Comply with requirements of ANSI A 117.1-1986, Uniform Federal Accessibility Standard and Americans with Disabilities Act.

- D. Handicapped Parking Sign: Provide 12x18" standard reflective aluminum handicapped parking sign displaying the International Symbol of Accessibility as indicated.

2.3 ROOM AND APARTMENT IDENTIFICATION:

- A. Unit Identification Numerals:
 - 1. 4 1/2" high x 6" long engraved acrylic, mounted on wall surface at 60" AFF adjacent to entrance doors.
 - 2. 2" high x 3" long engraved acrylic, mounted on wall surface at 8" AFF adjacent to entrance doors. Confirm compliance with the rules of the Portland, Maine Fire Department.

2.4 FINISHES:

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches as selected by the Architect from the manufacturer's standards.

3 PART 3 EXECUTION

3.1 INSTALLATION:

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions. Comply with installation requirements of ANSI A 117.1-2003, Uniform Federal Accessibility Standard and Americans with Disabilities Act.
- B. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- C. Wall Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
 - 1. Vinyl-Tape Mounting: Use double-sided foam tape, of thickness recommended by sign manufacturer for installation intended, to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Silicone-Adhesive Mounting: Use liquid silicone adhesive recommended by the sign manufacturer to attach sign units to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.
- D. Pole Mounted Panel Signs: Attach panel signs to heavy duty galvanized hat shaped channels. Mount signs @ 72" above grade. Paint poles in colors as directed.

3.2 CLEANING AND PROTECTION:

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.
- B. Restore sign surfaces that have been damaged prior to Substantial Completion. Replace damaged signs that cannot be repaired to satisfaction of Owner.

3.3 SIGN SCHEDULE:

A. Exterior Signs:

Handicapped Parking Signs: Provide one pole mounted sign at each designated handicapped parking space.

Permanent Property Identification Sign: by Owner.

Temporary Construction Signs: See Specification Section 01 00 00.

B. Interior Signs:

Unit Identification Signs: One per apartment, at each unit entrance door.

Common Area Room Signs: One per room, at entrance door.

Mount interior signs in accordance with accessibility standards.

...END OF SECTION 10 14 00

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Toilet, bath, shower, washroom and laundry accessories.
- B. Grab bars.

1.3 SYSTEM DESCRIPTION

- A. Conform to applicable code for installing work in conformance with ANSI A117.1 and ADA.

1.4 SUBMITTALS

- A. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- B. Supply 2 keys for each accessory to Owner. Key all accessories alike.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers: Products of one or more manufacturers are listed in Schedules to establish quality, appearance and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.

1. American Specialties Inc.
2. Basco.
3. Bobrick Washroom Equipment Inc.
4. Bradley Corp.
5. Franklin Brass.
6. NuTone.
7. McKinney/Parker Products Co.
8. Miami-Carey.

- B. Sheet Steel: ASTM A366.
- C. Stainless Steel Sheet: ASTM A167 Type 304.
- D. Tubing: ASTM A269 stainless steel.

- E. Fasteners, Screws, and Bolts: Hot dip galvanized steel, tamper-proof.

2.2 FABRICATION

- A. Form surfaces flat without distortion. Weld and grind joints smooth.
- B. Shop assemble components and package with anchors and fittings.
- C. Back paint components to prevent electrolysis.
- D. Provide steel anchor plates, adapters, and anchor components for installation.
- E. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

2.3 FINISHES

- A. Anchors: Galvanize to 1.25 oz./sq yd.
- B. Ferrous Metals - Shop Primed: Pretreat and clean, spray apply one coat primer and bake.
- C. Enamel: Pretreat, one coat primer and two coats baked enamel.
- D. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish.
- E. Stainless Steel: No. 4 satin luster finish.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify exact location of accessories for installation.
- B. Deliver inserts and rough-in frames to site. Provide templates and rough-in measurements as required.

3.2 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.

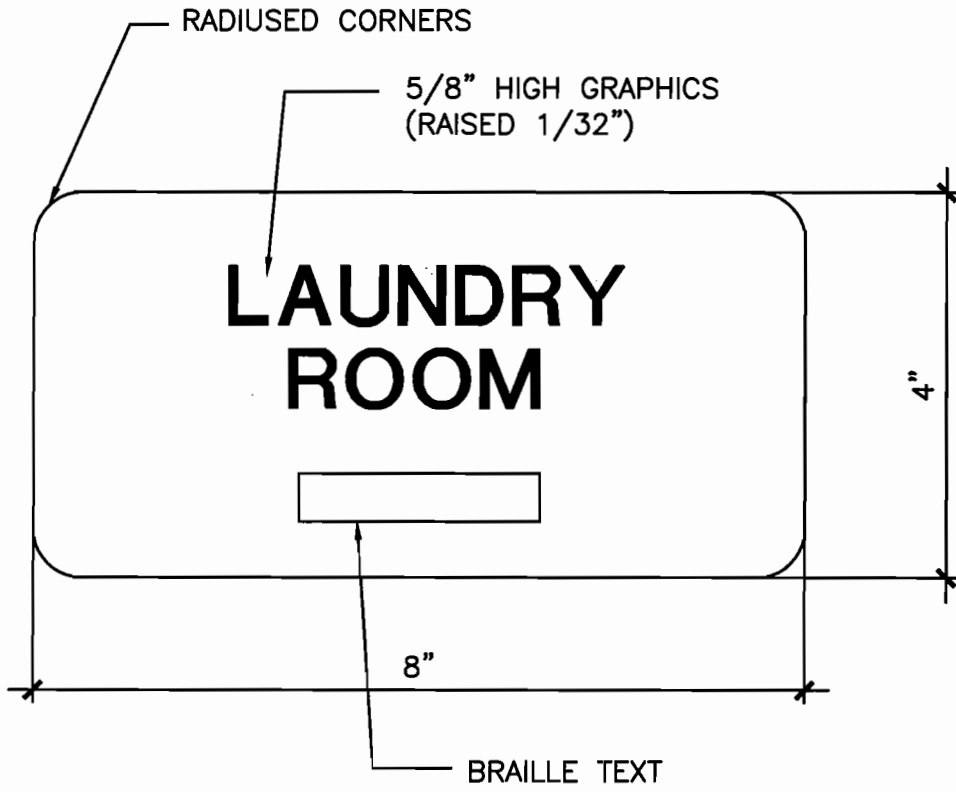
Continued next page...

3.3 SCHEDULE

ITEM (1)	QTY per Public Toilet Rm.	QTY per Existing Unit Bathroom	Quantity per Type A Unit Bathroom	MFR	MODEL NO.
Grab Bars	36"+42"+18"		36"+42"+18" & (2)24"+18"	Bobrick	B-6206.99 series (See Plan Layout)
Medicine Cabinet	0		1	Bobrick	B-297
Medicine Cabinet		1		Bobrick	B-299
Robe Hook	1	1	1	Bobrick	B6707
Shower Curtain Rod	0	1	1	Bobrick	B6107
Stainless Steel Mirror	1	0	1	Bobrick	B-293 1836
Toilet Tissue Dispenser	1	1	1	Bobrick	B-6857
Towel Bar		2	2	Bobrick	B-530
Paper Towel Dispenser	1	0	0	Bobrick	B-262
Soap Dispenser	1	0	0	Bobrick	B-2111

1. G.C. to provide solid wood blocking in wall for all scheduled toilet accessories.
2. Provide solid wood blocking at all locations of future grab bars (by owner) in all Type B units.

...END OF SECTION 10 28 00



LOCATIONS SCHEDULE:

PROVIDE (1) SG1 SIGNAGE AT EACH ROOM LOCATION EXCEPT AT EACH APARTMENT UNIT, PUBLIC RESTROOM, STAIRCASE, AND ELEVATOR

INSTALL 60" TO CENTER ABOVE FINISHED FLOOR, ON LATCH SIDE OF DOORS

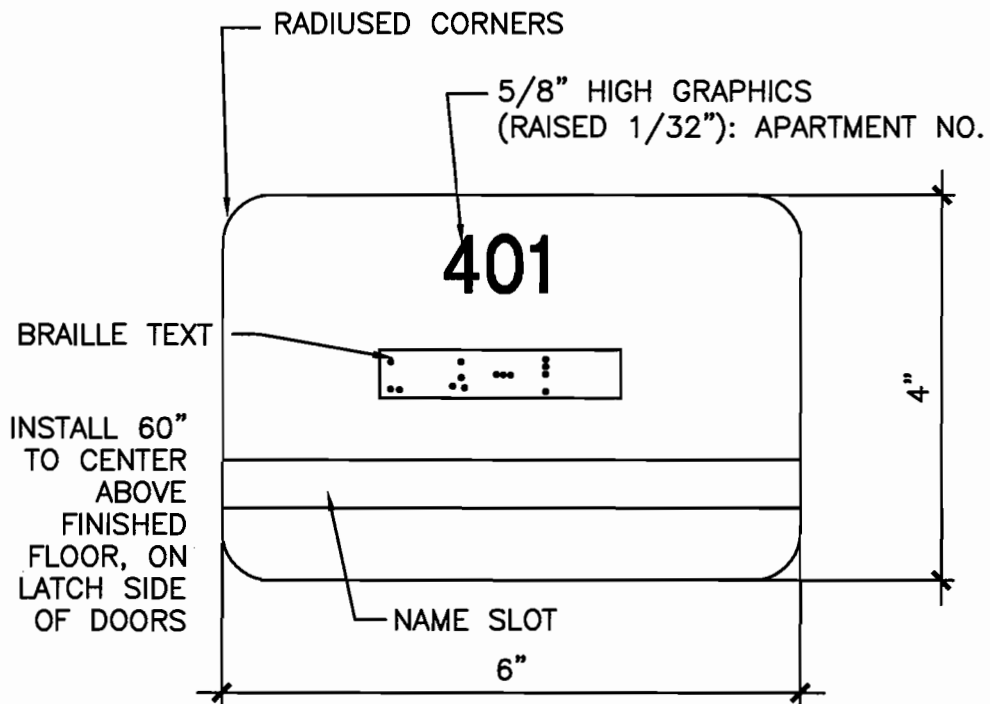


434 Cumberland Avenue
 Portland, ME 04101
 Phone: (207) 774-4441
 Fax: (207) 774-4016

Drawing Title:
 Laundry Room Sign

Scale: 6" = 1'-0"
 Date: 8/28/2009
 Revised:

Drawing Number:
SG1



PROVIDE (1) EACH APARTMENT



454 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

Drawing Title:
Apartment Number Sign

Scale: 6" = 1'-0"
Date: 8/28/2009
Revised:

Drawing Number:

SG2

CENTERLINE OF
SIGN SHALL BE
60" AFF



PROVIDE AT EACH PUBLIC RESTROOM



434 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

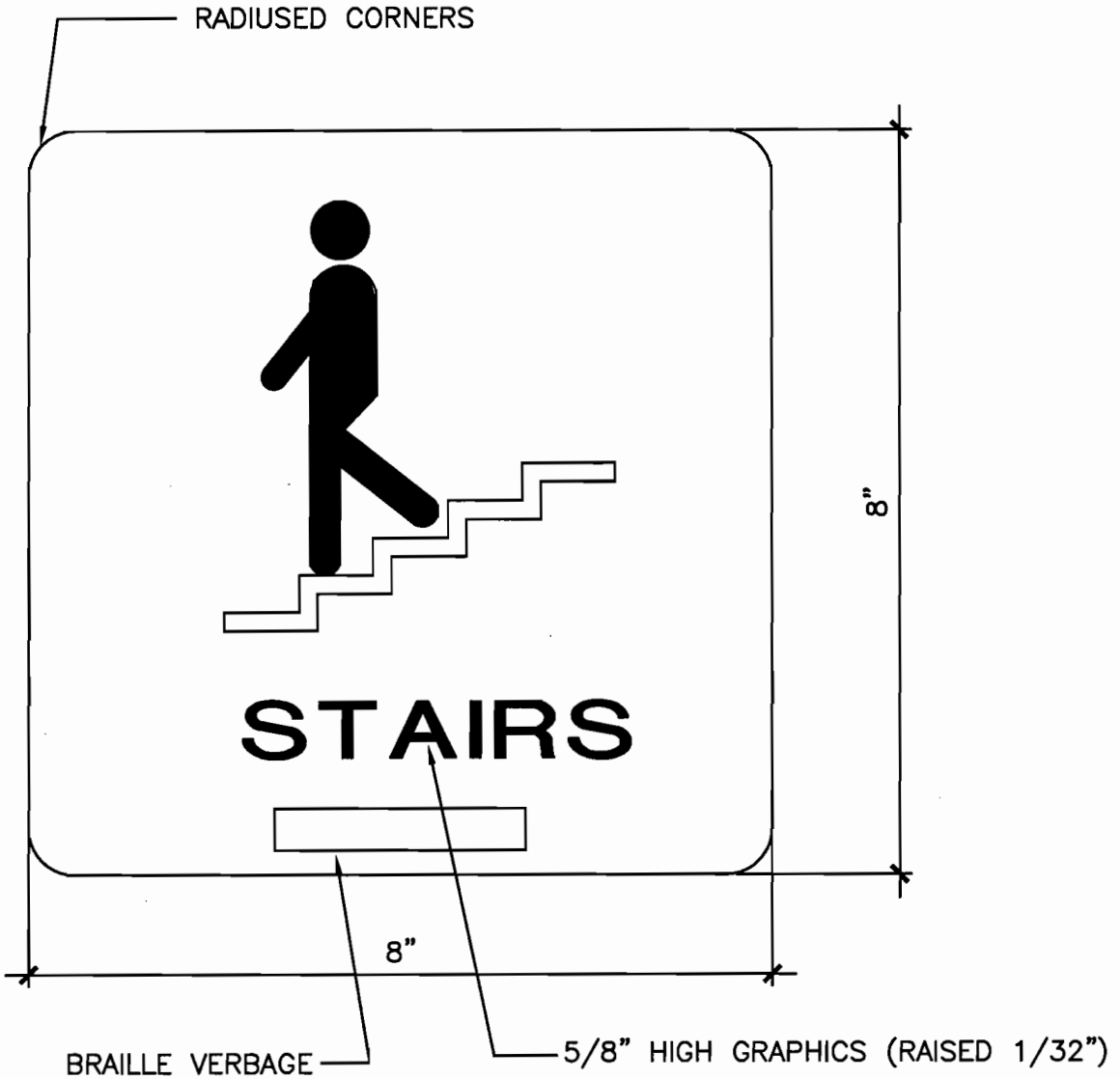
Drawing Title:
Restroom Sign

Scale: 6" = 1'-0"
Date: 8/28/2009
Revised:

Drawing Number:

SG3

CENTERLINE OF
SIGN SHALL BE
60" AFF



PROVIDE (1) EACH STAIR ENTRANCE
(15) TOTAL



434 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

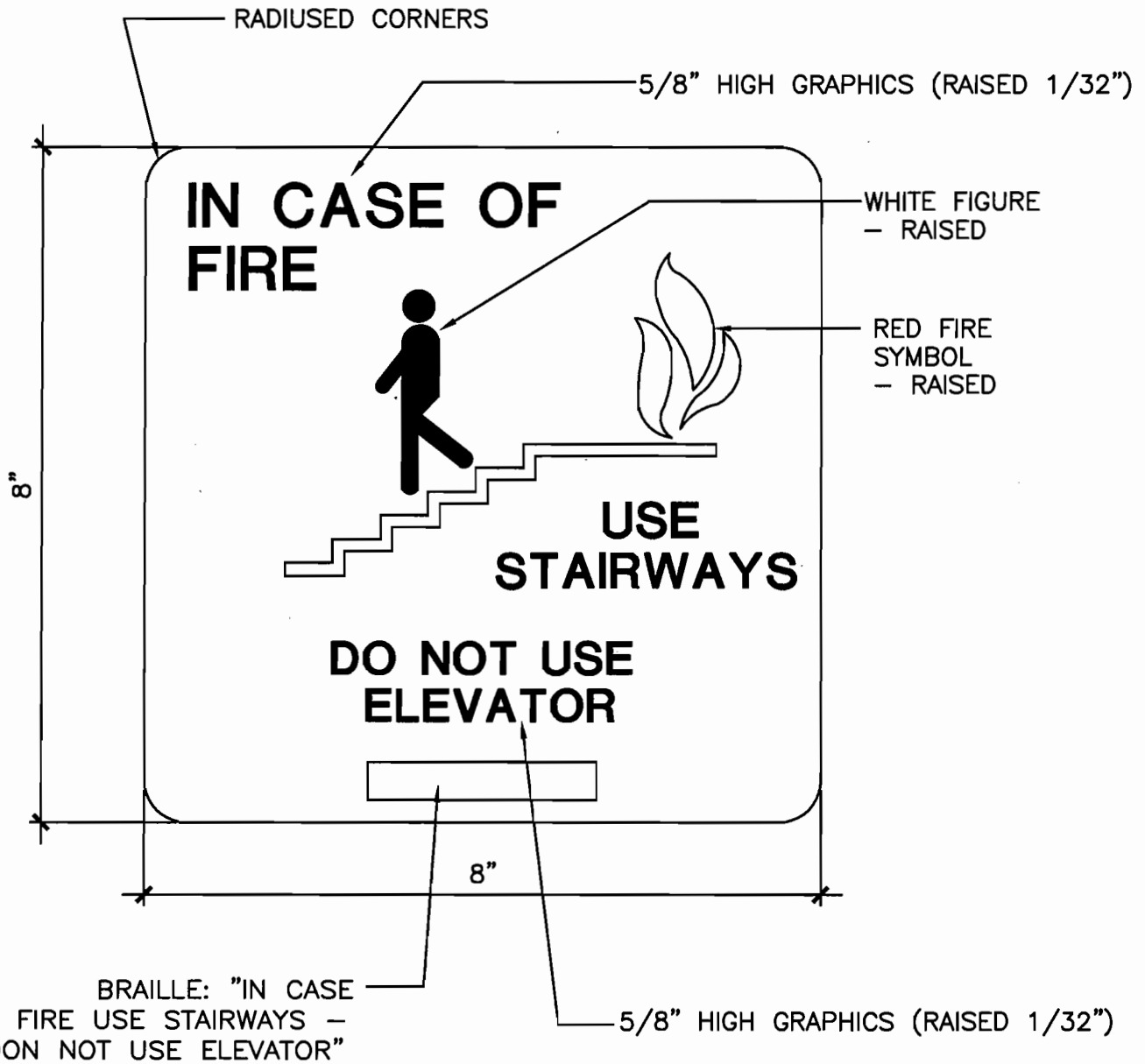
Drawing Title:
STAIR SIGN

Scale: 6" = 1'-0"
Date: 8/28/2009
Revised:

Drawing Number:

SG4

CENTERLINE OF
SIGN SHALL BE
60" AFF



PROVIDE (1) EACH ELEVATOR ENTRANCE
(3) TOTAL



434 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

Drawing Title:
IN CASE OF FIRE

Scale: 6" = 1'-0"
Date: 8/28/2009
Revised:

Drawing Number:

SG5

RADIUSED CORNERS

1" HIGH RAISED GRAPHICS

**STAIR No. 1
FLOOR**

2

5" HIGH
RAISED
GRAPHICS

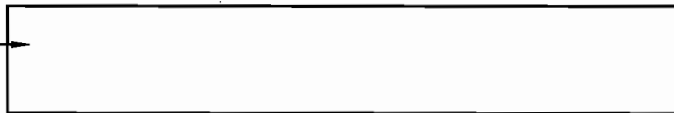
**FIRST FLOOR TO
SECOND FLOOR
NO ROOF ACCESS**



**DOWN TO FIRST FLOOR
FOR EXIT DISCHARGE**

1'-10"

BRILLE
"STAIR No.
FLOOR No."



1'-4"

FLOOR IDENTIFICATION DESIGNATION TO BE
COORDINATED WITH INSTALLATION LOCATION.
PROVIDE (1) PER FLOOR WITHIN EACH STAIR.

QUANTITY = 15



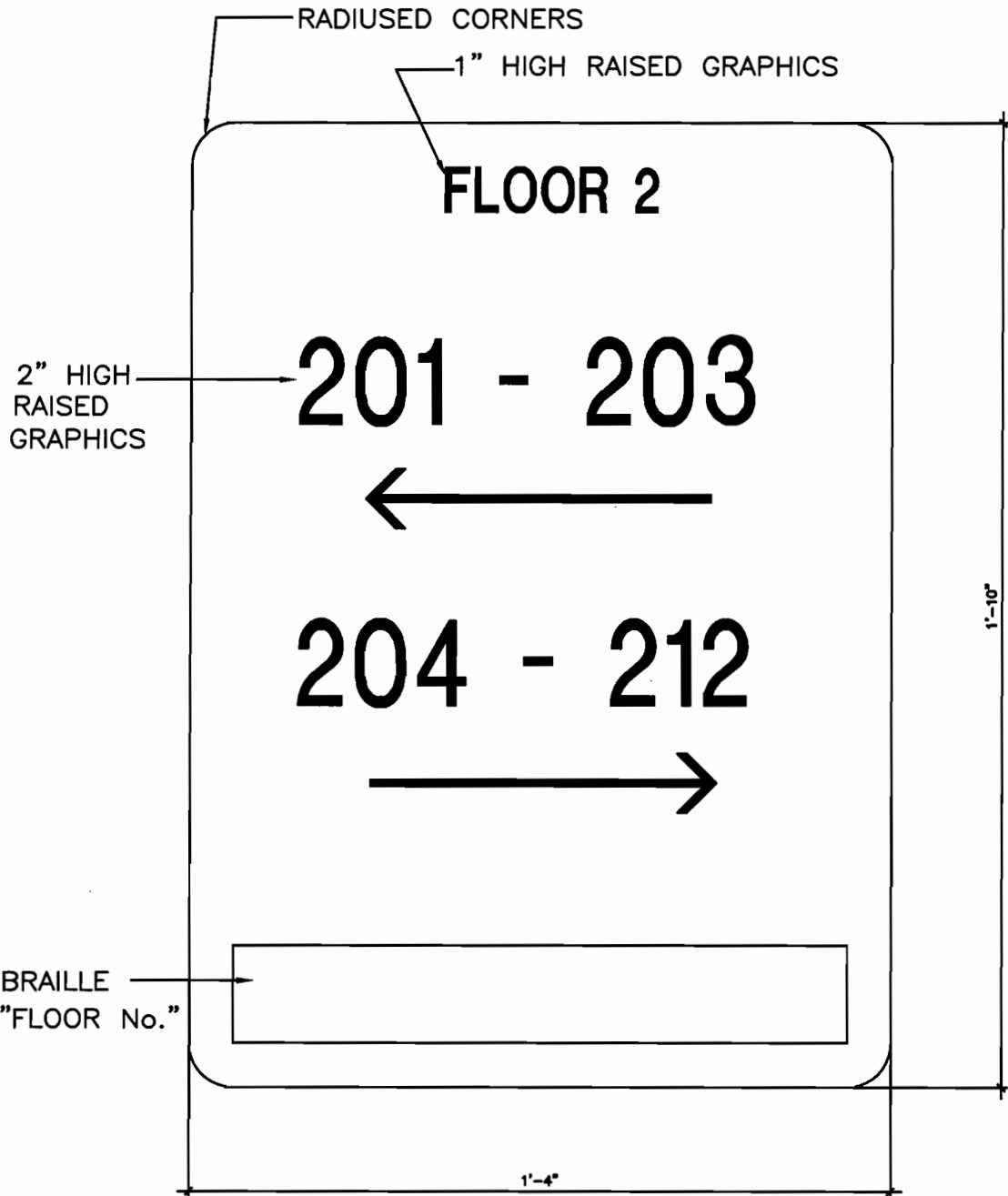
454 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

Drawing Title:
STAIR IDENTIFICATION SIGN

Scale: 3/4" = 1'-0"
Date: 8/28/2009
Revised:

Drawing Number:

SG6



FLOOR IDENTIFICATION DESIGNATION TO BE COORDINATED WITH INSTALLATION LOCATION. PROVIDE (1) PER FLOOR AT WEST CORRIDOR WALL ACROSS FROM ELEVATOR LOBBY. SEE SIGN SCHEDULE FOR UNIT NO. AT EACH FLOOR



□ 454 Cumberland Avenue
 Portland, ME 04101
 Phone: (207) 774-4441
 Fax: (207) 774-4016

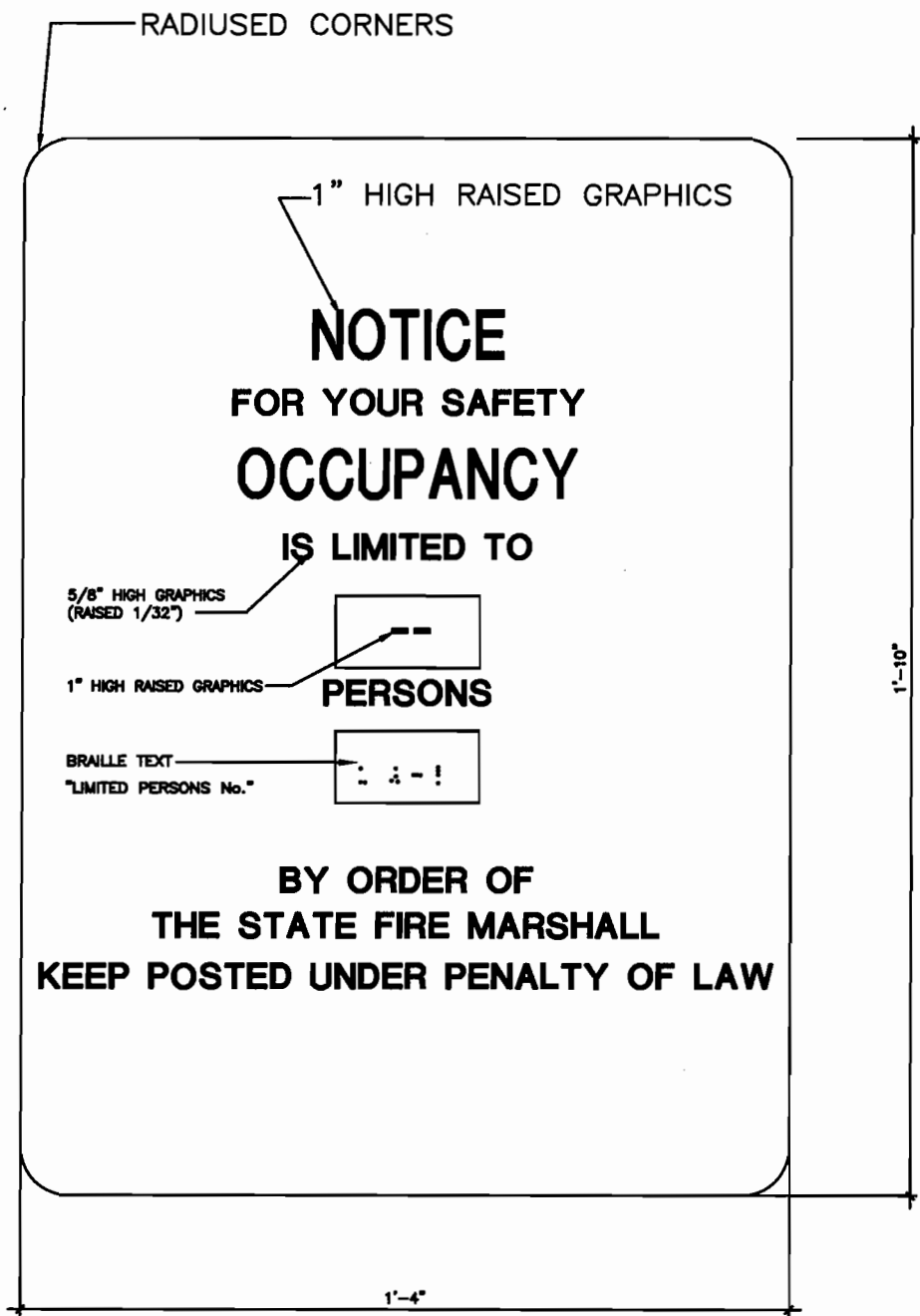
□

Drawing Title:
 Unit Directional Sign

Scale: 3/4" = 1'-0"
 Date: 8/28/2009
 Revised:

Drawing Number:

SG7



OCCUPANCY LOAD DESIGNATION TO BE COORDINATED WITH INSTALLATION LOCATION.
 PROVIDE (1) PER COMMUNITY ROOM. QUANTITY = 1
 PROVIDE (1) - PERSONS, AND (1) - PERSONS

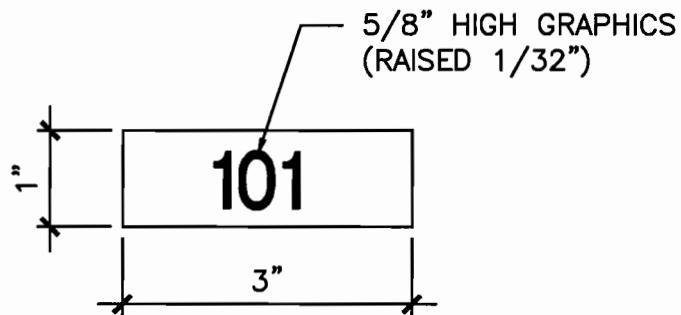


□ 454 Cumberland Avenue
 Portland, ME 04101
 Phone: (207) 774-4441
 Fax: (207) 774-4016
 □

Drawing Title:
 Occupant Load Limit Sign
 Scale: 3/4" = 1'-0"
 Date: 8/28/2009
 Revised:

Drawing Number:
SG8

LOCATION: LATCH SIDE OF DOOR
AT 6" TO 8" ABOVE THE FINISH
FLOOR (AFF)



PROVIDE (1) EACH APARTMENT



□ 454 Cumberland Avenue
Portland, ME 04101
Phone: (207) 774-4441
Fax: (207) 774-4016

□

Drawing Title:

Apartment Number Sign

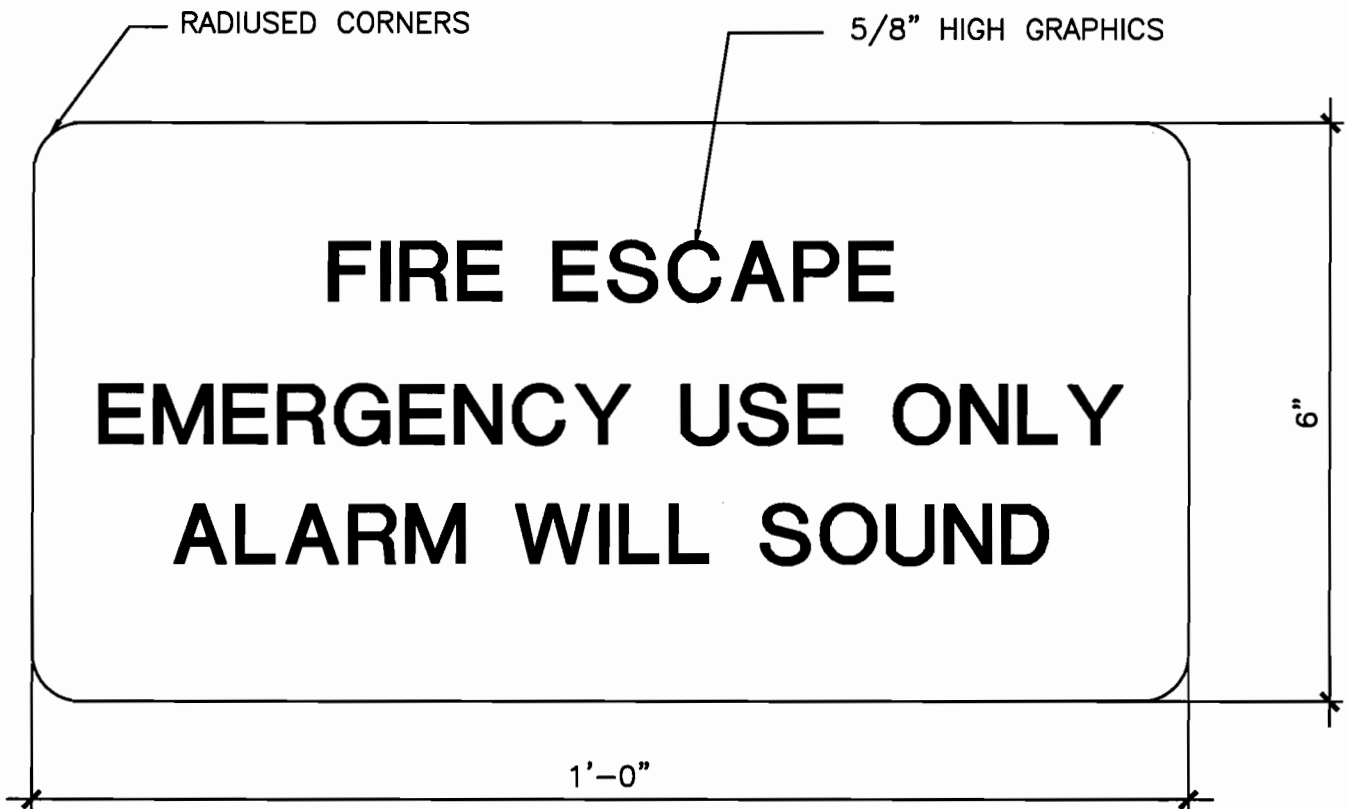
Scale: 6" = 1'-0"

Date: 8/28/2009

Revised:

Drawing Number:

SG9



PROVIDE TOTAL (12) SG9 SIGNAGE
 LOCATION: INSTALL ON LATCH SIDE
 OF FIRE ESCAPE STAIR DOOR AT
 60" TO CENTER ABOVE THE
 FINISHED FLOOR (A.F.F.)



□ 454 Cumberland Avenue
 Portland, ME 04101
 Phone: (207) 774-4441
 Fax: (207) 774-4016

Drawing Title:
FIRE ESCAPE

Scale: 6" = 1'-0"
 Date: 8/28/2009
 Revised:

Drawing Number:

SG10

Part II
Division 11
Equipment

SECTION 11 30 00

RESIDENTIAL EQUIPMENT

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Refrigerator, range, exhaust hood, dishwasher, air conditioner and wall sleeve, coin-op washer and dryer.

1.3 QUALITY ASSURANCE

- A. Equipment: Conform to applicable code for UL approval.
- B. Energy Star: Provide only Energy Star listed residential equipment

1.4 SUBMITTALS

- A. Product Data: Provide data on equipment, and accessories.
- B. Operating and Maintenance Instructions: Include relevant instructions.
- C. Include maintenance information on regular servicing.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Products of one or more manufacturers are listed to establish quality, appearance and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.
 - 1. Broan/NuTone.
 - 2. Freidrich.
 - 3. Frigidaire.
 - 4. General Electric.
 - 5. Maytag.
 - 6. Whirlpool.
 - 7. White-Westinghouse.

2.2 WASHER AND DRYER

- A. Washer, non-accessible: NIC (by Owner, install by GC)
- B. Washer, accessible: NIC (by Owner, install by GC)

- C. Dryer: NIC (by Owner, install by GC)

2.3 REFRIGERATOR AND RANGE

- A. Apartment Refrigerator: Energy Star 15.7 cubic ft. capacity, 28" width, free standing type, no-frost freezer compartment over, with adjustable shelves and crisper, white color; GE Model GTH16BBXRWW, or equal.
- B. Community Kitchen Refrigerator: Energy Star 22.3 cubic ft. capacity, 33" width, free standing refrigerator over freezer type, no-frost freezer compartment, adjustable glass shelves and two crisper drawers, white color; GE Model GBS22HBS, or equal.
- C. Range: GE Model JBP24DMWW electric free standing type, self cleaning, four top burners, oven below with top and bottom elements, with two chromed steel racks, window door, interior oven light, storage drawer, color as selected. [No Energy Star Requirement]
- D. Range, accessible: GE Model JBS15MWW electric free standing type, front controls, four top burners, oven below with top and bottom elements, with two chromed steel racks, window door, interior oven light, storage drawer, color as selected. Provide at all Type A accessible units. [No Energy Star Requirement]

2.4 DISHWASHER

- A. All Apartment Units & Community Partner's Kitchen Dishwasher: Energy Star rated, 24" width, stainless steel tub, adjustable racks, NSF sanitizing cycle, electronic controls, integral food disposer, white color; GE Model GLDA690PWW, or equal.

2.5 EXHAUST HOOD

- A. Vented Exhaust Hood: Broan Model QT230WW vented range hood, 200 cfm, rotary fan speed control, light, white color. (Provide 60-watt equivalent CFL light bulb.)

2.6 MICROWAVE

- A. Microwave Oven: GE Model JVM1850DMWW, under cabinet mounting trim kit, with optional Recirculating Charcoal Filter Kit Model JX81H. [No Energy Star Requirement]

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that openings and utility services are ready to receive work and opening dimensions are as instructed by the manufacturer.

3.2 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Set and adjust units level and plumb.
- C. Install washers in washer pan.
- D. Activate units to confirm correct operation.

- E. Turn refrigerators on to moderate temperature setting.
- F. Connect to utilities and make units operational.
- G. Provide (two) wall switches for range hoods in accessible units wired independently to light and fan.
- H. Provide insulated rigid aluminum ducting from range hood to exterior vent damper, pitched toward exterior from highest point of rise.

...END OF SECTION 11 30 00

SECTION 11 33 00

FIRE RATED CEILING ACCESS DOOR WITH FOLDING STAIRWAY

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal Folding Disappearing Stairway including stairway, frame and door.
- B. Products Required, But Not Supplied Under This Section:
 - 1. Required fasteners.

1.2 SYSTEM DESCRIPTION

- A. The system requires a ceiling opening of 2'- 6" X 4'- 6"(30" X 54") for floor to ceiling dimensions up to 9'-9' and a ceiling to upper floor dimension of 1' or less.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Examine stairway when it arrives on site. Notify the carrier and manufacturer of any damage.
- B. Store stairway until installation under roof, if possible; or, if stored outside, under a tarp or suitable cover.

1.4 WARRANTY

- A. Provide a limited warranty of 1 year against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

1.5 MAINTENANCE

- A. Under normal usage, the stairway shall require no preventive maintenance.
- B. No spare Parts shall be required.

2 PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Precision Ladders, LLC - P. O. Box 2279
Morristown, Tennessee 37816-2279.
Phone: (800)225-7814. FAX: (423)586-2091.

2.2 MATERIALS

A. Door

1. 20 gauge steel door with 2 hour fire-rated Warnoc Hersey label that meets ASTM E-119 & UBC 43-7 requirements.
2. Steel piano hinge.
3. Fire rated steel door flush with bottom of frame.
4. Eye bolt to accommodate pole for opening and closing.

B. Stairway

1. Stringers:
 - a. 6005-T5 Extruded aluminum channel 5" X 1" X 1/8"
 - b. Tri-fold design
 - c. Steel blade type hinges.
 - d. Adjustable foot with plastic Mar-guard.
 - e. Pitch 63° (standard). Other pitches optional.
2. Treads
 - a. 6005-T5 Extruded aluminum channel 5 3/16" X 1 1/4" X 1/8".
 - b. Width 5 3/16".
 - c. Length 21 9/16" (standard). Lengths to 36" available.
 - d. Deeply serrated top surface.
 - e. 9 1/2" riser height (standard). Other riser heights available.
 - f. 500 lbs load rating.

C. FRAME

1. 1/8 Steel, formed channel, 6" deep when using fire rated steel door.

D. HARDWARE

1. Steel blade type hinge connecting stringer sections, zinc plated & chromate sealed, bolted to stringers.
2. Steel operating arms, zinc plated & chromate sealed, both sides.
3. Double acting steel springs and spring cables, both sides.
4. Rivets rating at 1000# shear.

E. SAFETY

1. Steel bar handrail riveted to stringers, upper section, right side standard.
2. Steel section alignment clips at stringer section joints.
3. Molded rubber guards at corners of aluminum door panel.

F. MANUFACTURED UNITS

1. The disappearing stairway is a Model SS/AL-105.

G. ACCESSORIES

1. Supply steel pole to aid opening and closing stairways. Pole shall be equipped with a hook on one end and bicycle grip on the other.
2. Supply keyed lock for door.

H. FABRICATION

1. The stairway shall be completely fabricated ready for installation before shipment to the site.

I. FINISHES

1. Mill finish on aluminum stairway components.
2. Prime coat on frame.

J. SOURCE QUALITY CONTROL

1. All products shall be tested in factory test jig for proper operation before shipment.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine rough opening in ceiling for opening size and squareness.

3.2 INSTALLATION

- A. Install per the manufacturer's installation instructions.

...END OF SECTION 08 11 13

Part II
Division 12
Furnishings

SECTION 12 20 10

WINDOW TREATMENT

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Roll-up shades.

1.3 SUBMITTALS

- A. Product Data: Provide data indicating physical and dimensional characteristics and operating features.
- B. Samples: Submit samples for selection of color and finish of shades.

2 PART 2 PRODUCTS

2.1 ROLL-UP SHADES

- A. Shades: Vertical roll-up room darkening window shade, with continuous plastic chain and sprocket operation. Provide rolling chain termination device secured to lower window jamb.
 - 1. Fabric Sheeting: Vinyl coated fiberglass cloth.
 - 2. Color: As selected
- B. Manufacturers:
 - 1. Bali-Graber Contract.
 - 2. Kirsch.
- C. Roller: Hollow Metal.
- D. Attachment Hardware: Type recommended by blind manufacturer.
- E. Operating Hardware: Continuous chain drive with wall mounted chain stabilizer.

2.2 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance as recommended by manufacturer.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the work.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.
- C. Adjust blinds for smooth operation.

3.3 SCHEDULE

- A. Provide (1) roll-up shade at each unit bedroom window, at each unit living room window and all Common Area windows except at: stairwells, mechanical rooms, boiler rooms, storerooms, and bicycle storerooms.

...END OF SECTION 12 20 00

SECTION 12 35 30
RESIDENTIAL CASEWORK

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

- A. Shop fabricated cabinet units and counter tops.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate casework locations, scale plans, elevations, clearances required.
- B. Product Data: Provide data on component profiles, sizes, assembly methods, and schedule of finishes.
- C. Samples: Submit samples of plastic laminate for selection of color and finish.
- D. Sample: Submit one removable front base kitchen cabinet for review and approval.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with KCMA (Kitchen Cabinet Manufacturers Association) - Certification Program.

2 PART 2 PRODUCTS

2.1 CASEWORK

- A. Manufacturers: Products of one or more manufacturers are listed to establish quality, appearance and performance characteristics. Products of other manufacturers may be accepted subject to review by Architect.
- B. Manufacturers of Cabinets:
 - 1. Armstrong Cabinets.
 - 2. Kemper.
 - 3. Kitchen Kompact Inc.
 - 4. Merrilat Industries Inc.
 - 5. Substitutions: Permitted, subject to compliance with requirements.
- C. Manufacturers of Plastic Laminate:
 - 1. Formica Corp.
 - 2. Nevamar.
 - 3. Pioneer Plastics.

4. WilsonArt.

- D. Cabinet Style: Armstrong "Coronet" style, Allwood construction, routed solid panel edge glued plantation hardwood face, color as scheduled on Finish series Drawings; or equal.

2.2 CONSTRUCTION

- A. Face Frame: Solid $\frac{3}{4}$ " hardwood.
- B. End Panels: $\frac{1}{2}$ " multiply hardwood plywood.
- C. Back Panels: $\frac{1}{8}$ " hardwood plywood.
- D. Top and Bottom Panels: $\frac{1}{2}$ " multiply hardwood plywood.
- E. Hanging Rails: $\frac{3}{4}$ " multiply hardwood plywood.
- F. Doors: Solid $\frac{3}{4}$ " edge glued plantation hardwood panel with routed panel-in-panel appearance.
- G. Drawer Fronts: Solid $\frac{3}{4}$ " plantation hardwood.
- H. Drawers: $\frac{1}{2}$ " solid wood dove-tail corner construction with $\frac{1}{4}$ " multiply hardwood plywood bottom.
- I. Shelves: $\frac{5}{8}$ " multiply hardwood plywood.
- J. Removable Front Base Cabinets: Special Requirements - provide *easily* removable sink base fronts and interior bottoms at all accessible or adaptable units. Sink base shall be self supporting and have finished surfaces when the sink front is removed.

2.3 HARDWARE

- A. Drawer and Door Pulls: Polished nickel finish wire handles on 4 inch centers.
- B. Hinges: Concealed, self-closing.
- C. Drawer Glides: Side mounted, self-closing, 100 lb. capacity.

2.4 FACTORY FINISHING

- A. Exposed To View Surfaces: Stain, seal and varnish.
- B. Interior Surfaces: Clear coat sealer finish.

2.5 COUNTERTOPS

- A. Surface: High pressure plastic laminate, grade PF42.
- B. Configuration: 180 degree wrapped front edge, integral cove, and square backsplash.
- C. Substrate: Particleboard.

2.6 ACCESSORIES

- A. Accessory multi-ply bead board panels matching cabinet finish as indicated.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify adequacy of backing and location of mechanical and electrical outlets.
- B. Provide supplementary support framing.

3.2 INSTALLATION

- A. Set and secure casework in place rigid, plumb, and level.
- B. Provide cutouts for plumbing fixtures, appliances, and other fixtures and fittings.
- C. Use fixture attachments at concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- E. Carefully scribe casework which is against other building materials, leaving gaps of 1/32 inch maximum. Use filler strips, not additional overlay trim for this purpose.
- F. Secure cabinet and counter bases to floor using appropriate anchorage.
- G. Adjust moving or operating parts to function smoothly and correctly.

...END OF SECTION 12 35 30

SECTION 12 93 00
SITE FURNISHINGS

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing
 - 1. Bicycle rack: In quantities shown on drawings
 - 2. Granite bench: In quantities shown on drawings
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Bicycle Rack:
 - a. Product Data: Include physical characteristics such as shape, dimensions, bicycle parking capacity and finish for bicycle rack.
 - b. Shop Drawings: Show installation details for bicycle rack.
 - c. Samples for Verification: Submit finish samples for review and verification.
 - d. Maintenance Data: Include recommended methods for repairing damage to the finish. **Provide Owner with manufacture touch up paint kit.**
 - 2. Granite Benches:
 - a. Submit shop drawings including installation.

1.3 DELIVERY, STORAGE AND HANDLING:

- A. Package, handle, deliver and store site furnishings at the project site in a manner that will avoid damage.
- B. Bicycle rack:
 - 1. Upon delivery, before signing for shipment, inspect for any damages and notate on the B.O.L.

2. Store bicycle rack in original undamaged package or container until ready for installation.
 3. Handle bicycle rack with sufficient care to prevent any scratches or damage to the finish.
 4. Damaged bicycle rack shall not be installed; damage to paint finish shall be inspected by Project Landscape Architect before installation. Project Landscape Architect reserves the right to reject bike rack when damage to paint finish is significant and not suitable for touch up paint.
- C. Protect Granite Bench: store granite bench and base off of ground on raised timber or other method until installation. Damage to granite shall be inspected by Project Landscape Architect prior to installation. Project Landscape Architect reserves the right to reject granite bench and or base.

1.4 QUALITY ASSURANCE:

A. Bicycle rack:

- a. Installer Qualifications: An experienced installer who has completed installation of bicycle racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
- b. Manufacturer Qualifications: A firm experienced in manufacturing bicycle racks similar to those required for this project and with a record of successful in-service performance.
- c. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.
- d. Product Options: Drawings indicate size, shape and dimensional requirements of bicycle rack and are based on the specific system indicated.

1.5 WARRANTY:

- A. Bicycle rack shall carry a one year manufacturer's limited warranty against defects in materials and workmanship. The one year warranty period begins the date the product is shipped from the manufacturer.

2 PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. Bike rack listed as follows as provided by DERO BIKE RACK CO., 2657 32nd Avenue S, Minneapolis, MN 55406, 1-888-337-6729. Fax: 612-331-2731. Website: www.dero.com. Products of other manufacturers may be considered subject to compliance with requirements as judged solely by Landscape Architect.
- B. Granite bench as detailed and as provided by Swenson Granite Works 582 Bridgton Road Westbrook, Maine 04092 207-797-4500 Fax 207-797-2244 Website: www.swensongranite.com. Products of other manufacturers may be considered subject to compliance with requirements as judged solely by Landscape Architect.

2.2 MATERIALS:

A. Bicycle Rack:

1. Downtown Bike Rack
 - a. 2 inch 11g uncoated square tube.
 - b. Installation: In-ground mount, embedded into concrete base.
2. Finishes
 - a. Part is prepared for painting with hard sandblasting. An epoxy primer is electrostatically applied. A final TGIC, UV resistant polyester powder coat is applied. Final coating thickness shall be no less than 6 mils. Color: Blue RAL - 5005.

B. Granite benches

1. All granite shall be of standard architectural grade, free of cracks, seams, or starts, which may impair its structural integrity or function, color or other visual characteristics indigenous to the particular material. Texture and finish shall be within the range of samples approved by the project Landscape Architect.
2. Color shall be Woodbury Gray.
3. Fabrication shall consist of the following tolerances:

Dimensional Tolerance

Bench Thickness	± ¼ inch
Location of holes for anchor pins	± ¼ inch
Hole depth for anchor pins	± ¼ inch

Flatness Tolerance

Sawn	± 1/8 inch
Thermal	± 3/16 inch
Split Face	± 1 inch

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Bike Rack

1. Contractor shall install bike rack as shown on drawings in accordance with manufacturer's requirements.
2. Protect finish surface of bike rack during installation and placement of concrete pad.
3. Installation Method: In-ground mount is embedded into concrete base.

4. It is the responsibility of the installer to ensure that all base materials into which the rack will be installed can support the rack and will not be damaged by any required installation procedures.

B. Granite Bench

1. Granite bench shall be fabricated and installed in accordance with the plans and specifications in the quantities as shown on the drawings.

...END OF SECTION 12 93 00

Part II
Division 13

Special Construction
(Not Used)

Part II
Division 14
Conveying Systems

SECTION 14 24 00

HYDRAULIC ELEVATORS

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 sections, apply to work of this section.

1.2 SECTION INCLUDES

- A. Passenger elevator systems.
- B. Motor and pump, controllers, equipment and fitments.

1.3 SYSTEM DESCRIPTION

- A. Hydraulic Elevator Systems: One unit; buried cylinder and casing, with motor and pump adjacent to the hoistway.
- B. Characteristics of each elevator are as follows:
 - 1. Rated Net Capacity: 2500 lbs.
 - 2. Rated Speed: 90 ft/min.
 - 3. Nominal Platform Size: 84x69 inches.
 - 4. Clear Net Platform Size: 80x52 inches.
 - 5. Cab Ceiling Height: 90 inches.
 - 6. Hoistway and Cab Entrance Frame Opening Sizes: 42x84 inches.
 - 7. Door Type: Single leaf.
 - 8. Door Operation: Side opening.
 - 9. Number of Stops: 3
 - 10. Number of Openings: 2 Front, 1 Rear
- C. Controls System: Conform to the following criteria:
 - 1. Single Car Automatic Collective Operation elevator control system. Provide only a non-proprietary controller.
 - a. Acceptable Manufacturer: MCE.
 - 2. Door Operator: Provide only a non-proprietary door operator.
 - a. Acceptable Manufacturer: GAL.
- D. Special Operational Features:
 - 1. Key operated Fire Department Service
 - 2. Interconnect with building fire and smoke detection and alarm system, with automatic recall to first floor.
 - 3. Door Edge Protective Device: Infrared multi-beam door reversal device.
 - 4. Emergency Communication System: Provide system that complies with ASME A17.1, ICC/ANSI A 117.1 - 2003 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using

a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

5. Provide rough in for additional telephone line based security camera device (by owner) inside the elevator cab.
 6. Seismic Design: In accordance with applicable IBC code.
- E. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated.
1. Standby Powered Lowering: On activation of standby power, cars that are at a floor remain at that floor, cycle their doors, and shut down with the doors closed. Cars that are between floors are lowered to a field programmable floor, cycle their doors, and shut down with the doors closed. Cars that are below the preselected floor are lowered to the next lower floor, cycle their doors, and shut down with the doors closed.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
1. ASME A17.1 - Safety Code for Elevators and Escalators.
 2. UL 10B - Fire Tests of Door Assemblies.
 3. ICC/ANSI A 117.1-2003.
 4. Americans with Disabilities Act (ADA).

1.5 DEFINITIONS

- A. Defective Elevator Work: Repeated operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.6 SUBMITTALS

- A. Shop Drawings: Indicate the following minimum information on shop drawings:
1. Motor and hydraulic pump, valves, and other component locations.
 2. Car, supporting beams, guide rails, and other components in hoistway.
 3. Loads on hoisting beams.
 4. Applicable seismic design data; certified by a Registered Professional Structural Engineer.
 5. Elevator control functions and operational description.
- B. Product Data: Provide data on the following items:
1. Signal and operating fixtures, operating panels, indicators.
 2. Cab design, dimensions, layout, and components.
 3. Cab and hoistway door and frame details.
- C. Schematic: Provide legible schematic of hydraulic piping and electric wiring diagrams describing installed equipment. Provide one copy of master schematic, mounted in plastic glazed metal frame, mounted on machine room wall.
- D. Samples: Submit two samples, illustrating cab floor material, cab interior finishes, cab and hoistway door and frame finishes.

- E. **Manufacturer Certificates:** Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- F. **Maintenance Manuals:** Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include a parts catalog with complete list of equipment replacement parts. Include legible schematic wiring diagrams of installed electrical equipment. Include description of elevator system's method of operation, control description, motor control system, cab and hoistway door operation, visual and audio signals, fire fighter's service, and specified non-standard feature. Provide one copy of master hydraulic and electrical schematic and one copy of lubrication chart, each framed with clear plastic glass; mount on machine room wall. Submit for Owner's information at Project closeout as specified in Division 1.
- G. **Inspection and Acceptance Certificates and Operating Permits:** As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.7 MAINTENANCE SERVICE

- A. **Initial Maintenance Service:** Beginning at Substantial Completion, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: One hour or less.
- B. **Continuing Maintenance Proposal:** Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard 1 year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

2 PART 2 PRODUCTS

2.1 ELEVATOR SYSTEM AND COMPONENTS

- A. **Manufacturers:**
 - 1. Otis Elevator.
 - 2. Schindler USA.
 - 3. ThyssenKrupp Elevator.
 - 4. Canton Elevator.
- B. **Structural Components, Cylinder and Casing:** Required to construct elevator system and conform to code.
 - 1. **General:** Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components,

- published by manufacturer as included in standard preengineered elevator systems and as required for a complete system.
- C. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - D. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
 - E. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible noise isolation connectors to minimize sound and vibration transmissions from power unit. Do not suspend hydraulic piping from wood frame floor or wall systems; support with floor mounted pipe stands. Provide acoustical sound isolating (fire rated at fire rated assemblies) material at all penetrations through wall or floor assemblies.
 - F. Hydraulic Oil: Provide hydraulic oil of proper grade in the quantity recommended by manufacturer.
 - 1. Provide dielectric couplings between power unit and cylinder units.
 - 2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785 joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
 - G. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.
 - H. Protective Cylinder Casings (As required): HDPE pipe casings complying with ASME A17.1, of sufficient size to provide not less than 1-inch (25-mm) clearance from cylinder, and extending above pit floor.
 - I. Enameled Sheet Steel: ASTM A366/A366M Class 1.
 - J. Stainless Steel: ASTM A 666 Type 304 #4 directional satin polished finish.
 - K. Aluminum: ASTM B 632/B 632M, Pattern 1, alloy 6061-T6.
 - L. Plastic Laminate: NEMA LD 3 General Purpose type, fire retardant finish, matte surface finish, color/pattern as selected.
 - M. Motors, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators: UL approved.
 - N. Spring Buffers, Attachment Brackets and Anchors: Purpose designed, sized according to code with safety factors.
 - O. Guides: T-shaped steel cab guide rails with 4" roller guides.
 - P. Pump Housing: Sheet steel, acoustically insulated, removable.

2.2 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics:
 - 1. 208 volts, three phase, 60 Hz.
 - 2. Starter Characteristics: Reduced voltage.
- B. Motor: NEMA MG1.

- C. Disconnect Switch: Factory mount disconnect switch in control panel.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

2.3 CAB FABRICATION

- A. Flooring: VCT + 3/8" Plywood Underlayment, of type specified in Section 09 65 00.
- B. Walls: Plastic laminate on particleboard.
- C. Front Return Panel: Stainless steel.
- D. Base: Resilient vinyl cove, of type specified in Section 09 65 00.
- E. Ceiling: Down light type, 16 gauge metal pans with incandescent lamps and dimmer switch suspended 7'-4" (2235 mm) above the finished floor, with factory baked enamel finish.
- F. Light Fixtures: Incandescent,
- G. Ventilation: Fan, grille above ceiling;
- H. Control Panel and Face Plate: Stainless steel with illuminating call buttons.
- I. Indicator Panel: above control panel with illuminating position indicators.
- J. Hand Rail: Stainless steel, 1-1/2" diameter, 1-1/2" from wall; placed at side walls.
- K. Pad Hooks: Stainless steel button type.
- L. Protective Pads: One set sets, canvas cover, padded, brass grommets.
- M. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly

2.4 CAB ENTRANCES

- A. Cab Doors: ASTM A366 steel. hollow panel construction, flush design, rolled profiles, rigid construction, with factory baked enamel finish.
- B. Cab Door Frames: Stainless steel, welded corner design with smooth invisible joints.
- C. Thresholds: Extruded aluminum type.

2.5 HOISTWAY ENTRANCES

- A. Hoistway Doors: ASTM A366 steel hollow sandwich panel construction, flush design, rolled profiles, rigid construction, with factory baked enamel finish.
- B. Hoistway Door Frames: Stainless steel of rolled profiles, knocked down design.

- C. Door and Frame Construction: 1 hour fire rating.
- D. Weatherstrip hoistway doors and frames to minimize audible noise.
- E. Sills: Extruded aluminum type.
- F. Landing Buttons: Illuminating type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows
- G. Car Position Indicator: Illuminating, one per elevator at main floor.
- H. Car Direction Indicators: Illuminating, one per elevator per floor.

2.6 FINISHES

- A. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two coats of enamel sprayed and baked; color as selected.
- B. Stainless Steel: #4 Satin Polished.
- C. Aluminum: Clear anodized finish.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Verify that electrical power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Install in accordance with ASME A17.1 and manufacturer's instructions.
- B. Install system components and connect to building utilities.
- C. Accommodate equipment in space indicated.
- D. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system. Provide floor mounts to concrete slab and do not mount vibrating equipment to wood frame components of the building. Provide fire rated sound isolation systems where vibrating equipment penetrates wall systems.
- E. Coordinate installation of hoistway wall construction.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of

sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

- G. Grout sills in place with non-shrink non-metallic grout. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.
- H. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.
- I. Adjust automatic floor leveling feature at each floor to achieve maximum deviation of 1/4 inch from flush.

3.3 TESTS BY REGULATORY AGENCIES

- A. Obtain required permits to perform tests. Perform tests required by regulatory agencies.
- B. Schedule tests with agencies and Architect/Engineer, Owner, and Contractor present. Make necessary adjustments of operating devices and equipment to ensure elevator operates safely, accurately, and smoothly.

3.4 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

...END OF SECTION 14 24 00

Part II
Division 21
Fire Suppression

SECTION 21 13 13

AUTOMATIC FIRE PROTECTION

1 PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to design, install and test a pressurized, fully supervised, wet or dry pipe fire protection system for full building protection in accordance with NFPA, IBC, and the Owner's insurance underwriter. Areas subject to freezing shall have a dry pipe system, dry pendent or sidewall heads, or glycol-and-water loop per NFPA.
- B. The sprinkler systems design shall be based on NFPA13R requirements.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.

1.3 QUALIFICATIONS

- A. The Fire Protection Work shall be performed by a qualified Contractor primarily engaged in the design and installation of Fire Protection Systems. The fire protection system design shall be performed under the direction of, and sealed by, a professional engineer registered in the State of Maine or with NICET Level III (minimum) Certification.
- B. Welding qualifications of individuals installing welded piping shall be certified by the National Certified Welding Bureau for the type(s) of weld(s) proposed for use in piping assembly.

1.4 SUBMITTALS

- A. Items for which the submittal requirements of section 23 05 00, Supplemental Mechanical General Requirements, apply are as Follows:
 - 1. Hydrant flow test.
 - 2. System components.
 - 3. Hydraulic calculations.
 - 4. Piping layout, details and control diagram.
 - 5. Flushing and testing records.
 - 6. Certificate of installation.
 - 7. Copy of Fire Protection Contractors License.
 - 8. Welding certificates of individual welding technicians.
 - 9. Sprinkler heads.
 - 10. Alarm valve(s).
 - 11. Fire department connection(s).
 - 12. Firestopping materials and methods.

Submit hydrant flow test, equipment descriptive data, hydraulic calculations and system layout for review by the Owner's Insurance Underwriter. Submit the system layout to the Architect for review. The Architect's review will be limited to checking for conformance with the design concept of the project and general compliance with the contract documents and will in no way assume liability for review for compliance with codes, standards and laws.

1.5 SPRINKLER COVERAGE

- A. Sprinkler head coverage shall conform with NFPA 13R requirements for the use of the building. Coverage shall be increased accordingly where required by the Authority having jurisdiction.
- B. If the requirements of the inspection agency or the Owner's insuring agent are more rigorous than those stated herein, then the more rigorous requirements shall govern.

2 PART 2 PRODUCTS

2.1 SYSTEM COMPONENTS AND HARDWARE

- A. Pipe, Fittings, Joints, Hangers, Valves, Fire Department Connections, Alarms: Conform to NFPA 13R, Installation of Sprinkler Systems.
- B. Sprinkler Heads:
 - 1. Interior Heated Spaces: Conform to NFPA 13R, commercial quick response type. Provide semi-recessed type with white finish for acoustical tile ceilings. Sprinkler heads in GWB ceilings shall be "concealed" type. Dry pendent or sidewall heads, where required, may be standard response type.
 - 2. Provide a spare head cabinet with wrenches, the amount of spare heads for each orifice size, finish, temperature classification, pattern and length furnished in the project shall be in accordance with the following schedule:

Sprinkler Heads on Project	Number of Spare heads of each type.
Less than 300	6
300-999	12
1000 or more	24
 - 3. Provide head protection guards where required.
 - 4. Sprinkler heads in unheated areas shall be dry pendent or sidewall type, or served by a glycol and water loop or separate dry-pipe system.
- C. Fire Department Connection: Provide a 4" Storz connection or siamese connection (as verified with the local fire department) at a location coordinated with the local fire department and the Architect.

2.2 WATER SUPPLIES

- A. The sprinkler water service shall be cement-lined ductile iron and conform to the requirements of NFPA 13R, Installation of Sprinkler Systems.

2.3 DEVICES

- A. Detection devices and associated wiring both within the fire protection system and to the building Fire Alarm System shall be the responsibility of the Sprinkler Contractor.

2.4 BACKFLOW PREVENTER

- A. Provide AMES MODEL 2000.

2.5 PIPING SYSTEM IDENTIFICATION

- A. Piping system and valve identification and color coding shall be in accordance with ANSI.

3 PART 3 EXECUTION

3.1 PIPING LAYOUT AND DESIGN

- A. System requirements, installation requirements, design, plans, and calculations: Conform to NFPA 13R, Installation of Sprinkler Systems.
- B. Sprinkler piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless indicated on the drawings.
- C. Pipe penetrations through walls and floors shall be in accordance with Section 23 05 00 - Supplemental Mechanical General Requirements. Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy. Penetrations through walls shall be sleeved in accordance with Section 23 05 00. Sleeves shall be provided by the Fire Protection Contractor.
- D. Coordinate design and layout with building structure and building systems. The work shown in the contract documents has precedence for space requirements. Work of other trades may be modified or moved only with permission of the trade involved. Costs associated with modifications or relocations shall be the same as for "Substitutions" Section 23 05 00.
- E. Architect shall review proposed system layout and reserve the right to relocate heads, substitute head system and in general review final layout for components visible in occupied spaces.

3.2 SYSTEM ACCEPTANCE

- A. Approval, flushing, hydrostatic testing, instructions, and certificates of installation: Conform to NFPA 13R, Installation of Sprinkler Systems.
- B. Disinfect the water piping in accordance with AWWA C601. Fill the piping systems with solution containing a minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Repeat disinfection if chlorine residual is less than 10 parts per million after 24 hours. Flush the solution from the systems with clean water until maximum residual chlorine contents is not greater than 0.2 parts per million.
- C. Closing in Work:
 - 1. General: Cover up or enclose work after it has been properly and completely reviewed.
 - 2. No additional cost to the Owner will be allowed for uncovering and recovering, work that is covered or enclosed prior to required review and acceptance.
- D. Cleanup and Corrosion Prevention:
 - 1. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.
 - 2. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
 - 3. Before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

- E. Instructions: On completion of the project, provide a technician familiar with the system to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.
- F. Warranty: For a period of one (1) year after completion of the installation repair or replace any defective materials or workmanship. Upon completion of the installation, the system shall be turned over to the Owner fully inspected and tested, and in operational condition.

3.3 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

Part II
Division 22
Plumbing

SECTION 22 00 00

PLUMBING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental General Mechanical Conditions" are hereby made a part of the work of this section.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections, and incidentals and the performing of operations required to provide a complete and functional plumbing system.
- B. Work shall be in accordance with the current edition of the Maine State Plumbing Code and applicable local ordinances.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
1. Piping materials.
 2. Valves.
 3. Pipe hangers.
 4. Fixtures and trim.
 5. Miscellaneous equipment.
 6. Water heating equipment.
 7. Piping, valves and equipment identification.
 8. Gas piping system.
 9. Elevator pit drainage system.
 10. Thermostatic mixing valves.
 11. Firestopping.
 12. Solar water heating system **DEDUCT ALTERNATE #1**

2 PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Soil and Waste (Sanitary) and Vent Piping:
1. Below Grade: Cast iron with push-on joints or Sched. 40 PVC.
 2. Above Grade: Sanitary piping shall be cast iron "no Hub" (ONLY). Vent piping may be Sched. 40 PVC at contractor's option, cast iron (ONLY) thru roof.
- B. Domestic Water Piping and Condensate Drain Piping: "Flowguard Gold" Schedule 40 solvent-welded CPVC pipe and fittings. CPVC pipe and fittings shall be rated at 100 psig at

180°F and shall meet or exceed the requirements of ASTM D2846, the IBC, and be certified by the ANSI/NSF for potable water applications. Installation, including supports, shall be per the manufacturer's recommendations.

- C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper with cast brass fittings chrome plated finish, with deep one piece escutcheon plates at traverse points.
- D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440°F melting point, ASTM B32.
- E. Underground Cold Water Piping (Building Entrance): ASTM D2737 black polyethylene tubing, 200 psi rated with brass or bronze adapters complete with stainless steel clamps.
- F. Sprinkler Service Entrance Piping (to 10 ft outside of building): Cement-lined ductile iron, coordinate with Section 211313 - Automatic Fire Protection.
- G. Radon Vent Piping: Schedule 40 ABS with solvent-welded joints.

2.2 GAS PIPING SYSTEM

- A. Gas Piping: Schedule 40 carbon steel pipe conforming to ASTM 120 or A53, with threaded joints and malleable iron fittings (Above grade).
- B. Ball Valves for Gas Service: Copper alloy with chromium plated floating ball per Federal Specification WW-V-35B, Type II, Class 3. Blowout-proof stem, reinforced teflon seats, threaded ends, quarter turn on-off, 600 WOG rating, 250 psi rating for natural gas, UL-listed as an natural gas shutoff valve, Apollo Model 80-100 series.

2.3 NO HUB COUPLINGS

- A. For DWV piping, couplings shall be Clamp-All HI-TORQ125, shall maintain 15 PSI hydrostatic seal, constructed 304SS housing and ASTM C-564 neoprene gasket. Couplings shall meet FM 1680, IBC and local codes and requirements.

2.4 VALVES

- A. Ball Valves: Copper alloy with stationary seat ring and chromium plated or stainless steel floating ball per Federal Specification WW-V-35B. Blowout proof stem, reinforced PTFE seal. Sizes 2" and larger shall have threaded ends. Provide lever handle with stem extension as required to allow operation without interfering with pipe insulation.
- B. Check Valves: Horizontal Swing, MSS SP-80, Type 3, Class 125.
- C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap.
- D. Fixture Service Stop Valves: Angle Wheel Handle Stop, ASME A112.18M.
 - 1. Each plumbing fixture shall have individual stop valves in the hot and cold supplies.
 - 2. Service stop valves exposed in finished areas shall be chrome-plated brass; in non-finished areas, ball valves shall be used in lieu of chromed supplies.
- E. Temperature and Pressure Relief Valves: Bronze body, tested under ANSI Z21.22, AGA and ASME rated, 125 psig/210°F relief settings.
- F. Balancing Valves: Taco "Accu-Flo".
 - 1. Bronze or brass body and internals, teflon seats, memory stop, 300 psi working

pressure, 250°F working temperature. Balancing devices shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.

2. Install per manufacturer's recommendations for adjacent length of straight pipe.
 3. Submittals shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.
- G. Pressure Reducing Valves: Watts Regulator series U5LP bronze body, bronze internals, 200 psi working pressure, 200°F maximum temperature, adjustable pressure range 10-25 psig. Provide with inlet strainer (screen).

2.5 PIPE HANGERS

- A. Adjustable Swivel Hangers:
1. Pipe sizes 2" and less: Carpenter and Paterson Fig. 800, oversize for insulated piping systems.
 2. Pipe sizes larger than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 CT copper plated for copper piping, Fig. 126 for iron and PVC piping.
- C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.
- D. All piping 20' upstream and downstream of pumps shall also have Mason Industries PC30N precompressed double deflection spring isolators installed.

2.6 FIXTURES AND TRIM

- A. (P-1) Water Closet: Floor-mounted, tank-type, Toto Drake CST743S, elongated bowl, white vitreous china, low consumption (1.6 gpf), color matched trip lever.
1. Seat: Church Model 170, heavy weight solid plastic, closed front with cover, self sustaining check hinge, for elongated bowl, white color.
- B. (P-1A) ADA Water Closet: Floor-mounted, tank type, Toto Drake CST744SL, elongated bowl, white vitreous china, low consumption (1.6 gpf). Color matched trip lever shall be mounted on the wide side of the stall. Fixture shall be suitable for 12" rough-in.
1. Seat: Church Model 170, heavy weight solid plastic, closed front with cover, self sustaining check hinge, for elongated bowl, white color.
 2. Total installed height of front edge of seat shall be 17" to 19" above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.
- C. (P-1B) ADA Water Closet: Floor-mounted, tank type, Toto Drake CST744SL, elongated bowl, white vitreous china, low consumption (1.6 gpf). Color matched trip lever shall be mounted on the wide side of the stall. Fixture shall be suitable for 12" rough-in.
1. Seat: Church Model 175, heavy weight solid plastic, open-front with cover, self sustaining check hinge, for elongated bowl, white color.

2. Total installed height of front edge of seat shall be 17" to 19" above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.
- D. (P-2) Lavatory, Wall Hung: Toto LT307.4, 20"x18", self-rimming, white vitreous china, faucet holes on 4" centers.
1. Faucet: Symmons Symmetrix Model S-20-2 single handle, 0.5 GPM aerator, polished chrome finish, ceramic control cartridge.
 2. Drain: Pop-up drain assembly with bright metal finish.
 3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
- E. (P-2A) ADA Lavatory, Wall Hung: Toto LT307.4, 20"x18", self-rimming, white vitreous china, faucet holes on 4" centers.
1. Faucet: Symmons Symmetrix Model S-20-2-FR single handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge.
 2. Drain: Pop-up drain assembly with bright metal finish.
 3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
 4. Lavatory shall be installed at 34" above finished floor (See Architectural drawings). Final installation of lavatory and accessories shall meet ADA guidelines and ANSI A117.1. Insulate exposed traps and supplies with Truebro Lavguard.
- F. (P-2B) ADA Lavatory, Wall Hung: Toto LT307.4, 20"x18", self-rimming, white vitreous china, faucet holes on 4" centers.
1. Faucet: Symmons Symmetrix Model S-20-2-FR single handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge.
 2. Drain: Perforated grid strainer with bright metal finish.
 3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
 4. Lavatory shall be installed at 34" above finished floor (See Architectural drawings). Final installation of lavatory and accessories shall meet ADA guidelines and ANSI A117.1. Insulate exposed traps and supplies with Truebro Lavguard.
- G. (P-2C) Vanity Top: The Swan Corporation "Chesapeake", 25" wide x 22" deep with backsplash. Verify size and color with Architect.
1. Faucet: Symmons Symmetrix Model S-20-2-FR single handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge.
 2. Drain: Perforated grid strainer with bright metal finish.
 3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.

- H. (P-3) Tub / Shower: Comfort Designs XST6032GTS, one-piece gelcoat, 60"L x 33"W x 77"H overall dimensions, weighted anti-bacterial curtain and curtain rod.
 - 1. Shower Controls: Symmons Temptrol packaged unit Model S-96-2, polished chrome finish. Pressure-Balancing mixing valve with combination integral diverter and volume control. Tub spout, Clear-Flo shower head (2.0 gpm), arm and flange.

- I. (P-3A) ADA Roll-in Shower: Comfort Designs XST6333BFADA75, one-piece open-top gelcoat, 63"L x 34"W x 78.75"H overall dimensions, white u-shaped grab bar, 18" ANSI grab bar, blocking for future fold-up seat, collapsible damn, weighted anti-bacterial curtain and curtain rod and 0.75inch "no-recess necessary" threshold.
 - 1. Shower Controls: Symmons Temptrol packaged unit Model S-96-300-B30-L-V, polished chrome finish. Pressure-Balancing mixing valve with adjustable stop screw to limit handle turn. Lever handle volume control. Wall/hand shower (2.0gpm) with in-line vacuum breaker, flexible metal hose, wall connection and flange, 30" slide bar for hand shower mounting.
 - 2. Installation of shower and accessories shall meet ADA guidelines and ANSI A117.1.

- J. (P-3B) ADA Tub / Shower: Comfort Designs XST6032GTS, one-piece gelcoat, 60"L x 33"W x 77"H overall dimensions, white ADA/ANSI grab bars, blocking for future fold-up seat, weighted anti-bacterial curtain and curtain rod.
 - 1. Shower Unit: Symmons Temptrol packaged unit Model S-96-400-B30. Pressure-Balancing mixing valve with combination intergral diverter and volume control. Tubspout, wall/hand shower (2.0 gpm) with flexible metal hose, vacuum-breaker, wall connection and flange, 30" slide bar for hand shower mounting.
 - 2. Installation of shower and accessories shall meet ADA guidelines and ANSI A117.1.

- K. (P-4) Kitchen Sink, Single Bowl: Elkay LR2521, stainless steel, 25"x21.25" overall size, 4 faucet holes on 4" centers, fully sound deadened.
 - 1. Faucet: Symmons Symmetrix Model S-23-2-10 wrist operation handle, 10-7/8" swing spout, polished chrome finish, ceramic control cartridge, single lever.
 - 2. Strainer: Removable basket and neoprene stopper.

- L. (P-4A) ADA Kitchen Sink, Single Bowl: Elkay LRAD2521, stainless steel, 25"x21.25" overall size, 4 faucet holes on 4" centers, fully sound deadened.
 - 1. Faucet: Symmons Symmetrix Model S-23-2-10 wrist operation handle, 10-7/8" swing spout, polished chrome finish, ceramic control cartridge, single lever with pull-out side spray.
 - 2. Strainer: Removable basket and neoprene stopper.
 - 3. Sink installation shall be in compliance with the ADA guidelines.
 - 4. Exposed traps and supplies with Truebro Lavguard.

- M. (P-4B) ADA Kitchen Sink, Double Bowl: Elkay LRAD3321, stainless steel, 33"x21.25" overall size, 4 faucet holes on 4" centers, fully sound deadened.
 - 1. Faucet: Symmons Symmetrix Model S-23-2-10 wrist operation handle, 10-7/8" swing spout, polished chrome finish, ceramic control cartridge, single lever.

2. Strainer: Removable basket and neoprene stopper.
 3. Sink installation shall be in compliance with the ADA guidelines.
 4. Exposed traps and supplies with Truebro Lavguard.
- N. (P-5) Mop Basin: Fiat Model MSB-2424, molded stone, 24"x24"x10" with 1" wide shoulders; 3" stainless steel drain with combination dome strainer and lint basket.
1. Faucet: Fiat Service Faucet Model 830-AA, chrome-plated with vacuum breaker, integral stops, adjustable wall brace, pail hook, and 3/4" hose thread on spout.
 2. Hose and Hose Bracket: Fiat Model 832-AA, 30" long flexible heavy duty 5/8" cloth reinforced rubber hose with 3/4" chrome coupling at one end, 5"x3", stainless steel bracket with rubber grip.
 3. Wall Guard: Fiat Model MSG-2424, stainless steel wall guards.
 4. Mop Bracket: Fiat Model 889-CC, 24" stainless steel.
 5. Caulk around mop basin at floor and walls with white silicone caulk.
- O. (P-5A) Laundry Tub, w/ legs: Fiat Model FL-1, molded stone, 23"x22"x14" with backsplash, 2" drain, white baked enamel legs and Fiat A-1 deck faucet.
- P. (P-6) Washing Machine Supply and Drain: In-wall concealed, galvanized metal, (IPS Corporation) Guy Gray WB200HA, 2" drain, single shutoff valve to provide simultaneous control of hot and cold water and water hammer arrestors.

2.7 MISCELLANEOUS EQUIPMENT

- A. Floor Drain (FD-1): Zurn Z-415, cast iron body with 2" or 3" bottom outlet, combination invertible membrane clamp and adjustable collar. Strainer shall be 6" diameter Zurn "Type B", polished nickel-bronze. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest plumbing fixture.
- B. Floor/Yard Cleanout (FCO/YCO): Zurn Z-1400 adjustable floor cleanout, cast iron body, with gas and watertight ABS tapered thread plug. Provide size equal to piping served with maximum size of 4".
1. Concrete floor finishes: Scoriated round polished bronze top.
 2. Sheet tile finishes: Scoriated square polished bronze top recessed to receive tile.
 3. Carpeted finishes: Scoriated round polished bronze top and carpet marker.
- C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind Zurn Z-1468 round stainless steel wall access cover.
- D. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.
- E. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- F. Backflow Preventor (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled.

1. Double Check (DC): Double check backflow assembly with test ports, bronze body with stainless steel springs, corrosion resistant internals, stop and waste ball valves.
 2. Atmospheric Double Check (DCA): Double check continuous pressure type with atmospheric port for low hazard applications, 250°F maximum water temperature, bronze body, stainless steel internals with rubber seals and integral strainer.
 - C. Reduced Pressure Zone (RPZ): Reduced pressure principle type; bronze body with stainless steel internals. Provide bronze body ball valves, test cocks, and air gap fittings.
- G. Freezeless Wall Hydrant: Woodford Model 25, 3/4" size, brass body, brass head nut, automatic draining, with vacuum breaker.
- H. Freezeless Yard Hydrant (see drawing L101 for location): Woodford Model Y2, 3/4" size, brass body, brass head nut, automatic draining, with backflow protection, suitable for 5 foot bury depth minimum.
- I. Thermometers: Trerice Series V80445 or Ashcroft Series 600A-04, vapor actuated, adjustable angle, 4-1/2" diameter face, cast aluminum case, stainless steel ring, glass window, white background dial with black figures, black finished stainless steel pointer, brass movement with bronze bearings, phosphor bronze bourdon tube. Accuracy shall be to within one scale division.
1. Thermowell: Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill interstitial space between bulb and well.
 2. Range: 30°F to 240°F for domestic hot water systems.
- J. Pressure Gauges: Trerice Series 800 or Ashcroft Type 1005, Grade B, 3-1/2" dial, ANSI B40.1, drawn steel case, white background dial with black figures, clear glass window, brass movement, beryllium copper bourdon tube, 0 to 100 PSI range, accuracy shall be within 2% over middle half of scale and 3% over the remainder. Provide with shut off petcock and restrictor.
- K. Circulator (inline)(CP): Taco model indicated, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with all bronze construction 125 psig rated working pressure, 200°F maximum water temperature, carbon Ni-resist mechanical seal, flexible coupling, resilient-mount drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned and painted with machinery enamel. A set of installation instructions shall be included with pump. Provide high efficiency motors if available as an option of the manufacturer. If high efficiency motors are not available as an option of the manufacturer, submit a certification stating same.
- L. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.
- Schedule:
- "A" - Size #100 PDI - 0-11 Fixture Units
"B" - Size #200 PDI - 12-32 Fixture Units
"C" - Size #300 PDI - 33-60 Fixture Units
- M. Vacuum Breaker: Watts Model N36, 3/4" size, 15 CFM capacity.

- N. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- O. Elevator Pit Drainage System: Stancor, Inc., Model SE50 "Oil-Minder System", Zoeller or approved equal, 1/2HP, 3600 RPM, 120V. , 2" discharge with float switch. A NEMA 4X control panel and a self-cleaning, hermetically sealed, stainless steel oil sensing probe shall alarm if oil is sensed. The pump shall be submersible with discharge check valve. The equipment shall be UL-listed.
- P. Thermostatic Mixing Valve: Thermostatic controller shall be of capacity and size indicated. Provide regulator valve, swivel action check stops, removable cartridge, strainer, stainless steel piston and liquid fill thermal motor with bellows element mounted out of water, in rough chrome finish.
- Q. Trap Primer: Zurn Z-1022 Automatic Trap Primer, all bronze body with integral vacuum breaker, non-liming internal operating assembly with gasketed bronze cover.

2.8 DUPLEX SEWAGE EJECTOR

- A. Goulds Model 3887 submersible solids handling sewage pumps, 2" solids handling, 2" discharge, 1/2 HP, 120V/1PH/60Hz, 13.0amps, 124 GPM at 10 ft. WG, with built-in overload protection, 10-foot breather-type PVC power cord and grounded plug, and low-level micro pressure switch with manual test button, 4-inch "off" level, 6-inch "on" level. Provide duplex basin Model A7-3602, 36" diameter, 36" deep, fiberglass gasketed cover. The controller shall be SES series custom duplex control panel, UL-listed with NEMA 4X enclosure, duplex controller with automatic alternator and high level alarm. High level alarm shall have a remote visual alarm in the Main Office. The controller shall include float-type level switches, audible and visual alarm indication, relays and switches, (2) 120/1/60 pump feeds with control circuit.

2.9 WATER HEATING EQUIPMENT

- A. Indirect-Fired Water Heater (IFWH): Make, model, and performance as scheduled on Drawings. Provide with ASME rated temperature and pressure relief valve, adjustable thermostat, set to provide 140°F water.

2.10 PIPING, VALVE, AND EQUIPMENT IDENTIFICATION

- A. Piping identification: Provide plastic "wrap-around" identification markers indicating flow and fluid flowing for the following:
 - 1. Domestic Hot Water
 - 2. Recirculated Domestic Hot Water
 - 3. Domestic Cold Water
 - 4. Vent Piping
 - 5. Exposed Above-ground Sanitary Drain Piping
 - 6. Gas Piping
 - 7. Condensate Piping
- B. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
- C. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing.
- D. Valve Tags:

1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.
 2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
 3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
 4. Tags and charts shall be coordinated with Section 15700 Heating System and when completed this work shall have been done sequentially.
- E. Equipment Identification: Provide laminated plastic nameplates for equipment, pumps, mixing valves, backflow preventers, and balancing valves. Nameplates shall be laminated 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

2.11 SOLAR DOMESTIC WATER HEATING SYSTEMS **DEDUCT ALTERNATE #3**

- A. Shall be Oventrop, Veismann, or approved equal, packaged, integrated system consisting of multiple vacuum tube solar collectors (absorbers), piped as detailed, collector supports, piping, electronic controllers, packaged pump station, circulator pumps, sensors, indirect-type storage tanks with integral heat exchangers, expansion tank, glycol mixture, make-up water with PRV, backflow preventer, relief valves, pipe insulation and wiring.
- B. The installation shall be in accordance with the manufacturer's recommendations and be started up and supervised by an authorized agent of the system manufacturer.
- C. The system shall be filled with manufacturers supplied heat transfer / freeze protection fluid.
- D. The solar system controller shall be Resol Electronics 'Delta-Sol M' with KWE Technologies 'Versatronik 505 Resol' gateway capable of transmitting btu's provided by solar system to the temperature controls system. Coordinate with Section 230900 and temperature controls contractor.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that plumbing may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.2 INSTALLATION OF PIPING

- A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.
- D. Install unions to facilitate removal of equipment.
- E. Copper pipe shall be reamed to remove burrs.
- F. Connections between copper and steel piping shall be made with brass fittings.
- G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.
- H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.
- J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope.

3.3 PIPE HANGERS

- A. Impact driven studs are prohibited.
- B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Copper Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	6'	3/8"
1-1/4"	8'	3/8"
1-1/2"	8'	3/8"
2"	10'	3/8"

- C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Cast Iron Size	Hanger Intervals	Rod Sizes
1-1/2"	5'	3/8"
2"	5'	3/8"
2-1/2"	5'	1/2"
3"	6'	1/2"
4"	7'	5/8"

- D. PVC/CPVC Pipe: Supported at 4 foot intervals.
- E. Verticals: Supported by use of clamp hangers at every story height, and at not more than 6 feet intervals for copper piping 1-1/4" and smaller size.
- F. Spring Isolators: All pipe 20' upstream and downstream of pumps.

3.4 CLOSING IN UNINSPECTED WORK

- A. General: Cover up or enclose work after it has been properly and completely reviewed.
- B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.
- B. Fixtures, piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- C. Caulk around fixtures at floor and wall.
- D. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.6 DISINFECTING

- A. After the entire potable water system is completed, cleaned and tested, and just before the building is ready to be occupied, disinfect the system as follows: After flushing the mains, introduce a water and chlorine solution for a period of not less than three hours before final flushing of the system.

3.7 TESTS

- A. Sanitary soil, waste and vent piping: Fill with water to top of vents, and test as required by Code.
- B. Water piping shall be tested to a pressure of 100 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two pounds per square inch. Leaks shall be repaired and system retested. Notify Architect 24 hours before test is to be performed.

3.8 INSTRUCTIONS

- A. On completion of the project, 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 four (4) hours. The time of instruction shall be arranged with the Owner.

3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

Part II
Division 23

HVAC

SECTION 23 00 00

HVAC SYSTEM

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the heating and ventilating systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental Mechanical General Requirements, apply are as follows:
1. Piping materials.
 2. Fittings for steel pipe.
 3. Hangers.
 4. Valves.
 5. Piping, valve and equipment identification.
 6. Hydronic specialties.
 7. Gas-fired boilers
 8. Finned tube radiation.
 9. Finned tube radiation schedule of all elements, room by room.
 10. Unit heaters/cabinet unit heaters/wall heaters.
 11. Fans.
 12. Circulating pumps.
 13. Energy recovery ventilators.
 14. Duct coils.
 15. Split system air conditioning units.

2 PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Hot Water Heating Piping: Type L hard copper tubing and cast bronze or wrought copper solder fittings.
- B. PEX Piping (Insulated): Wirsbo hePEX cross-linked polyethylene tubing with ProPEX brass fittings as manufactured by Uponor. Tubing shall have crosslinked polyethylene inner and outer layers with an oxygen barrier capable of limiting oxygen diffusion below 0.1 g/m³ per day at 104°F. Tubing shall be rated to handle 200°F water temperature at 80 psi. The tubing shall carry a thirty year warranty as standard.

2.2 HANGERS

- A. Adjustable Swivel Hanger: Pipe Sizes 2" and Less: Carpenter and Paterson Fig. 800 conforming to MSS-SP-58, oversize for insulated piping systems. Pipe Sizes Larger Than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 and Fig. 126 CT conforming to MSS-SP-58, provide copper plated clamps on copper pipes.
- C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.
- D. All piping 20' upstream and downstream of pumps shall also have Mason Industries PC30N precompressed double deflection spring isolators installed.

2.3 VALVES

- A. Ball Valves: Apollo 77-100 (threaded) or 77-200 (solder), bronze body, full port, Fed. Spec. WW-V-35, Type II, Class A (bronze), Style 3, blow-out proof stem, 600 pound W.O.G., screwed connection for steel pipe, sweat connection for copper tube. Provide stem extension to allow operation without interfering with pipe insulation. Provide Tee handles for valves thru 2" pipe size.
- B. Gate Valves: Nibco Model S-113 or T-113, bronze body Fed. Spec. WW-V-54, wedge disc, rising stem, screwed connection for steel pipe, sweat connection for copper tube, 150-pound class.
- C. Check Valves: Nibco Model S-413 or T-413, bronze body Fed. Spec. WW-V-51, regrinding swing check type, 200 pound class.
- D. Butterfly Valves: Centerline or Norris, valves shall conform with MSS-SP67, Type I 150 psig - Tight shut off valve, ends shall be flangeless or grooved, cast iron body, type 300 series corrosion resistant steel stems and corrosion resistant or bronze discs with molded elastomer disc seals. Valves shall have throttling handles with a minimum of 7 locking positions. Valves shall be suitable for water temperatures up to 220 degrees F.

2.4 PIPING, VALVE AND EQUIPMENT IDENTIFICATION

- A. Pipe Identification: Provide plastic "wrap around" identification markers indicating flow direction and fluid flowing for the following:
 - Hot Water Supply Piping
 - Hot Water Return Piping
 - 1. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
 - 2. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing. Markers shall not be installed in exposed areas except in the mechanical rooms.
- B. Valve Tags:
 - 1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.

2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
 3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
 4. Tags and charts shall be coordinated with Section 23 00 00 Heating System and when completed this work shall have been done sequentially.
- C. Equipment Identification:
1. Provide laminated plastic nameplates for boilers, pumps, and air handling units. Laminated plastic shall be 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

2.5 HYDRONIC SPECIALTIES

- A. Thermometers: Terrice Model V80445 or Ashcroft Series 600A-04, dial type, Mil Spec MIL-T-9955, 4-1/2" diameter face. Hot water system thermometers shall have a range of 30°F to 240°F with 2° increments. Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill the sealed interstitial space between bulb and well. Evidence of the transfer fluid leaking shall be cause for refilling and sealing the well.
- B. Pressure Gauges: Terrice Series 800 or Ashcroft Type 1005, Grade B, ANSI B40.1, 3-1/2" diameter face installed with shut off petcock and restrictor. Pressure range: 0-50 psig with 5 psi graduations, 0-100 psig with 10 psi graduations for chilled water pumps.
- C. Expansion Tanks (Captive Air Type) (ET): Taco Model as scheduled, tank shall be of capacity indicated and shall be welded steel, constructed and tested hydrostatically in accordance with Section VIII of the ASME Boiler Pressure Vessel Code. The tank bladder shall be butyl rubber and shall be removable for inspection. Tank shall have air charging and system connections, and shall be factory pressurized.
- D. Strainers: Watts Model 77S, MIL-S-16293, 125 psig minimum rating wye strainers, cast iron or bronze body, screen shall be stainless steel, monel or bronze with 20 mesh perforations. Provide with blowdown ball valve and 3/4" hose connection.
- E. Automatic Air Vents: Armstrong No. 1-AV, float type to vent air in hydronic systems. Vent constructed with cast iron body and stainless steel internals and with NPT male inlet and outlet for 1/4 inch overflow for safe water connection. 150 psi working pressure, 250°F maximum temperature.
- F. Tangential Air Separator (AS): Taco model 4900-AD, or Spirovent, as scheduled, steel construction, designed for not less than 125 psig and constructed and tested in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code. Tank shall have fabricated connections, screwed for sizes 2" and smaller, flanged for sizes 2-1/2 inches and larger. Separators shall be factory prime-painted. Each air separator shall have an internal design suitable for creating the required conditions for optimal air separation and microbubble

- removal. Provide fittings for connection of automatic air vent and for connection of manual blow-down valve.
- G. Manual Air Vents: Brass body, fiber discs, 125 psi working pressure, 240°F maximum temperature, adjustable for quick venting at system start-up.
- H. Circulator (inline) (CP): Taco model indicated, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with cast-iron body and bronze-fitted, 175 psig rated working pressure, 220°F maximum water temperature, carbon Ni-resist mechanical seal, flexible coupling, resilient-mounted drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned, and painted with machinery enamel. A set of installation instructions shall be included with the pump. Provide high efficiency motors if available as an option of the manufacturer. If high efficiency motors are not available as an option of the manufacturer, submit a certification stating same.
- I. Manual Circuit Balance Valves: Taco "Accu-Flo".
1. Bronze or brass body and internals, teflon seats, 300 psi working pressure, 250°F working temperature. Balancing devices shall be adjustable and shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.
 2. Install per manufacturer's recommendations for adjacent length of straight pipe.
 3. Shop drawings shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.
 4. At the Contractor's option, balancing valves with combination shut-off - balancing - drain provisions may be used in lieu of the individual components indicated. The balancing valve shall be furnished with a memory stop feature so that the valve can be correctly returned to the balance position after serving the stop function
- J. Water Pressure Reducing Valve: Pressure Reducing Valves: Watts Regulator series U5-Z3 bronze body, bronze and stainless steel internals, 300 psi working pressure, 160°F maximum temperature, adjustable pressure range of 25-75 psig, with inlet strainer (screen). Valves used for make-up water applications shall have suffix "LP" and be rated for an adjustable pressure range of 10-35 psig.
- K. Flexible Connectors at Pumps and at Coils: Multi-layer neoprene-nylon cord fabric twin-sphere connectors with flange ends, rated at 150 psig at 220°F. Sizes 1-1/2" to 2-1/2": 6" long, sizes 3" to 6": 9" long, line size.
- L. Temperature and Pressure Test Ports: Peterson Equipment Co. Model 110 "Pete's Plugs" temperature and pressure test capability, brass body, 1/4" NPT fitting, Nordel valve cores, 275°F maximum temperature, 500 psig maximum pressure. Provide with (1) pressure and temperature test kit.
- M. Automatic Flow Control Valves: Flow Design, Inc., Autoflow Model AC (up to 2") and Model WS (larger than 2") or approved equal. The valves shall be factory set to maintain the specified flow rates within +/- 5% over an operating range of 2-32 psid. Each valve shall have a five (5) year warranty and free first year cartridge exchange. The internal wear surfaces of the valve cartridge shall be electroless nickel or stainless steel. The valve body shall be forged brass and permanently marked with the flow rate and spring range. Minimum pressure and temperature ratings shall be 400 psig at 250°F. Valve accessories shall include a union, ball valve and integral strainer. Installation shall be in accordance with the manufacturer's recommendations. The ball valve shall have a teflon packing, brass packing

nut and blowout-proof stem, large diameter plated ball and a full size steel handle with vinyl grip.

- N. Triple Duty Valve: Multi-Purpose Valves: Shall be Taco MPV, Armstrong or Bell and Gossett. The multi-purpose valves shall incorporate a combination gate valve, metering valve, balancing valve and non-slam check valve in one valve body. Construction shall be cast-iron body, stainless steel stem sleeve, cast iron, non-lubricated plug and brass seat with "O" ring seal. The design working pressure shall be 175 psig and temperature rating shall be 240F.

2.6 GAS-FIRED BOILER/BURNER UNIT

- A. Boiler shall be high efficiency, sealed combustion, direct vent condensing type. The manufacturer shall be Heat Transfer Products "ModCon", or approved equal suitable for natural gas. The minimum rated working pressure shall be 50 psig. Boiler-burners shall be Model and size as scheduled. Thermal efficiency shall be a minimum of 92%. Direct vent boilers shall be Energy Star compliant.
- B. Provide 4" or 6" PVC plastic or AL-429C stainless steel intake/venting and condensate drain piping installed in accordance with the manufacturer's recommendations.
- C. Accessories shall include floor support stand, 50 psig ASME rated pressure relief valves, theraltimeter, operating aquastat, intake/exhaust wall venting terminations, low water cut-off, condensate neutralization kit and flow switch.
- D. The boiler/burner units shall be started and adjusted by a factory representative who shall submit an efficiency report for Engineer review.
- E. Provide firestats, emergency shut-off switches, and service switches as required by NFPA 54.
- F. The boilers shall incorporate an automatic restart feature on flame failure or ignition failure.

2.7 FINNED TUBE RADIATION (FTR-#)

- A. Finned tube radiation (FTR) shall be of manufacturer, type, size, and capacity scheduled.
- B. Finned Tube Radiation (Wall Hung): Heating elements shall have aluminum fins with integral fin collars mechanically bonded to the tube. Provide element mounting system consisting of wall mounted mounting brackets and pipe cradles on 4' centers. Cradles shall run on nylon guides for noiseless operation. Enclosures shall be 18 gauge steel, shall be continuous, and shall mount to a continuous channel mounting strip at the top of the enclosure. The bottom of the enclosure shall fasten to the pipe mounting brackets. Provide a continuous urethane gasket between the top mounting channel and the wall to prevent dust streaking. Provide end caps, corner pieces, access panels and enclosure extensions as required. Provide factory enamel finish - color by Architect.
- C. Finned tube radiation located in "wet" environments" such as bathrooms or laundry areas shall have aluminum cover similar to Sterling DesignLine Series.
- D. Manufacturer's local representative shall provide a schedule of all elements for the project. The room by room schedule shall include the design information, heating outputs (btuh) with all corrections factors included, element lengths, cover lengths and accessories.

2.8 UNIT HEATER (UH-#)

- A. Horizontal unit heaters shall be manufactured by the Trane Co., McQuay, Sterling or American Air Filter. Coils shall be copper tube mechanically expanded into aluminum fins and pressure rated at 200 psig at 250F. Fans shall consist of a single blower. Coils shall be certified in accordance with ARI Standard 410. Casings shall be galvanized steel. Cabinets shall be finish painted in a factory-applied baked enamel.
- B. Furnish with factory-mounted disconnect switch.

2.9 FANS (EF-#)

- A. Shall be model indicated. The fan shall include housing, fan wheel, shaft, bearings, inlet shroud, motor, mounting support and mounting frame as a factory-assembled unit. An OSHA-approved belt guard shall be included. The fan drive shall have a 1.5 service factor for the maximum rated horsepower. Each fan shall incorporate a backdraft damper or one shall be installed at the discharge (louver).
- B. Bearings shall be precision, flange-mounted self-aligning ball bearings at inlet and discharge. Grease lines shall extend to the exterior of the fan housing.
- C. Submit sound power data for inlet and discharge sound.
- D. Submit fan curves for each fan with the design operating point clearly marked.
- E. Furnish accessories as noted on drawings.
- F. Roof fans and duct penetrations thru the roof shall have 12" high insulated pre-fabricated and self-flashing insulated curbs by Conn-Fab, or approved equal. Provide a suitable foam gasket between the curb and fan base to seal airtight.

2.10 CABINET UNIT HEATERS (CUH-#)

- A. Construction:
 - 1. Cabinet unit heaters shall be manufactured by the Trane Co., Sterling, Vulcan or American Air Filter. Unit configuration shall be inverted airflow, wall-mounted or floor-mounted as indicated. Cabinets shall be surface-mounted, semi-recessed or fully-recessed, as indicated. Coils shall be copper tube mechanically expanded into aluminum fins and pressure rated at 200 psig at 250F. Fans shall consist of multiple squirrel cage blowers on a common shaft. Coils shall be certified in accordance with ARI Standard 410. Casings shall be galvanized steel. Cabinets shall be finish painted in a factory-applied baked enamel with color selection by the Architect.
 - 2. Furnish units with a 3-speed fan switch, disconnect switch and throwaway dust filter (with 2 spare sets per unit).
- B. Performance:
 - 1. Performance and capacity shall be as scheduled.

2.11 WALL HEATER (WH-#) OR KICKSPACE HEATER (KSH-#)

- A. Heater shall be VRV Products, Beacon-Morris, or Embassy, capacity scheduled on drawings. Heaters shall be 120V with pipe mounted aquastat, fully recessed and painted with an enamel paint (color by architect).

2.12 TOTAL ENERGY HEAT RECOVERY EQUIPMENT (ERV-#)

- A. Shall be Greenheck MiniVent, Loren Cook or approved equal, with capacities and performance as scheduled. The heat recovery equipment shall be a factory assembled and tested package, constructed and rated in accordance with ARI, AMCA and UL. System components shall include fan(s), air-to-air heat exchangers, dampers, filter sections, motor starters, timed defrost system, welded structural steel base, non-fused disconnect switches. The casing shall be lined with 1" thick 3.0 pcf fiberglass thermal insulation. A minimum of ten (10) feet of separation shall be provided between the outside air intake and exhaust outlet.
- B. The air-to-air "total energy" heat recovery units shall be a rotating enthalpy wheel (molecular sieve design or desiccant) or static plate core capable of sensible and latent energy transfer. Rotating wheel exchangers and drives shall include a purge section and a five (5) year replacement warranty for materials and labor. The exterior casing shall be constructed of galvanized steel, phosphatized and painted with a finish coat of epoxy paint (Greenheck "Permatecor", or approved equal).
- C. Fans shall be DWDI centrifugal forward curved and have direct drive blower and motor assemblies selected at 1.5 times the maximum rated motor horsepower. Motors shall be premium high efficiency, inverter-duty rated and shall be compatible for use with speed controller. Fan bearings shall be regreasable tapered roller pillow block bearings with an L10 life of 200,000 hours. Provide extended lubrication lines for each bearing. All serviceable components shall be readily accessible via removable, fully gasketted access panels.
- D. Supply and exhaust prefilters shall be 1" thick, 30% efficient extended surface pleated media disposable type. Furnish a total of two (2) complete sets of filters for each filter bank.
- E. Dampers shall be galvanized steel, backdraft type. Blade seals shall be neoprene and jamb seals shall be compressible aluminum or stainless steel.
- F. Electrical work shall be in accordance with the National Electrical Code (NFPA 70) and shall include motor starters and junction boxes. Wiring shall be in galvanized steel or liquid tight conduit. A single point electrical connection shall be provided.
- G. Controls shall include timed exhaust frost control.
- H. The heat recovery units shall be started up and their operation verified by an authorized representative of the equipment manufacturer and the commissioning agent during the commissioning process.

2.13 DUCT COILS

- A. Coils: Capacities and pressure drops shall be rated in accordance with ARI 410. Coils shall be pressure tested at 300 psig and shall be suitable for 150 psig service. Heating Coils shall be constructed of copper tubes, aluminum fins and copper headers. Casings shall be 16 gage galvanized steel.

2.14 SPLIT SYSTEM AIR CONDITIONING UNIT (SAC-# and SCU-#)

- A. The split system air conditioning unit shall be Mitsubishi "PK" Series wall mounted indoor units with vertical outdoor units, or approved equal by Daikin or Sanyo. Cooling capacity shall be as scheduled. Furnish with refrigerant piping, wiring and condensate piping as recommended by the manufacturer. The air conditioning units shall be suitable for operation at 0°F outside ambient. Units must be suitable for use with the refrigerant line lengths required by the unit placement as shown on the plans with no reduction in capacity.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF PIPING

- A. In general, piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless written authorization is given by the Architect.
- B. Provide and erect in accordance with the best practice of the trade piping shown on the Drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- C. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- D. Piping shall be erected so as to provide for the easy and noiseless passage of heating fluid under working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size.
- E. Water mains shall be run level or pitch slightly upward so that no air pockets are formed in the piping. The mains shall be set at elevations such that the runouts feeding equipment shall have no pockets where air can collect except where vents are provided. Provide drains at low points in the piping systems.
- F. High points in water piping shall be provided with manual vents.
- G. In the erection of water piping, make proper allowances for expansion and contraction. Piping shall be anchored as necessary to control expansion. Hot water runouts to units shall be the size as indicated on the Drawings and shall come off the main downward or off the side with a minimum of two 90° elbows provided on runout from main.
- H. Install stop valves and unions to facilitate isolation and removal of equipment. Provide final connections for hydronic specialties furnished under other sections of the Specifications.
- I. Steel piping with screwed connections. Threads on piping shall be full length and clean-cut with inside edges reamed smooth to the full inside bore. Close nipples shall not be used. Pipe threads: standard pipe threads, machine cut and full length. Pipe: reamed to remove burrs and up-ended and rapped to dislodge dirt and scale. Joint compound shall be applied to male thread only. If it is necessary to back off a screwed joint after it is made, the thread shall be cleaned and new compound applied. Caulked threads will not be permitted.
- J. Connections between copper and steel piping shall be made with bronze fittings.
- K. Install thermometer wells for temperature gauges and sensors, projecting a minimum of 2" into the pipe with extension to face of insulation. Piping 1-1/2" and smaller shall be enlarged

to 2" where wells are installed. Wells shall be installed in active sections of piping. Fill wells with heat transfer fluid.

- L. Solder joints shall be made with non-lead solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Hot wipe solder at each fitting.
- M. PVC piping shall have solvent welded joints except at connections to equipment and valves which shall be screwed for sizes 2" and smaller and flanged for sizes 2-1/2" and larger. Solvent welded joints: Pipe ends deburred, and beveled. Pipe end and fitting: Cleaned and dried, primed to soften bonding surfaces. Pipe end: Apply even full layer of solvent cement after priming. Before cement starts to set, insert pipe end into fitting and turn 1/4 turn to evenly distribute cement. Hold joint together until cement sets-up, wipe excess cement off joint.
- N. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental Mechanical General Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- O. Automatic Air Vents: Shall be installed with a manual isolation valve. The vent discharge shall be piped to a local floor drain.

3.3 PIPE HANGERS

- A. Impact driven studs are not acceptable.
- B. Pipes (copper or steel) shall be supported at intervals and rod sizes as follows, double nuts on hangers and on beam clips.

Pipe Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	7'	3/8"
1-1/4"	8'	3/8"
1-1/2"	9'	3/8"
2"	10'	3/8"
2-1/2"	11'	1/2"
3"	12'	1/2"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Steel Pipe: Not more than 16 ft.

Copper Pipe and Tubing:

- 1-1/2" and larger - Not more than 12 ft.
- 1-1/4" and smaller - Not more than 6 ft.

- D. Provide welded steel saddles at each hanger on steel piping systems 4" and larger.
- E. PVC Piping: Supported at 4' intervals.
- F. Spring Isolators: All piping within 20' upstream and downstream of the pumps.

3.4 INSTALLATION OF BOILERS

- A. Assemble boiler sections, jacketing, burner, combustion controls, operating controls, and safety controls per NFPA-54 and manufacturer's instructions. Provide boiler interconnecting power and control wiring.
- B. The boiler/burner units shall be started and adjusted by a factory representative in the presence of the Architect. The factory representative shall provide a field efficiency report to the Engineer at the completion of the start-up. The report shall include, but not be limited to:

- CO₂ reading (%).
 - Stack draft (in W.G.).
 - Stack temperature, room temperature.
 - Combustion efficiency (%).

Incorporate the field test results in the "Operations and Maintenance" manuals.

Charge hot water heating system with corrosion inhibitor per manufacturer's recommendations. Concentrations shall be based on a system temperature of 220°F and shall be the high end of the manufacturer's recommended concentration range.

3.5 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.6 TEST AND ADJUST

- A. Piping Systems: Test with water to a pressure of 75 psi and hold for a period of two hours. Repair any leaks and retest the piping system; repeat process until systems are leak-free. Test piping before it is insulated.
- B. Before operating any system, flush the piping to remove oil and foreign materials.
- C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- D. Demonstrate that the HVAC systems have free and noiseless circulation of water, that all air has been purged and that systems are watertight.
- E. Correct defects which develop in operational testing, conduct additional testing until defect free operation is achieved.
- F. Provide balancing and adjusting of terminal devices in accordance with Specification Section 23 05 93.

3.7 CLEANUP AND CORROSION PREVENTION

- A. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved

protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.8 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

SECTION 23 05 00

SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to be familiar with conditions related to the installation of the work.

1.2 WORK SHOWN ON DRAWINGS

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

1.3 MATERIALS AND LABOR

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed such that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.

1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.

- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

1.6 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

1.7 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Owner.

1.8 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

1.9 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

- American Society for Testing and Materials (ASTM)
- Underwriters' Laboratories, Inc. (UL)
- Air Moving and Conditioning Assoc. (AMCA)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Society of Mechanical Engineers (ASME)
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronics Engineers (IEEE)
- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)
- American Water Works Association (AWWA)
- Local Fire Code
- Local Plumbing Codes
- American Welding Society
- International Building Code (IBC)

1.10 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, five (5) copies, to be submitted to the Architect. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected" less two (2) copies. Work shall progress in accordance with "Reviewed" shop drawings (ONLY).

- B. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Typical similar items would be "Diffusers and Registers", "Valves and Controls". Rejection of individual items shall not be cause for rejection of the entire document.
- C. Clearly indicate item(s) to be reviewed on each submission by highlighting or underlining intended item(s). Submissions not clearly marked shall be returned "Amend and Resubmit".
- D. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.
- E. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.

1.11 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

1.12 VISITING THE PREMISES

- A. Visit the site and examine existing conditions before submitting bid.

2 PART 2 PRODUCTS

NOT USED

3 PART 3 EXECUTION

3.1 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

3.2 SLEEVES AND PREPARED OPENINGS

- A. Coordinate cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. All penetrations through concrete shall be sleeved as required by IBC.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

3.3 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

3.4 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

3.5 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to valves and other serviceable components.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

3.6 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

3.7 GUARDS

- A. Exposed moving and rotating elements of mechanical equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

3.8 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.
- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

3.9 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.
 3/4 Horsepower and greater - 208 volt, 3 phase, 60 Hz.

- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be of the latest type and quality specified under individual items of equipment.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 16 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.
- D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

<u>MOTOR HORSEPOWER</u>	<u>PERCENTAGE EFFICIENCY</u>		
	<u>(1200RPM)</u>	<u>(1800 RPM)</u>	<u>(3600 RPM)</u>
1,1-1/2,2,3	----	78.0	76.0
5	87.4	87.4	86.3
7.5	89.4	89.8	87.7
10	89.7	90.3	89.0

3.10 CLEANING OF SYSTEMS

- A. Piping systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing labels and foreign substance.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

3.11 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to insure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

3.12 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

3.13 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

3.14 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

3.15 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.
- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit two (2) copies in bound volumes to the Engineer for distribution.

3.16 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.
- C. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

3.17 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

SECTION 23 05 93

TESTING AND BALANCING AIR AND WATER SYSTEMS

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. The work covered by this section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required for testing and balancing the air and water systems.

1.2 GENERAL REQUIREMENTS

- A. The provisions of Section 23 05 00, "Supplemental Mechanical Requirements", apply to this section.

1.3 DEFINITIONS

- A. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment, (e.g., reduce fan speed, throttling).
- B. Balance: To proportion flows within the distribution system (submains, branches and terminals) in accordance with specified design quantities.
- C. Procedure: Standardize approach and execution of sequence of work operations to yield reproducible results.
- D. Report Forms: Test data sheets arranged for collection of test data in logical order to submission and review. This data should also form the permanent record which shall be used as the basis for any future testing, adjusting, and balancing required.
- E. Test: To determine quantitative performance of equipment.

1.4 SUBMITTALS: Submit the following:

- A. Standards Compliance:
 - Testing Agency
 - Testing Agency Personnel
 - Professional Engineers
 - Instrument Calibration

1.5 TESTING AND BALANCING AGENCY

- A. Air and Water Systems Testing and Balancing: Upon completion of the installation and field testing, performance test and adjust the supply, return, make-up, and exhaust air systems, and heating water systems to provide the air volume and water flow quantities indicated. Accomplish work in accordance with the agenda and procedures specified and AABC 71679 and standards of the NEBB. Correct air and water system performance deficiencies disclosed by the test before balancing the systems.
- B. Agency Qualifications: Obtain the services of a qualified testing organization to perform the testing and balancing work as herein specified. Prior to commencing work under this section of the specifications, the testing organization shall have been reviewed by the Architect. The criteria for determining qualifications shall be membership in the AABC, or certification by the

NEBB, or the testing organization shall have submitted proof to satisfy the Architect that the organization meets or exceeds the technical standards for membership of the AABC as published in the AABC 71679. The testing organization shall be independent of both the installing contractors and equipment suppliers for this project.

1.6 AGENDA

- A. Preliminary Report: Review drawings and specifications prior to installation of any of the affected system. Submit a written report to the Architect indicating any deficiencies in the system that would preclude the proper adjusting, balancing, and testing of the systems.

1.7 PROCEDURES, GENERAL

- A. Requirements: Adjust systems and components thereof that perform as required by drawings and specifications.
- B. Test Duration: Operating tests of heating and cooling coils, fans and other equipment shall be of not less than 4 hours duration, after stabilized operating conditions have been established. Capacities shall be based on temperatures and air and water quantities measured during such tests.
- C. Instrumentation: Method of application of instrumentation shall be in accordance with the manufacturer's instructions. Furnish personnel, instruments, and equipment for tests specified herein.
- D. Accuracy of Instruments: Instruments used for measurements shall be accurate. Provide calibration histories for each instrument for examination. Calibrate each test instrument by an reviewed laboratory or by the manufacturer. The Architect has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.
- E. Accuracy of Thermometers: Plus or minus one graduation at the temperatures to be measured. Graduations shall conform with the following schedule:

Medium	Design Temperature Differential (°F)	Maximum Graduation (°F)
Air	10 or less	1/2
Air	over 10	1
Water	10 or less	1/10
Water	10-20	1/2
Water	over 20	1

- F. Flow Rate Tolerance: Values are based on discussion in ASHRAE "HVAC Applications", Chapter 34. Air filter resistance during tests, artificially imposed if necessary, shall be 80 percent of final values.
 1. Air Handling Unit CFM: Minus 0 percent to plus 10 percent.
 2. Other Fans: Minus 0 percent to plus 10 percent.
 3. Air Terminal Units (VAV Boxes): Minus 5 percent to plus 10 percent.
 4. Minimum Outside Air (for manually set dampers): Minus 0 percent to plus 10 percent.

5. Individual Room Air Outlets and Inlets, and Air Flow Rates Not mentioned Above: Minus 10 percent to plus 10 percent.
6. Heating System Pumps GPM: Minus 0 percent to plus 10 percent.
7. Other Pumps GPM: Minus 10 percent to plus 10 percent.
8. Air Handling Unit Coils GPM: Minus 5 percent to plus 10 percent.
9. Terminal Unit Coils/Elements GPM: Minus 10 percent to plus 10 percent.

2 PART 2 PRODUCTS

NOT USED

3 PART 3 EXECUTION

3.1 AIR SYSTEM PROCEDURES

- A. Adjustments: Adjust air handling systems to provide the required design air quantity to, or through, each component. Conduct adjusting and balancing of systems during periods of the year approximating maximum seasonal operation.
- B. Balance: Use flow adjusting (volume control) devices to balance air quantities only; i.e., proportion flow between various terminals comprising system, and only to the extent that their adjustments do not create objectionable air motion or sound, i.e., in excess of specified limits.
- C. Balancing Between Runs (submains, branch mains, and branches): Use flow regulating devices at, or in, the divided - flow fitting. Minimize restriction imposed by flow regulating devices in or at terminals.
- D. Final Measurements of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.
- E. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds, or axial-flow fan wheel blade pitch. For systems with direct-connected fans (without adjustable pitch blades), damper restrictions of a system's total flow or variable speed rheostats shall be adjusted as appropriate.
- F. Air Measurement:
 1. Pitot Tube: Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein. Pitot tubes, associated instruments, traverses, and techniques shall conform with the ASHRAE Handbook Fundamentals.
 2. Pitot Tube Traverse: Pitot-tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of Pitot-tube traverse, determine air flow in the duct by totalling volume of individual terminals served, measured as described herein.
 3. Measurements of Air Quantity: Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.
- G. Air Terminal Balancing: Measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing.

3.2 WATER SYSTEM PROCEDURES

- A. Adjustment: Adjust heating, water systems to provide required quantity to, or through each component.
- B. Metering: Measure water quantities and pressures with calibrated meters.
- C. Water Measurements and Balancing: Use venturi tubes, orifices, or other metering fittings and pressure gages. Adjust systems to provide the design flow rates through the heat transfer equipment prior to the capacity testing. Perform measurement of temperature differential with the air system, adjusted as described herein, in operation.
- D. Automatic Controls: Position automatic control valves for full flow through the heat transfer equipment of the system during tests.
- E. Flow: Flow through by-pass circuits at three-way valves shall be adjusted to balance that through the supply circuit.
- F. Distribution: Adjust distribution by means of balancing devices (cocks, valves, and fittings) and automatic flow control valves. Do not use service valves for adjustment. Where automatic flow control valves are utilized in lieu of venturi tubes, record only the pressure drop across the valve if within the pressure drop rating on the valve tag.
- G. Special Procedures: Where available, pump capacity (as designed) is less than total flow requirements of individual heat transfer units of system served, full flow may be simulated by the temporary restriction of flow to portions of the system.

3.3 CERTIFIED REPORTS

- A. Submittal: Submit three copies of the reports described herein, covering air and water system performance, air motion (fpm), to the Architect prior to final tests and inspection.
- B. Instrument Records: Include types, serial numbers, and dates calibration of instruments.
- C. Reports: Reports shall identify conspicuously items not conforming to contract requirements, or obvious maloperation and deficiencies.
- D. Certification: The reports shall be certified by an independent Registered Professional Engineer who is versed in the field of air and water balancing and who is not affiliated with any firm involved in the design or construction phases of the project.

3.4 AIR SYSTEM DATA

- A. Report: The certified report shall include for each air-handling system the data listed below:
 - 1. Equipment (fan or factory fabricated station unit):
 - a. Installation Data:
 - 1) Manufacturer and Model
 - 2) Size
 - 3) Arrangement, Discharge, and Class
 - 4) Motor H.P., Voltage, Phase, Cycles, and Full Load Amps.
 - 5) Location and Local Identification Data
 - b. Design Data: Data listed in schedules on drawings and specifications.

- c. Fan Recorded (Test) Data
 - 1) C.F.M.
 - 2) Static Pressure
 - 3) R.P.M.
 - 4) Motor Operating Amps.
 - 5) Motor Operating B.H.P.
- 2. Duct Systems:
 - a. Duct Air Quantities (Maximum and Minimum) - Main, Submains, Branches, Outdoor (Outside) Air, Total-Air, and Exhaust
 - 1) Duct size(s)
 - 2) Number of Pitot-tube (Pressure) Measurements
 - 3) Sum of Velocity Measurement, excluding pressure measurements
 - 4) Average Velocity
 - 5) Recorded (Test) C.F.M.
 - 6) Design C.F.M.
 - b. Individual Air Terminals:
 - 1) Terminal Identification (Supply or Exhaust, Location and Number Designation)
 - 2) Type Size, Manufacturer, and Catalog Identification
 - 3) Design and Recorded Quantities - C.F.M.
 - 4) Deflector Vane or Diffusion Cone Settings
 - 5) Applicable Factor for Application, Velocity, Area
 - 6) Design and Recorded Velocities - F.P.M. (State "core" "inlet," as applicable)

3.5 WATER SYSTEM DATA

A. Report: Include data listed below:

- 1. Pumps:
 - a. Installation Data:
 - 1) Manufacturer and Model
 - 2) Size
 - 3) Type Drive
 - 4) Motor H.P., Voltage, Phase, and Full Load Amps.
 - b. Design Data:
 - 1) G.P.M.
 - 2) Head
 - 3) R.P.M.
 - 4) B.H.P. and Amps.
 - c. Recorded Data:
 - 1) Discharge Pressures (Full-Flow and No-Flow)
 - 2) Suction Pressures (Full-Flow and No-Flow)
 - 3) Operating Head
 - 4) Operating G.P.M. (from pump curves if metering is not provided)

- 5) No-Load Amps. (where possible)
- 6) Full-Flow Amps
- 7) No-Flow Amps

2. Air Heating and Cooling Equipment:

a. Design Data:

- 1) Load in Btu per hr
- 2) G.P.M.
- 3) Entering and Leaving Water Temperature
- 4) Entering and Leaving Air Conditions (D.B. and W.B.)
- 5) C.F.M.
- 6) Water Pressure Drop

b. Recorded Data:

- 1) Type of Equipment and Identification (location or number designation)
- 2) Entering and Leaving Air Conditions (D.B. and W.B.)
- 3) Entering and Leaving Water Temperatures
- 4) G.P.M. (if metered)
- 5) Temperature Rise or Drop

3.6 FINAL TESTS, REVIEW, AND ACCEPTANCE

- A. Capacity and Performance Tests: Make tests to demonstrate that capacities and general performance of air and water systems comply with contract requirements.
- B. Final Inspection: At the time of final review, recheck, in the presence of the Engineer, random selections of data water and air quantities and air motion recorded in the certified report.
- C. Points and Areas for Recheck: As selected by the Architect.
- D. Measurement and Test Procedures: As reviewed for work forming basis of certified report.
- E. Selections for Recheck (specific plus random): In general, selections for recheck will not exceed 25 percent of the total number tabulated in the report.
- F. Retests: If random tests elicit a measured flow deviation of ten percent or more from, or a sound level of 2 Db or more greater than that recorded in the certified report listings, at ten percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made.
- G. Marking of Settings: Following final acceptance of certified reports by the Architect, the settings of valves, dampers, and other adjustment devices shall be permanently marked, so that adjustment can be restored if disturbed at any time. Do not mark devices until after final review.

*** END OF SECTION ***

SECTION 23 07 00

INSULATION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental General Mechanical Conditions" are hereby made a part of the work of this section.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to insulate the heating, ventilating, air conditioning, and plumbing systems.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Piping insulation.
 - 2. Duct insulation.
 - 3. Equipment insulation.
 - 4. Insulation application schedule.
 - 5. Vapor barrier coating.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.
- B. Unfinished Spaces: Mech/Elect Rooms and attic.
- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures (attic) and spaces not air conditioned.
- C. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- D. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.
- E. Exposed: Visible from a finished or unfinished space.

1.5 MANUFACTURER'S STAMP OR LABEL

- A. Packages or standard containers of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation shall be asbestos-free.

1.6 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. Materials shall have a flame-spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with NFPA 255, ASTM E84, or UL 723.
- B. Provide materials with flame resistant treatments not subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, or heat.
- C. Materials Exempt From Fire-Resistant Rating: Nylon anchors for securing insulation to ducts or equipment.

2 PART 2 PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft²-°F at 150°F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450°F service. Fitting insulation shall be of same material used for pipe.
 - 1. Insulation Jacket: All service (ASJ) type conforming to Fed. Spec. HH-B-100B Type I. Jacket permeability shall not exceed 0.02 perms (ASTM E96). Pipe fitting jacket shall be factory premolded, one-piece, PVC covers with pressure sensitive taped joints. Jackets in exposed locations shall have a white surface suitable for field painting. Provide vapor barrier as required by service.
- B. Flexible Unicellular: Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type I, Tubular and shall be suitable for 200°F service. Fitting insulation shall be of same material used for pipe. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.
- C. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.
- D. Insulation Kit: Insulate exposed supply and waste piping at handicapped accessible sinks with fully molded insulation kit. McGuire Products ProWrap, 3/16" thick closed vinyl with anti-microbial additive, 1.02 Btu-in/hr-F²-°F thermal conductivity, white color.

2.2 EQUIPMENT INSULATION

- A. Fiberglass (Hot Equipment): Semi-rigid fiberglass board conforming to Fed. Spec. HH-I-558B, Form B, Type I. Thermal conductivity shall be 0.32 Btu-in/hr-ft²-°F at 150°F mean temperature (ASTM C177), insulation shall be suitable for 650°F service. Insulation jacket shall be "all service" type conforming to Fed. Spec. HH-I-100B Type I or II. Jacket permeability shall not exceed 0.02 perms (ASTM E96).
- B. Flexible Unicellular (Cold Equipment): Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type II, sheet and shall be suitable for 200°F service. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.

2.3 DUCT INSULATION

- A. Fiberglass (Ductwrap): Fiberglass duct wrap with foil-scrim-kraft facing/vapor barrier, 1.0 lb/cu.ft. density (0.75 lb/cu.ft. for 3" thickness only), 0.29 Btu-in/hr-ft²-°F conductivity at 75°F mean temperature, 0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A & B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.

- B. Fiberglass (Ductboard): Fiberglass insulation board with foil-scrim-kraft facing/vapor barrier, 3.0 lb./CF density, 0.25 Btu-in/hr-ft²-°F conductivity at 75°F mean temperature, 0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A and B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.

2.4 VAPOR BARRIER COATING

- A. Raw (cut) ends of fiberglass pipe insulation shall be finished (protected) with the application of a suitable vapor barrier coating or finishing cement (mastic) to maintain the continuous visual and functional integrity of the insulation jacket. Mastic shall be Childers "Chil-Perm" CP-30, elastomeric resin, or approved equal, applied in accordance with the manufacturer's recommendations.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 GENERAL

- A. Insulate after system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and are dry.
- B. Install insulation with jackets drawn tight and cement down longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems and pipe penetrations through fire rated assemblies. Extend surface finishes to protect ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping and ductwork. Keep insulation dry during the application of the finish. Bevel and seal the edges of exposed insulation.
- C. Unless otherwise indicated, do not insulate the following:
 - 1. Factory pre-insulated flexible ductwork.
 - 2. Factory pre-insulated ductwork, plenums, casings, mixing boxes, and filter boxes.
 - 3. Chrome plated pipes and fire protection pipes.
 - 4. Vibration isolating connections
 - 5. Adjacent insulation
 - 6. ASME stamps, nameplates, access plates
 - 7. Ductwork exposed to view in a normally occupied space.
 - 8. Hydronic specialties: Low water cutoff, relief valves, relief valve discharge piping, pressure reducing valves, and expansion tanks.
 - 9. Unions and flanges at equipment required for frequent service.

3.3 PIPING INSULATION

- A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than

- 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Exposed fiberglass shall be coated with vapor barrier coating.
- B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory pre-molded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.
 - C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.
 - D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.
 - E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.
 - F. PVC or Metal Jackets: Provide over insulation where subject to abuse. Machine cut jacket to smooth edge of circumferential joints. Overlap metal jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by insulation manufacturer for weatherproofing. Solvent weld PVC jacket system to provide continuous watertight seal.

3.4 DUCT INSULATION

- A. Rigid Insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on centers and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Each pin or anchor shall be capable of supporting a 20-pound load. Cut off protruding ends of pins. After installing washers, provide foil-scrim-kraft (FSK) tape to seal break in vapor barrier, tape shall extend 1" minimum around pin. Apply insulation with joints tightly butted. Bevel insulation around name plates and access plates and doors. Seal joints with FSK tape. Provide additional adhesive or staples to assist tape adhesion in difficult applications.
- B. Flexible Blanket Insulation: Apply insulation with joints tightly butted. Staple laps of jacket with outward clinching staples and seal with foil scrim kraft (FSK) tape. Sagging of flexible duct insulation shall not be permitted. For ductwork over 24-inches wide on horizontal duct runs, provide pins, washers and clips. Install speed washers with pins and pin trimmed to washer. Cut off protruding ends of pins after clips are secured. Seal with FSK tape, extend tape 1" minimum around pin. Use pins on sides of vertical ductwork being insulated. Space pins and clips on 18 inch centers and not more than 18 inches from duct corners. Carry insulation over standing seams and trapeze-type hangers.

3.5 EQUIPMENT INSULATION

- A. General Procedures: Apply equipment insulation suitable for temperature and service to fit as closely as possible to equipment. Join sections of insulation with adhesive. Bevel insulation around name plates, ASME Stamp, and access plates. For insulation on equipment that must be opened periodically for inspection, cleaning, or repair, construct insulation to be removable and replaceable without damage. Provide vapor barrier seal at joints and seams for "cold" equipment.
- B. Heating Equipment: Provide semi-rigid mineral fiber board insulation. Seal longitudinal and lateral seams with FSK tape. Bond cuts, ends, and mitered sections with adhesive. Provide a vinyl-acrylic mastic coating on exposed fiberglass ends.
- C. Cold Equipment: Provide flexible unicellular sheet insulation, bond cuts, butt joints, longitudinal joints and ends with vapor barrier adhesive. Vapor seal exposed edges to equipment.

3.6 INSULATION APPLICATION SCHEDULE

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
PIPING:		
Domestic Cold Water Piping		
1" and smaller	1/2"	Fiberglass w/ASJ or Flexible Unicellular
1-1/4" and larger	1"	Fiberglass w/ASJ or Flexible Unicellular
Domestic Hot Water Piping and Domestic Hot Water Recirculation Piping 2" and smaller	1"	Fiberglass w/ASJ or Flexible Unicellular
Domestic Water Branch Piping Less than 10 ft in Stud Walls	1/2"	Fiberglass w/ASJ or Flexible Unicellular
Water and Drain Piping Under Handicap Accessible Fixtures		Insulation Kit
Hot Water Heating Supply and Return Piping	1-1/2"	Fiberglass w/ASJ
Hot Water Heating Supply and Return Branch Piping Less than 10 ft in Stud Walls	1"	Fiberglass w/ASJ
PEX Tubing	1"	Flexible Unicellular
Condensate Drain Piping	1/2"	Flexible Unicellular
DUCTWORK:		
Exhaust Ductwork from a point three (3) feet interior of the motorized control damper or backdraft damper to the exterior wall, roof, or louver.	3" 3"	Ductwrap, FSK (Round) Ductboard, FSK (Rectangular)

EQUIPMENT:

Water Meter	1/2"	Flexible Unicellular
Backflow Preventer	1/2"	Flexible Unicellular
Heating System Air Separators	1-1/2"	Fiberglass, ASJ
Flexible Connectors, Valves, etc.	1/2"	Flexible Unicellular

3.7 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

* END OF SECTION *

SECTION 23 09 00

AUTOMATIC TEMPERATURE CONTROLS

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the automatic temperature control system indicated. The system shall be a direct digital control (DDC) system with touch screen human interface panel to provide the sequences as described in these specifications. The ATC system shall be complete with required components including, low voltage and line voltage wiring and conduit and shall be compatible with any existing controls that remain in service. Wiring shall be in accordance with Division 16 of the specifications and NFPA 70, National Electrical Code.
- B. The automatic temperature controls system shall be provided and installed by trained control mechanics regularly employed in the installation and calibration of ATC equipment by the manufacturer of such equipment. Control installation by any Contractor whose principle business is not direct manufacture and installation is prohibited.
- C. **DEDUCT ALTERNATE #4:** Replace DDC control system with electric / electronic. Note: A partial DDC system may be required if solar pre-heat system is installed due to the "solar monitoring" requirements.

1.2 ACCEPTABLE MANUFACTURERS

- A. Honeywell, Inc.
- B. Siebe / Invensys, Maine Controls.
- C. Siemens
- D. Johnson Controls

1.3 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" and Section 26 00 00 "Electrical" are hereby made a part of the work of this section.

1.4 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00 relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the shop drawings paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, controller gains, differentials, operating ranges, normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.
 - 2. Sequence of operation for each system and function.

3. Generic, functional description of each control component indicated.
4. Equipment interlocks required by sequence of operation.
5. Automatic valve schedule showing flow, Cv, and pressure drop.
6. Manufacturer's Data:
 - a. Dampers, valves and operators.
 - b. Controllers, including wiring and connection diagrams.
 - c. Thermostats, temperature sensors, including wiring and connection diagrams.
 - d. Temperature and pressure indicators.
 - e. Pressure sensors, including wiring and connection diagrams.
 - f. Switches, relays, transmitters, transformers, including wiring and connection diagrams.
7. Operator's interface terminal.

2 PART 2 PRODUCTS

2.1 CONTROL PANELS

- A. In general, relays, transformers, or other control devices (not including room thermostats or duct-mounted instruments) shall be grouped and mounted in a factory-built cabinet enclosure.

2.2 AUTOMATIC CONTROL DAMPERS

- A. Automatic dampers not furnished with equipment shall be furnished under this paragraph. Automatic dampers shall be constructed and installed in accordance with the following specifications:
 1. Damper Blades: All automatic dampers, including dampers for static pressure control, shall be of the balanced type, factory-fabricated, with fully gasketed galvanized steel airfoil blades, mounted in welded frames. Damper blades shall be not more than 8 inches wide, shall have interlocking edges, edge and jamb seals and be capable of operation against 4" static pressure differential. Dampers shall be Arrow "Arrow-Foil" Model PBDAF-206, OBDAF-207, Ruskin Model CD-60 or Tamco Series 1000.
 2. Modulating Dampers: All modulating dampers shall be of the opposed blade type.
 3. Damper Size and Bearings: Damper blades shall have steel trunnions mounted in oil-impregnated bearings. Dampers shall be not more than 48 inches in length between bearings.
 4. Frames: Damper frames shall be of welded channel or angle-iron, with heavy steel corner gussets and braces or stiffened with steel tie-rods where necessary. Frames shall be painted with aluminum paint to prevent rusting.
 5. Dampers shall be guaranteed to close tightly, and shall provide substantially the full area of the opening when open. All outdoor air intakes and all exhaust ducts to outside and all fresh air, return air and exhaust air dampers in systems shall have damper blades with inflatable seals or other devices to guarantee low leakage, not to exceed 4 CFM/SF at 1 in. WG pressure differential.
 6. Damper Linkages: Damper-operating links shall be cadmium plated steel or brass rods, adjustable in length with ball and socket joints and of such proportions that they will

withstand, without appreciable deflection, a load equal to not less than twice the maximum operating force of the damper motor. Linkages shall be concealed in the frame.

- B. Damper Actuators: For each automatically controlled damper, a suitable damper actuator or actuators shall be provided in accordance with the following specifications:
 - 1. Actuator: Damper actuators shall be electronic, direct-coupled, spring-return type and have a rating of not less than twice the torque needed for actual operation of the damper.
 - 2. Adjustments: Provide adjustable stops for the open and closed positions.
 - 3. Mounting: Damper actuators shall be direct-coupled over the shaft. The damper actuators and mounting base shall not be mounted directly on cold or insulated ducts and casings, but shall be mounted outside the insulated covering in such a manner as to prevent sweating and interference with the insulation.
 - 4. Where indicated, damper actuators shall be provided with an auxiliary switch rated at 120 V AC, and accept a 4 to 20 ma input.

2.3 AUTOMATIC CONTROL VALVES (HOT WATER, 250°F MAX.)

- A. Valves shall have removable composition discs with monel stem. Bodies two inches or smaller shall be bronze with screwed ends. Bodies 2-1/2 inches and larger shall be cast-iron with flanged ends. Valve bodies, trim and stuffing boxes shall be designed for not less than 125 psi working pressure. Valve packing shall be non-lubricated teflon packing suitable for hot water service, as required.
- B. Modulating valves shall be sized for maximum pressure drop of 1.5 to 4.0 psi.
- C. Automatic control valve differential shut-off pressure shall be a minimum of 35 psig.
- D. Heating valves shall fail to the "normally-open" position with a manual override switch..
- E. Valves shall have a clearly marked position indicator as part of the operating linkage.
- F. Actuator: Shall be electronic, direct-coupled, spring-return type and have a rating of not less than twice the torque needed for actual operation of the valve.

2.4 TEMPERATURE SENSORS

- A. Temperature Sensors: RTD Elements, accuracy of $\pm 0.1\%$ at 70°F, sensors shall be securely attached to a single gang electrical box or other suitable base, securely mounted on the wall or other building surface. Each sensor shall be located where shown or, if not shown, where it will respond to the average temperature in the room. Sensors, generally, shall be mounted 48 inches above the floor within ADA reach guidelines, and shall not be mounted on outside walls if other locations are possible. If located on an outside wall, it shall have an insulated base. Sensors shall have adjustment devices, by means of which the operating points can be adjusted through a range of not less than 10 degrees above and below the operating points specified.
- B. Room temperature sensors shall be similar to Honeywell T8775 Digital Round, with "twist" setpoint adjustment and LCD display for temperature and setpoint status.
- C. No devices containing mercury are permitted.

2.5 OPERATOR INTERFACE PANEL

- A. Operator Interface Panel shall be a wall mounted interface panel by Honeywell or equal. Each screen shall be capable of displaying and changing all controlled variables. The terminal shall be capable of displaying the system point name (up to 30 characters), current value, priority and status. It shall trend and display alarms. The display shall be an LCD screen displaying a minimum 40 character per line and 2 lines. The terminal shall include an integral alphanumeric keypad.
 - 1. Locate in Mechanical room or as indicated on drawings.
 - 2. System shall be dial-in (or web access) and trending capable.

2.6 VARIABLE FREQUENCY DRIVES

- A. Unless specified and furnished with packaged equipment under other sections of the specifications (Section 23 00 00), variable frequency drives shall be furnished and installed under this section. Drives shall be Toshiba, Square D or Danfoss, 208 volt, 60 Hz., 3 phase, have microprocessor based adjustment of three phase motor, utilize a vector torque control strategy to regulate motor flux to optimize motor torque without the need for encoders. Drives requiring voltage, dwell and current adjustments to achieve improved torque control are not acceptable. The controller shall be rated to control the scheduled fans / pumps.
- B. The drives shall be pulse width modulated design converting the utility input voltage and frequency to a variable voltage and frequency output via a two step operation. Insulated gate bipolar transistors shall be used in the inverter section.
- C. The drives shall have an efficiency that exceeds 97% at 100% speed and load. The efficiency shall exceed 80% at 50% speed and load. The drive shall maintain the line side displacement power factor no less than 0.95 regardless of speed and load. The drives shall have a one minute overload current rating of 110% and shall be capable of operating NEMA B induction motor.
- D. The drives shall limit harmonic distortion level as defined by IEEE 519 for general system applications. Harmonic attenuation shall be provided by the addition of drive line reactance. Harmonic calculations shall be provided upon request and shall be calculated based on the kVA capacity, X/R and impedance of the transformer supplying the drive.
- E. The drives shall be capable of operating into a spinning motor and shall be capable of determining motor speed and direction and resume operation without tripping.
- F. Operating conditions shall be:
 - 1. Incoming Power: 208 volt, three phase, 60 Hz.
 - 2. Frequency stability of +0.5% for 24 hours with voltage regulation of +2.0% of maximum rated output voltage.
 - 3. Motor slip dependent speed regulation of 1.0%.
 - 4. Five cycle carry over during utility loss.
 - 5. Temperature range 32 - 105°F. Humidity range 0 - 95%.
- G. Drive control function shall be adjustable from a digital operator keypad located on the front of the drive. Drive parameters shall include the following: Programmable keypad speed and start command; forward or reverse start; stop and digital speed control; maximum and minimum

frequency limits; two acceleration and deceleration times; critical frequency avoidance lockout zones; electronic overload and torque limit; multiple attempt restart; jog and preset speeds; spinning motor functions; two digital output relays; analog output relay; DC injection braking time; programmable PI process control; digital potentiometer.

- H. The drives shall have the following system interfaces:
 - 1. Inputs: Process control speed reference interface to receive either a 0-10 Vdc; 4-20 mAdc or speed potentiometer signal; remote mode start and stop contacts; remote forward and reverse contacts; remote preset speed contacts; remote external stop contact; remote reset contact; remote jog contact.
 - 2. Outputs: Two programmable digital relays N.O. contact; Form C contact to indicate protective function trip; two programmable analog output signals.
 - 3. Provide a LonWorks interface card for each drive.
- I. Drives shall have a two line sixteen character each display indicating output current, output frequency, motor RPM, output voltage, power, load, elapsed time, cause of trip.
- J. The drives shall contain the following protection functions; over current, over/under voltage, over frequency, phase loss, over temperature, ground fault and short circuit.
- K. Drives shall have a 3 year warranty (parts and labor) and be started up by a factory-authorized technician. Drive enclosures shall be NEMA 1 rated.
- L. Provide one drive for each main heating circulator pump (CP-3 & CP-4).

2.7 SEQUENCE OF CONTROL

- A. Provide and install electronic/electric DDC components to enable the mechanical system to operate in the following sequences:
 - 1. Hot Water Reset: The main heating loop supply temperature shall be reset based on outside air temperatures (adjustable). The minimum supply temperature shall be 110°F at 60°F outside air temperature. The maximum supply temperature shall be 190°F at 10°F outside air temperature.
 - 2. Main Heating Hot Water Circulators (CP-3 & CP-4): Operate Lead/Lag - if lead circulator fails the Lag circulator shall run. The lead-lag pumps shall be automatically alternated based on runtime. At outside air temperatures above 65°F, CP-3 and CP-4 shall be de-energized. The pumps shall operate again when the outside air temperature drops below 65°F. Once the pumps start they shall operate continuously to maintain a constant differential pressure at the location indicated on the drawings by proportioning the variable frequency drive controlling each pump.
 - 3. Secondary Heating Hot Water Circulators (CP-1A & CP-2A) and Boilers (B-1 & B-2): Operate Lead/Lag – On a call for heat Lead pump & boiler shall be energized. Boilers shall be interlocked with its respective pump through a flow switch. Once flow is proven, the Lead boiler shall modulate to satisfy the hot water supply setpoint. The Lag pump & boiler shall sequence on in the same manner until the hot water supply setpoint is satisfied. A time delay shall keep the pumps operating for approximately one (1) minute after the respective boiler stops firing with a minimum of one (1) minute of pump and burner runtime per cycle (adjustable). The Lead and Lag pumps and boilers shall be alternated based on runtime. During periods where there is no call for heat, the boilers shall remain off.

4. Domestic Hot Water Pumps (CP-1B & CP-2B): Shall be cycled from immersion temperature sensors located in the domestic hot water tanks. On a call for domestic heating, the respective boiler pump (CP-1A or CP-2A) shall be de-energized to give priority to the domestic water heating.
5. Fintube Radiation (V-1): The zone valve shall cycle as required to satisfy the zone sensor.
6. Hot Water Recirculation Pump (CP-5): The pump shall operate based on a pipe mounted aquastat, on at 105°F and off at 115°F.
7. Exhaust Fan (EF-1): Shall operate continuously at a minimum speed and automatically switch to high speed based on motion sensor. The fan shall continue to operate at high speed for 5 minutes (adj.) post occupancy.
8. Exhaust Fan (EF-2): Shall be operated by a wall mounted switch.
9. Exhaust Fans (EF-3 & EF-4): Shall operate continuously.
10. Booster Fan (BF-1): Shall be electrically interlocked with dryer.
11. Kitchen Exhaust Fan (KF-1): Shall be operated by a wall mounted switch.
12. Mechanical Room Ventilation (SF-1 & MOD):
 - a. At outside air temperatures 40°F and above: On a call for cooling from the zone sensor, the motorized dampers shall open and the fan shall be energized.
 - b. At outside air temperatures below 40°F: On a call for cooling from the zone sensor, the motorized dampers shall open. The supply fan shall be locked out.
13. Wall Heaters (WH-1): The zone valve shall open and the fan shall operate (subject to a pipe mounted aquastat) to satisfy the zone sensor.
14. Unit Heaters (UH) & Cabinet Unit Heaters (CUH): The fan shall operate (subject to a pipe mounted aquastat) to satisfy the zone sensor.
15. Energy Recovery Ventilator / Duct Coils (ERV-1 / HC-1, ERV-2 / HC-2, ERV-3 / HC-3):
 - a. Fans: Motorized dampers shall be open and the supply and exhaust fans shall operate continuously.
 - b. Enthalpy Wheel: Shall operate continuously. The wheel speed shall cycle to maintain a discharge air temperature of 65°F, adjustable.
 - c. Heating: 3-way valve (V-2) shall modulate to maintain a discharge air temperature of 65°F, adjustable.
 - d. Freeze Protection: A manual reset freezestat serpentine across the coil shall de-energize the fans, close the outside air and exhaust air dampers and the 3-way valve (V-2) shall modulate to full coil heat if the coil discharge air drops below 45°F.
 - e. Motorized Dampers: Outside air and exhaust air dampers shall close upon unit shutdown.
 - f. Leaving Water Temperature Sensor: Shall modulate the 3-way valve (V-2) to full coil heat if the heating coil leaving water temperature drops below 45°F.

16. Solar Domestic Hot Water Monitoring: A btu output reading from the solar domestic water pre-heat system controller (see Section 220000) shall be tallied and the total btu output from the system shall be emailed to Maine State Housing Authority (MSHA) on a daily basis. Coordinate the required email address with the MSHA field representative.
17. Solar Preheat Recirculation Pump (CP-6): At solar pre-heat tank temperatures above 130°F, CP-6 shall be enabled.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that the automatic temperature control and system may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.2 INSTALLATION

- A. Provide wiring, and conduit to connect the ATC components for an operational ATC system. Wiring and installation shall conform to NFPA 70.
- B. Identification: Label or code each field wire at each end. Permanently label or code each point of field terminal strips to show the instrument or item served. Color-coded cable with annotated cable diagrams may be used to accomplish cable identification.
- C. Temperature Sensors: Stabilize sensors to permit on-the-job installation that will require minimum field adjustment or calibration. Temperature sensor assemblies shall be readily accessible and adaptable to each type of application to allow quick, easy replacement and servicing without special tools or skills. Strap-on sensor mountings, using helical screw stainless steel clamps, shall be permitted on new piping for unit heater or other on-off operation only, after pipe is cleaned to bright metal. Strap-on bulb and pipe shall be insulated after installation. Strap-on sensor mountings are also permitted for hot water piping sizes up to 2 inches. Other liquid temperature sensors shall be provided with wells.
- D. Duct Sensors: Provide sensors in ductwork; specific location within duct shall be selected to accurately sense air properties. Do not locate sensors in dead air spaces or positions obstructed by ducts or equipment. Installation shall be within the vibration and velocity limits of the sensing element. Where an extended surface element is required to sense the average or lowest air temperature, position and securely mount sensor within duct in accordance with sensor manufacturer's recommendations. Temperature sensing elements shall be thermally isolated from brackets and supports. Provide separate duct flange for each sensing element; securely seal ducts where elements or connections penetrate duct. Seal penetrations of duct insulation vapor barrier with vapor barrier coating compound to provide a vapor-tight covering. Mount sensor enclosures to allow easy removal and servicing without disturbance or removal of duct insulation or vapor barrier. On downstream side of each sensor, provide access doors.
- E. Pipe Sensors: Provide wells for sensors measuring temperatures in pressure vessels or in pipes. Wells shall be noncorrosive to the medium being measured and shall have sufficient physical strength to withstand the working and test pressures and velocities. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in the piping at elbows to effect proper flow across the entire area of the well. Wells may either look upstream or downstream. Provide thermal transmission material within the well to speed the response of temperature

measurement. Provide wells with sealing nuts to contain the thermal transmission material and allow for easy removal. Wells shall not restrict flow area to less than 70 percent of line-size-pipe normal flow area. Increase piping size as required to avoid restriction.

3.3 ADJUSTMENTS

- A. Adjust controls and equipment to maintain the conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

3.4 INSTRUCTING OPERATING PERSONNEL

- A. Upon completion of the work and when designated by the Architect, furnish the services of a competent technician regularly employed by the temperature control manufacturer for the instruction of Owner in the operation and maintenance of each automatic space temperature control system. The period of instruction shall be for not less than one 4 hour period and shall include video tape demonstration of controllers.

3.5 FIELD INSPECTION AND TESTS

- A. Tests shall be performed or supervised by employees of the ATC system or manufacturer of the ATC system, or by an authorized representative of the ATC manufacturer. Give Architect 14 calendar days advance written notice prior to the date of the field acceptance testing. If the Architect witnesses tests, such tests shall be subject to approval. If the Architect does not witness tests, provide performance certification.
- B. Plan for Inspections and Tests: Furnish a written inspections and tests plan at least 60 days prior to the field acceptance test date. This plan shall be developed by the manufacturer of the ATC system. The plan shall delineate the inspections and testing procedures required for the ATC system to demonstrate compliance with the requirements specified. Additionally, the test plan shall indicate how ATC system is to be tested, what variables will be monitored during test, names of individuals performing tests, and what criteria for acceptance should be used. Indicate how operation of H&V system and ATC system in each seasonal condition will be simulated.
- C. Field Acceptance Testing: Upon completion of 72 hours of continuous H&V and ATC systems operation and before final acceptance of work, test the automatic temperature control systems in service with the heating, ventilating and air conditioning systems to demonstrate compliance with contract requirements. Test controls through each cycle of operation, including simulation of each season insofar as possible. Test safety controls to demonstrate performance of required function. Adjust or repair defective or malfunctioning automatic space temperature control equipment or replace with new equipment. Repeat tests to demonstrate compliance with contract requirements.

* END OF SECTION *

SECTION 23 30 00

DUCTWORK AND ACCESSORIES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.

1.2 DESCRIPTION OF WORK

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the ductwork systems indicated.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
1. Ductwork.
 2. Ductwork accessories.
 3. Air devices.
 4. Firestopping materials and methods.
 5. Louvers, brick vents and dampers.
 6. Ductwork sealing products.

2 PART 2 PRODUCTS

2.1 DUCTWORK

- A. Classification of Ductwork: Low pressure ductwork: up to 2" W.G. static pressure.
- B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.
- C. Construction for Low Pressure Round and Rectangular Ductwork:
1. Material: Galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq. ft. of a sheet. Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class.
 2. Fittings: Shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY).
 3. Longitudinal joints shall be Pittsburgh lockseam (ONLY). Button punch snap locks are not acceptable.

4. Joints shall be sealed to SMACNA seal class B.

2.2 DUCTWORK ACCESSORIES

- A. Access Doors: Ruskin Model ADC2, 12"x12" size, 24 gauge galvanized steel, steel on both sides of door, foam gasket seals, 1" insulation, 2 cam locks, no hinge.
- B. Counter Balanced Dampers (CBD): Aluminum frame and blades, extruded vinyl edge seals, 2-1/4" deep, set 0.06" WG.
- C. Backdraft Dampers (BDD): Ruskin Model CBD2 or American Warming and Ventilating aluminum frame and blades, extruded vinyl edge seals, field set at 0.10" W.G. pressure differential for full open operation.
- D. Fire Dampers: Greenheck FD-series, Ruskin Model IBD2, or Cesco, curtain type, 100% free area (ONLY), Style C for round duct installations, and Style B for rectangular duct applications. Fire dampers located immediately behind transfer grilles may be Style A dampers. The dampers shall be UL rated for 1-1/2 hours and have a 165°F fusible link. Fire dampers shall comply with UL "Standard for Safety" 555.
- E. Flexible Duct Connections: Ventfabrics, Inc. neoprene coated glass fabric.
- F. Drawbands for Flexible Ducts: Clinch type stainless steel with screwdriver adjustment, or nylon with lever action tightening tool provided by the drawband manufacturer.
- G. Turning Vanes: (Low Pressure):
 1. Solid blade, mounted with the long edge down stream in accordance with duct construction details indicated. Submit a 12"x12" sample elbow for review prior to fabrication.
- H. Volume Dampers:
 1. Factory fabricated as specified, or shop fabricated in accordance with SMACNA "HVAC Duct Construction Standards".
 2. Rectangular: Ruskin Model MD-35, or American Warming and Ventilating, 12 gauge galvanized steel, locking quadrant, opposed blade over 11", single blade 11" and under.
 3. Round: Ruskin Model MDRS25, or American Warming and Ventilating, 20 gauge galvanized steel with locking quadrant(ONLY). Dampers may be provided integral with spin-in fittings.
- I. Flexible Ductwork:
 1. Low Pressure Duct Systems: Wiremold type WGCF, polyester core with wire helix, 2" thick (R-6 min.), 3/4 lb fiberglass insulation, polyolefin jacket/vapor barrier, 2" W.G. rated pressure.
- J. Joint Sealer:
 1. Hardcast Two-Part II DT tape with RTA-50 indoor/outdoor activator.
 2. Hardcast Duct-Seal 321 water based indoor/outdoor sealant.

- K. Louvers (L): Ruskin Model ELF6375DX, Greenheck, or American Warming and Ventilating. Extruded aluminum construction, 0.081" thick, aluminum extrusions, drainable blade, 1/2" expanded metal bird screen, size and performance as scheduled. AMCA certified leakage rate shall be a maximum of 0.02 ounces of water per square foot of free area at 1000 FPM free area velocity. Provide Kynar 500 finish, color selected by Architect. Provide frame styles compatible with building construction, see architectural details. Provide concealed architectural or standard visible mullions in multi-panel louver assemblies as indicated on the drawings. Inactive / blanked-off louvers shall have a double wall sheetmetal closure on the interior face of the louver. The closure shall have a 2" thickness of 1.5 pcf rigid fiberglass board insulation with a foil face. Both sides of the sheetmetal shall be painted flat black.
- L. Acoustical duct liner for rectangular ductwork shall be Type AP Armaflex SA duct liner. The liner shall be elastomeric unicellular (closed cell) and have a thermal conductivity of 0.27 Btuh/°F.-sf-in. and be cleanable and suitable for duct velocities of 4000 FPM. Duct liner thickness shall be 1" unless indicated otherwise. The installation shall include 100% coverage of the manufacturer's recommended adhesive and protective Z-strips at all exposed upstream edges. Mechanical fasteners shall be used in addition to adhesive. Insulation shall comply with NFPA 90A and NFPA 90B and be approved by Factory Mutual. Duct dimension are net inside of liner.
- M. Brick Vents (BV): Ruskin Model BV100, Greenheck, or American Warming and Ventilating. Extruded aluminum construction, 0.100" thick, extruded aluminum.

2.3 AIR DEVICES (Krueger, Price, Metal Aire, Titus) ONLY

- A. Material and Finishes: Construct diffusers, registers, and grilles of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Steel parts shall be factory zinc-phosphate treated prior to priming and painting or have a baked-on enamel finish. Aluminum parts shall be finish painted. Provide frame style compatible with ceiling or wall type. Colors shall be selected by Architect. Devices to be installed on exposed duct installations shall be furnished in primer suitable for field application of color coat.
- B. Sound Pressure Level: Manufacturer certified sound pressure level rating of inlets and outlets in accordance with ADC 1062 R4. Conform with the permissible room sound pressure level for each device as scheduled.
- C. Throw: Defined as distance from the diffuser, register, or grille to the point which the resultant room air velocity is 50 to 35 feet per minute.
- D. Ceiling Diffusers: Equip with core styles required to provide air distribution pattern indicated. Internal parts shall be removable through the diffuser-neck for access to the duct and without the use of special tools. Construct each diffuser of four or more concentric elements designed to deliver air in a generally horizontal direction. The interior elements of square and rectangular ceiling diffusers may be square or rectangular as manufacturer's standard. Screws or bolts in exposed face of frames or core elements are not acceptable. Diffusers shall have an opposed blade volume damper in the diffuser neck. Diffusers shall have a 24"x24" lay-in panel for areas with acoustical ceilings and surface-mount frame for GWB ceilings.
- E. Grilles and Registers: Construction and finish as indicated, 1/2" louver spacing, 45° curved blade. Registers shall have opposed-blade volume dampers with screwdriver adjuster. Unless otherwise indicated, registers shall be provided.
- F. General: The interior of all sheetmetal connections to grilles, registers and diffusers shall be painted with a non-specular flat black paint so that no sheetmetal surfaces are visible from the finished space.

3 PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that the duct systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF DUCTWORK AND AIR DEVICES

- A. Provide and erect in accordance with the best practice of the trade ductwork shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place ductwork in proper position to avoid conflicts with other work and to allow the application of insulation and finish painting to the satisfaction of the Architect. Sizes given are "inside - clear" dimensions and not necessarily that of sheet metal. Ducts shall be arranged to adjust to "field conditions". The Sheet Metal trades shall coordinate his work with other trades. Work shall conform to ASHRAE duct construction recommendations, SMACNA "Duct Construction Standards", NFPA, and the requirements of IBC.
- B. Joint Sealing: See PRODUCTS section.
- C. Longitudinal joints: See PRODUCTS section.
- D. Turns shall be made with long radius elbows or, if physically impossible to use long radius elbows, shall be square turns with specified turning vanes. CAUTION: Turns not conforming to this requirement shall be ordered removed and replaced with properly built turns.
- E. Access Doors: Provide access doors for concealed apparatus requiring service and inspection in the duct system including but not limited to dampers, sensors and motors, and upstream and downstream from duct coils.
- F. Duct Sleeves and Prepared Openings: Install duct sleeves and prepared openings for duct mains, duct branches, and ducts passing through walls, roofs, and ceilings. Insure the proper size and location of sleeves and prepared openings. Allow one-inch clearance between duct and sleeve or one-inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
- G. Duct Supports: Unless otherwise indicated, provide one-inch wide by 16 gage galvanized steel sheet metal strips on each side of ducts. Anchor risers in the center of the vertical run to allow ends or riser free vertical movements. Attach supports only to structural framing members. Do not anchor supports to metal decking unless a means is provided (architectural review required) for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
- H. Flexible Collars and Connections: Provide flexible collars between fans and ducts or casings and where ducts are of dissimilar metals, as indicated or required. For round ducts, securely fasten flexible connections using stainless steel clinch-type draw-band. Nylon drawbands may be used if installed using the drawband manufacturer's lever-action tightening tool. For rectangular ducts, lock flexible connections to metal collars.

- I. Flexible Ducts: Provide where indicated. No fiberglass shall be in contact with air flow. Flexible duct length shall not be more than 4'-0". Install with metal band hangers and without excess length, provide maximum extension of flex duct. Securely fasten flexible ducts to metal collars using a stainless steel or tool-tightened nylon drawband on the duct core and a second drawband on the insulation vapor barrier. If the duct exceeds 12 inches diameter, position the drawband behind a bead on the metal collar. Taping in lieu of drawbands is not allowed.
- J. Any deviation in the duct system must be submitted as a shop drawing and stamped. CAUTION: Any deviation not submitted and favorably reviewed will be ordered removed from the system and replaced with that which is shown on the Drawings.
- K. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.
- L. Field Changes to Ductwork: Field changes of ducts such as those required to suit the sizes of factory-fabricated equipment actually furnished shall be designed to minimize expansion and contraction. Use 4:1 transitions in field changes as well as modifications to connecting ducts.
- M. Transitions with a slope greater than 4 to 1 shall be ordered removed from the system and replaced with a transition which meets this criteria.
- N. Joints and seams at intake and exhaust plenums and joints on intake and exhaust ductwork for a distance of 3 feet from the plenum shall be sealed watertight on the bottom and side joints and seams.
- O. Isolation dampers at intake and exhaust louvers and vent hoods shall be sealed to the ductwork to provide an airtight assembly with similar performance characteristics to the isolation damper.
- P. Ductwork serving clothes dryers shall not have sheetmetal screws. All joints shall be taped with VentureTape 3520CW, 2.0-mil annealed aluminum foil tape with solvent acrylic pressure sensitive adhesive, UL 723 listed.

3.3 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.4 TEST AND ADJUST

- A. Before operating any system, the system shall be cleaned out to remove dust and foreign materials.
- B. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- C. Correct defects which develop during the test period, conduct additional testing until defect free operation is achieved.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Ductwork and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to duct systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces.

3.6 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.7 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

Part II
Division 26
Electrical

SECTION 26 00 00

ELECTRICAL

1 PART 1 GENERAL

1.1 SCOPE

A. The work covered by this section includes the furnishing of labor and materials, equipment, and incidentals and the performing of operations in connection with "electrical work" as indicated on the drawings and/or specified herein and including incidental items to effect a finished, complete and operable system as indicated. The electrical work shall include but not be limited to:

1. Perform all electrical work in accordance with requirements of 2008 NEC.
2. Provide new wiring for lights and receptacles as indicated. All new wiring to be minimum 12 ga. copper.
3. Provide new wiring for new heating system equipment and controls as required.
4. Provide new GFCI protection for receptacles in all bathrooms and kitchens in accordance with 2008 NEC.
5. Provide new AFCI protection for receptacles in all bedrooms in accordance with 2008 NEC.
6. Provide new tamper resistant receptacles in dwelling units in accordance with 2008 NEC.
7. Provide complete new Addressable fire alarm system. Provide complete smoke detector coverage in apartment and egress paths per NFPA 72 and City of Portland ordinances. Provide audio/visual alarms in all units per NFPA 72 and City of Portland ordinances. Provide tamper and flow switched on sprinkler systems and pulls stations per NFPA 72. Provide
8. Provide system connected Co2 detection in all apartments near sleeping areas.
9. Provide new light fixtures in corridors and common areas as indicated on the architectural plans.
10. Provide new light fixture inside apartments as indicated on the architectural plans.
11. Replace exposed CATV/Tel cable with new concealed CATV and Tel cable and jacks in all units.
12. Provide power and new fire alarm devices for new elevator on (Shailer only)
13. Provide new electrical work associated with new community rooms in basements per architectural drawings.
14. Clean up abandon electrical equipment and associated wiring in basement areas.
15. New exterior lighting indicated on the drawings.

Work shall be subject to the conditions of the contract and shall be in strict accordance with these plans and specifications.

- B. Before submitting his bid, the Electrical Contractor is required to visit the site and survey the conditions likely to be encountered in the performance of the electrical work. Failure to familiarize himself with said conditions shall not relieve the Contractor of responsibility for full completion of the work in accordance with the provisions of the Contract.
- C. The term "Contractor used hereinafter shall designate the Electrical Contractor.

- D. Any questions regarding this specification or the Electrical Drawings must be addressed in writing to the Architect before bids close; after close of bids, the Architect's interpretation of the meaning and intent of the specifications and drawings shall be made according to the provisions of the General Conditions.

1.2 RELATED DOCUMENTS

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work.

1.3 CODES AND STANDARDS

- A. Where referred to, published standard specifications of technical societies, trade associations and governmental agencies codes and regulations of Underwriters and protective organizations, Federal, State and Municipal regulations and codes and publications of a similar nature shall be the edition current as of the date of this Specification.
- B. The applicable requirements of the publications of the following organizations shall apply to the work under this section as if fully written herein:
 - 1. American National Standards Institute, Inc. (ANSI)
 - 2. National Electrical Manufacturers Associations (NEMA)
 - 3. National Fire Codes (NFPA)
 - 4. Underwriters Laboratories, Inc. (UL)
 - 5. Federal, State and Municipal Building Codes, and all other Authorities having jurisdiction.
 - 6. National Electrical Code (NEC)
 - 7. Americans with Disabilities Act (ADA)
 - 8. Occupational Safety and Health Administration (OSHA)

1.4 MATERIALS AND EQUIPMENT

- A. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- B. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- C. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically noted otherwise. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

1.5 SHOP DRAWINGS

- A. Submit to the Architect for approval not less than eight (8) sets of Shop Drawings of the materials, fixtures and equipment to be incorporated in the work. Information shall contain specific reference to catalog numbers and shall be qualified in writing as required. No considerations will be given to brochure or catalog information not specifically designated or referenced to the specification by an identifying number.

- B. Shop drawings that are facsimiled, (FAX) produced, or photocopies of FAX documents will not be considered or reviewed. Only originals and or photocopied originals, complying with paragraph A above will be considered.
- C. Before consideration, electrical submittal packages shall include cover pages for each of the electrical equipment groups, i.e. loadcenters, lighting, fire alarm, devices, emergency call system, apartment intercom/security system.
- D. Shop drawings must bear the Architect's review stamp. In the event that the Architect rejects shop drawings, the shop drawing must be revised and resubmitted for review.

1.6 SUBSTITUTIONS

- A. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Architect is first obtained.

1.7 CODES, PERMITS, INSPECTIONS

- A. The installation shall comply with laws and regulations applying to the electrical installation in effect at the site with regulations of any other governmental body of agency having jurisdiction, and with regulations of the National Electrical Code (NEC).
- B. Obtain and pay for permits required by the ordinances at the site. After completion of the work, furnish the Owner a certificate of final inspection and approval from the Inspection Bureau having jurisdiction.
- C. Inspections and tests shall be made in accordance with the requirements of Division One. Rejected materials shall be removed from the site and new materials furnished, retested and installed to the satisfaction of the Architect without additional cost to the Owner.
- D. Arrange for periodic inspections by the local Electrical Inspector during construction.

1.8 TEMPORARY LIGHT AND POWER

- A. Temporary light and power shall be installed and maintained by the Electrical Contractor for use by all trades for the duration of construction complete with all wiring, switches, protective devices and similar equipment as may be required. Arrangement for the temporary service with the Power Company is the responsibility of the Electrical Contractor. Power bills will be paid by the General Contractor.

1.9 ACCEPTANCE

- A. Before acceptance of the work under this section, damaged or imperfect materials shall be refinished or replaced, debris, scaffolding and tools shall be removed and premises shall be "broom clean" to the satisfaction of the Owner.

1.10 GUARANTEE

- A. This contractor shall guarantee materials and installations under normal use to be free of defects and poor workmanship for a period of one (1) year from the date of acceptance. Any replacement of parts or adjustments, including labor made necessary by inherent defects, shall be provided by the contractor without cost to the Owner within the guarantee period.

1.11 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Protect equipment and material for the electrical work after delivery, before and after installation. This protection must be extended against pilferage, dampness and damages from all causes until the work is accepted by the owner.

1.12 ELECTRICAL REFERENCE SYMBOLS

- A. Symbols shown on the Drawings show approximate locations of fixtures, outlet boxes, conduit runs and other equipment, unless otherwise detailed. The exact location shall be governed by structural conditions and obstructions. This is not to be construed as to permit redesigning systems. Outlets shall be connected from circuits as shown on the drawings. Locate and install boxes and equipment where they will be readily accessible.

1.13 MATERIALS AND INSTALLATION

- A. Only the best materials of each class specified shall be used and the installation shall be made in a neat and workmanlike manner, complete in every detail, ready for immediate satisfactory operation by the Owner.

1.14 WORK BY OTHERS

- A. Trenching and backfill
- B. Painting
- C. Cutting and patching
- D. Telephone and cable TV service entrance cable and interface.

2 PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

- A. Unless otherwise indicated, the materials to be furnished under this specification shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. Materials shall be delivered to the site in the original sealed containers of packages bearing the manufacturer's name and brand designated. Materials shall be stored in a clean, well-ventilated, warm area. Care shall be exercised in handling materials during delivery, storage and installation. Materials damaged, in the opinion of the Architect, shall be replaced at no additional cost to the Owner.

2.2 EQUIPMENT MOUNTING AND SUPPORTS

- A. Provide supports including supplementary steel, channels, rods and guys required for the proper installation, mounting and support of equipment.
- B. Supports shall be firmly attached and connected to building structural elements and constructed in an acceptable manner. Continuously threaded rods less than 3/8" in diameter, tie wire, or metal straps are not acceptable.
- C. Supports in structural systems shall be installed as an integral part of the structural system. Explosive or cartridge driven type anchors, insert or supports are not acceptable.

- D. Except as otherwise required by the Contract Documents the type and size of supports shall be as determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection as required by codes or standards and the support manufacturer's requirements for loading.
- E. Inform all parties as to location, size details and method of attachment of supports and the weight which the support is to carry, so that the installation may be coordinated.
- F. Supports shall be installed in a neat and workmanlike manner, perpendicular or parallel to walls, floor, columns, beams or ceilings.

2.3 GROUNDING

- A. Furnish and install grounding system as required by codes or standards.
- B. Grounding terminal on receptacles and switches shall be bonded to outlet box with grounding conductor to establish grounding continuity.
- C. Flexible metal conduit and electric metallic tubing feeder raceways shall include grounding conductor.
- D. Grounding conductors shall be stranded copper wire with green color insulation. Grounding conductors shall be run with all circuits, feeders, etc. Raceways only will not be considered as a grounding means.
- E. Grounding bushings shall be provided for raceways where required.

2.4 PANELBOARDS

- A. Panelboard cabinets shall be of the dead-front safety type, provided with the size and number of single, double or triple pole branches as indicated in the schedule. Cabinets shall be constructed of zinc coated sheet steel and shall conform to Underwriters Laboratories, Inc, Standard for Cabinet and Boxes. Cabinet heights shall not exceed 72" and cabinets shall be mounted so that the distance from the floor to center of the top circuit breaker will not exceed 6', except in handicapped units where the cabinet height shall not exceed 48" AFF. Cabinets shall be provided with trims having adjustable trim clamps. Trims, unless otherwise noted, shall be fitted with hinged doors having combination lock and latch with locks keyed alike. A typewritten directory, properly identifying the circuits, shall be mounted in each frame. Panels shall be as scheduled on the Drawings.
- B. Panelboards shall be surface or flush mounted with branch circuit breakers and main breaker or main lugs as indicated on the Drawings and/or specified herein.
- C. Branch circuit breakers installed in the panels shall have a minimum short circuit rating as indicated on the drawings.

2.5 RACEWAYS

- A. Install wiring in electric metallic tubing (EMT), and or schedule 40 PVC. Schedule 40 PVC may be used outside only, raceways within the building shall be metal.
- B. Raceways and wiring, except as otherwise noted, shall be installed exposed in unfinished areas such as electrical and mechanical rooms.
- C. Electric metallic tubing shall not be installed in concrete on grade, in concrete in contact with earth or underground.

- D. Buried rigid steel conduits (RSC) shall have two coats of bituminous protection.

2.6 CONDUCTORS - WIRE AND CABLE

- A. Branch circuit conductors installed in the building may be type "NM" cable. Panel feeders may be type SE cable if permitted by local codes.
- B. Conductor sizing shown on the Drawings is based on copper. Contractor can substitute aluminum of equal ampacity for all panel feeders and service conductors.
- C. Joints and splices shall be made in a manner equivalent electrically and mechanically to the conductor itself.
- D. Conductors shall be color coded - Phase A: black, Phase B: red, phase C: blue, Neutral: white, Ground: green.
- E. Colors, except colors for conductors No. 4 and larger, shall be factory applied the entire length of the conductors by solid color compound, solid color coating or colored striping or bands, 2 sets 180 degree apart. On-site coloring shall not be done, except color coding by means of paint or tapes is acceptable only for conductors No. 4 and larger.
- F. Voltage rating, manufacturers, type and conductor, AWG size indication shall be continuous, factory applied the entire length for each conductor.
- G. Wire No. 8 AWG and larger shall be stranded. Wires smaller than No. 8 AWG shall be solid.
- H. Minimum wire size is #12 AWG per MSHA standard.

2.7 WIRING DEVICES

- A. Switches, receptacles and other utilization devices shall be specification grade, grounding type. Color by Architect.
- B. Receptacles and switches shall have a grounding pole and grounding terminal, which shall be connected to the outlet box with grounding conductor to establish grounding continuity.
- C. Verify mounting height of devices prior to roughing.

2.8 WIRING DEVICE PLATES

- A. Provide device plates for devices, switches, receptacles, and miscellaneous outlets.
- B. Plates shall be plastic to match the installed device. Color by Architect.

2.9 PULL BOXES AND JUNCTION BOXES

- A. Pull boxes of code gauge galvanized steel with screw covers to match, shall be as required and shall be as shown on Contract Drawings.
- B. Junction Boxes in Exterior walls shall be air vapor barrier box as manufactured by LESSCO or equal. Conductors passing through pull boxes shall be identified to indicate their origin and termination.

2.10 NAMEPLATES

- A. Provide nameplates for panelboards, motor disconnect switches, and motor starters designating equipment controlled and function.

- B. Nameplates shall be laminated plastic with engraved white letters. Letters shall be 1/4 inches high. Nameplates shall have identifying color background for each system.

2.11 OUTLETS

- A. Outlets shall be centered in panels and spaces provided therefore. If any discrepancy is found to exist between outlets as shown on Electrical Drawings and Architectural Drawings notify Architect to have location verified prior to installation.
- B. Verify power wiring with equipment wiring diagrams before wiring equipment. Disconnects and starters shall have nameplates indicating the loads they control.

2.12 LIGHTING FIXTURES AND LAMPS

- A. Fixtures shall be by the manufacturers specified or as otherwise determined by the Architect.
- B. Energy Saving Ballasts for fluorescent fixtures shall be Class P: high power factor; shall incorporate UL listed automatic resetting protection: shall be classified for quiet operation, "A" sound rating: shall be designed for a nominal 120 volt system as shown.
- C. Energy saving lamps of wattage, type and color indicated shall be furnished and installed in necessary quantity to completely lamp every fixture. Incandescent lamps installed in permanent lighting fixtures and used for lighting during construction shall be replaced on or just after the date of substantial completion.
- D. Fixtures shall be complete with all accessories such as close nipples, extension couplings, connecting straps, screws, locknuts, hickies, plaster rings, to provide complete fixture installation for use with any type of standard outlet or switch box. Special fittings required to support fixtures shall be supplied as well as wood, or metal supports or grounds to support surface or pendant mounted fixtures.

2.13 FIRE ALARM SYSTEM

- A. The fire alarm system shall consist of the fire alarm control panel, pull stations, horns and strobes, strobes only (ADA), smoke detectors, heat detectors. Furnish and install wire, cables, conduit and conduit fittings, wiring and wiring devices, junction boxes and outlet boxes, fire alarm boxes, fire detectors and control equipment and accessories indicated or specified herein for a complete fire detection installation. System shall be Notifier or equal.
- B. The system shall be fully addressable, fully supervised fire alarm installed according to the drawings and specifications and in accordance with NFPA Codes 72 and local codes and the Portland Fire Department. Material shall be new, except as noted, first quality and the best of each class specified. Work shall be executed in a workmanlike manner and shall present a neat appearance when completed. Equipment shall be installed in accordance with the recommendations of the manufacturer and best standard practice for this type of work.
- C. Require the manufacturer of the equipment to include the battery calculations for standby batteries. The furnishing of complete installation Drawings and Riser Diagram and connection diagrams and catalog cuts of components shall also be required of the manufacturer by this contractor.
- D. Provide the services of the manufacturer of the equipment to supervise the installation, to adjust and test the system, to assure a complete and fully operative facility in accordance with the Specifications and to instruct designated personnel in the operation, adjustment, testing and maintenance of the system.

- E. Notify the Architect, Owner and Portland Fire Department when the system is ready for final approval tests. The system shall be considered ready for such testing only after all necessary preliminary tests have been made and all deficiencies found have been corrected to the satisfaction of the equipment manufacturer's technical representative. Two copies of the test report shall be submitted to the Owner.
- F. Furnish and install a complete 24VDC closed circuit, electrically supervised, zone annunciated fire alarm system as specified herein and indicated on the drawings. The system shall include but not to be limited to all control equipment, power supplies, signal initiating devices, audible and visual alarm devices, conduit, wire, fittings and other accessories required to provide a complete and operable system. The system shall operate as a non-coded, continuous sounding system.
- G. Provide and install required equipment and accessories necessary for the proper operation of the system.
- H. Fire system equipment shall be labeled with the manufacturer's name and logo to assure the integration of the complete system.
- I. Wiring for the fire alarm system shall be subject to the same restriction as herein before specified for light and power circuitry. (NEC Article 760) Raceways containing conductors shall not contain any other conductors and no A.C. carrying conductors will be allowed in the same raceway with the D.C. fire alarm detection and signaling conductors. Plenum rated fire alarm cable may be used if allowed by the authority having jurisdiction.
- J. Equipment shall be listed by Underwriters Laboratories, Inc. or approved by Factory Mutual or as accepted by the authority having jurisdiction. The catalog numbers specified are those of Notifier Fire Alarm Systems. The fire alarm system in its entirety shall be in compliance with all applicable fire and electrical codes and comply with the requirements of the local authority having jurisdiction over said systems.
- K. General requirements as follows:
 - 1. A riser diagram of the complete fire alarm system extension, (Typical riser diagrams are not acceptable).
 - 2. A complete point-to-point installation diagram for the extension. (Typical wiring diagrams are not acceptable).
 - 3. A complete list of current drain requirements during normal supervisory, trouble and alarm condition.
 - 4. Battery standby calculations showing total standby power required to meet the specified system requirements.
- L. The operation of any manual station or automatic activation of any smoke detector, or waterflow device shall cause:
 - 1. Fire alarm horns to sound in the building.
 - 2. Evacuation lamps to flash in the building.
 - 3. Automatically shut down fans and/or close doors to prevent the re-circulation of smoke.
 - 4. Notify the Portland Fire Department via a fire alarm dialer and monitoring company.

5. Elevator recall shall be initiated by activation of any elevator lobby smoke detector, the smoke detector in the Elevator Machine Room or the smoke detectors in the elevator shaft and pit. Elevator recall shall cause the elevator to go to the First Floor (Main Egress Level) or alternate floor if the First Floor detector is in alarm. Provide all programmable relay modules.
 6. Operation of the 120 volt dual contact heat detector in the elevator Shaft, Elevator Pit or Elevator Machine Room shall cause the shunt trip on the elevator feeder breaker to trip and disconnect electric power to the disconnect switch prior to water flow from the sprinkler system and initiate an alarm in the Elevator Zone of the Fire Alarm System. Provide programmable control relay modules.
 7. Detectors for the Elevator shall be zoned separately from detectors throughout the building. Only elevator lobby smoke detectors will initiate special "Fire Service" elevator operation.
- M. Each initiating circuit shall be represented on the zone cards in the control panel by an amber trouble LED and a red alarm LED. The LED's for each zone shall be identified on the control panel by custom lettering showing the zone designation. Circuit trouble shall be indicated by the amber LED. Audible trouble and alarm devices shall be supervised. Flashing lights to be supervised.
- N. Each initiating circuit shall be electrically supervised for opens and ground faults in wiring, and for short circuit faults and shall be so arranged that a fault condition in any circuit or groups of circuits will not cause an alarm to be sounded. The occurrence of any fault will light a trouble LED and sound the sonolert but will not interfere with the proper operations of any circuit which does not have a fault condition.
- O. The installer shall coordinate the installation of the fire alarm equipment with the manufacturer. Conductors and wiring shall be installed per the manufacturer's recommendations. It shall be the installer's responsibility to coordinate with the manufacturer the correct wiring procedures in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ). Pigtail connections between circuit wires and detector terminals are not acceptable. Devices shall be connected to the circuit line wires.
- P. Guarantee equipment and wiring free from inherent mechanical and electrical defects for a period of one year from date of the final acceptance. Before the installations shall be considered completed and acceptable by the awarding authority, a test on the system shall be performed as follows: The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate the building annunciator and control panel. One half of all tests shall be performed on battery standby power. Where applying heat would destroy any detector, they may be manually operated. The initiating circuit and the signaling circuits shall be opened in at least two locations per zone to check for the presence of correct supervisory circuitry. When the testing has been completed to the satisfaction of both the contractor's job foreman and the representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department. The contractor shall leave the fire alarm system in proper working order and without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year from the date of final acceptance by the awarding authority. Prior to final test, the fire department must be notified within a reasonable time of test date (at least 24 hours). The contractor shall provide the necessary personnel and equipment to conduct the tests outlined above.

- Q. Detection and signaling circuits shall be run separate from all other conductors. Wiring shall be number 14 solid.
- R. Connection within the control equipment and devices shall be made with T and B "stakon" spade terminals. Wiring within the control equipment shall be secured with T and B "tyeraps" and placed in wired gutters.
- S. Part numbers specified are for Notifier. Fire alarm system components shall be as follows:
 1. Fire alarm control panel: Notifier NFS-640 addressable panel, supply with all modules and relays for complete operational system. Supply with NFPA required battery back-up and charger located in electrical room. Provide digital alarm communicator transmitter and all associated telephone interface hardware. Shell contractor responsible for complete operational system.
 2. System Smoke Detectors: Notifier FSP-751 low profile, intelligent, addressable photoelectric head with B710LP base - Provide quantity as shown on the plans and at least one over the fire alarm control panel for NFPA compliance. Smoke detectors within apartments shall be system connected but shall not trip the building fire alarm system. The remote annunciator located at the staff reception area shall annunciate all apartment smoke detectors
 3. Manual Pull Stations: Notifier NBG12LX - addressable, dual action, key reset station with integral LED visible from the front of the pull station that blinks when the pull station is addressed by the control panel.
 4. Horn/Strobe Alarms: Notifier NS-24-MC-WFR series with adjustable candela settings and adjustable volume taps. Provide synchronized strobes in rooms where more than 2 strobes are visible within the same sightlines, provide Notifier DSM12/24R synchronization modules as required. Provide wire guards for gym horn/strobes. Provide the proper candela strobes for the room sizes as follows:

Room Size	Candela Rating
20' x 20'	15/75 cd
30' x 30'	30/75 cd
40' x 40'	75 cd
50' x 50'	110 cd

Use equivalent ratings for larger rooms per NFPA 72 Code.

5. Strobe Only Alarms: Notifier RSS-24-MC-WFR remote strobes with adjustable candela settings. Provide proper candela for each rooms as outlined above under horn/strobes. Provide wire guards for gym strobes.
6. Duct smoke detectors: Notifier for AHU in attic by manufacturer.
7. Heat detectors: Provide Notifier FST-751 (135 fixed temp) or FSD-751R (combination 135 fixed temp and rate of rise) heat detector heads with B-710LP addressable or HD-604 (200 fixed temp) wired to FMM-101 monitor module.

8. Sprinkler devices: Provide Notifier FMM-101 monitor module for each sprinkler alarm or tamper switch.
9. Control relay modules: Provide Notifier FRM-1 programmable relay modules as required to perform other specified or code required contacts to control other life safety alarm function in the building including elevator emergency signal light in cab.
10. Knox Box - #3270 recessed provided and installed by EC.
11. Carbon Monoxide Detectors: system connected, addressable.

2.14 MECHANICAL SYSTEM CONNECTIONS

- A. Connect mechanical equipment as shown on the drawings. Control wiring shall be furnished and installed by the Mechanical Contractor.

2.15 APARTMENT INTERCOM/SECURITY SYSTEMS

- A. Provide apartment intercom/security systems as shown on the drawings and specified herein.
- B. The system described herein is a TEKTON HP-101 system (contact Norris, Inc.).

When a visitor presses a pushbutton on the Lobby panel a steady signal will sound in the apartment being called and the handicapped apartment visual signals will flash.

The tenant operates the "talk" button, then the "listen" button for 2-way voice conversation. Operation by the tenant of the door button will activate the door release in the lobby entrance door. This door will also be unlocked by the Postal Lock Option which will give access to the postman.

- C. System components (by TEKTON or equal) shall be as follows:
 1. Transformer - TEKTON SS 106.
 2. Lobby Panel - TEKTON Button and speaker panel with postal lock option and pushbutton/directory panel with (43) buttons minimum, backbox and frame.
 3. Apartment Intercom Panel - TEKTON#IR19B (48" AFF in apartments per ADA).
 4. Hearing Impaired Apartment Intercom Panel Lamp: Add strobe per manufacturer.
 5. Control unit and power supply: TEKTON PK2019.
 6. Lobby Door Strike: By G.C. E.C. shall coordinate and wire. Lobby panel shall be medium bronze, mounted 48" AFF to top to comply with ADA requirements for wheelchair access.
- D. Wiring shall be as required by the manufacturer. Wiring shall be run in raceways where exposed and shall be plenum rated if not run in raceway.
- E. Coordinate the installation with the manufacturer. Secure detailed wiring diagrams from the manufacturer and to arrange for the manufacturer to supervise the installation and provide necessary instructions for use and maintenance to the Owner.

2.16 TELEPHONE/DATA

- A. Provide and install telephone backboard in electrical room. Twisted pair cabling inside building and phone/data or phone only jacks where indicated on the drawings. Punch down blocks, etc. for an operational system.
- B. 4" PVC conduit underground to telephone backboard with pull string. (Entrance cable by Telephone Company). Each apartment to have (2) separate lines.
- C. Telephone equipment (phones, processors, etc.) by others.
- D. Provide CAT 5E cable, jacks, plates, terminations and testing for complete operational system. All cables shall be run to electrical room tel backboard.

2.17 CABLE TELEVISION

- A. Provide and install cabling, jacks and plates inside building where indicated on drawings. Cabling shall terminate on telephone backboard in electrical room. Final connections by the cable company. Cable and jack type shall be per Cable TV Company.
- B. 4" PVC conduit underground to telephone backboard with pull string. (Entrance cable by Cable TV Company).

3 PART 3 EXECUTION

3.1 LICENSE

- A. Electrical work shall be installed by persons duly licensed by the Electricians Board of the State of Maine.

3.2 COORDINATION

- A. It shall be the responsibility of this contractor to coordinate his work with other trades to insure that his work is terminated in a satisfactory manner.

3.3 WORKMANSHIP AND PREPARATION

- A. Work shall be executed in a workmanlike manner by experienced electricians in accordance with the most modern engineering practice and shall present a neat appearance when completed. The work shall be carefully laid out in advance and where cutting, channeling, chasing, or drilling of floors, walls, partitions, and ceiling or other surfaces is necessary for the proper installation, support or anchorage of the conduit, raceways or other electrical work, this work shall be carefully done and any damage to the building, piping or equipment shall be repaired by skilled mechanics of the trades involved and at no additional cost to the Owner.
- B. After installation, electrical equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent entrance of foreign materials. The interior of boxes and cabinets shall be left clean, exposed surfaces shall be cleaned and plated surfaces polished.

3.4 OBTAINING INFORMATION

- A. Obtain information from the manufacturers of the apparatus which is to be provided for the proper methods of installation. Also obtain information from the General Contractor and

other Sub-Contractor which may be necessary to facilitate work and the completion of the whole project.

3.5 GIVING INFORMATION

- A. The Contractor shall keep himself fully informed as to the shape, size and position of openings and foundations required for his apparatus and shall give full information to the General Contractor sufficiently in advance of the work so that such openings and foundation may be built in advance. Also furnish supports herein specified so the General Contractor may build same in place. In the case of a failure on the part of the Contractor to give proper information as noted above, he shall assume the cost of having the work done.

3.6 RACEWAYS

- A. Raceways, where applicable, shall be supported and secured at intervals of not more than 10 ft. with minimum of two supports shall be provided if required. Tie wire or perforated metal straps shall not be used to support or secure raceways or other equipment. Electric metallic tubing shall be supported within 18" of each coupling or connector. In finished areas, furnish and install escutcheons for exposed conduit passing through or entering finished floors or walls.
- B. Expansion coupling shall be provided in each raceway crossing building expansion joint and when length of raceway requires expansion coupling, expansion coupling shall have a total minimum expansion of 4" and shall have a flexible bonding conductor. Setting of expansion coupling shall be a function of the temperature at the time of installation. Flexible couplings shall be provided where required.
- C. Raceways shall have runs installed parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings. Field-made bends and offsets shall be avoided where possible, but where necessary, shall be made within an approved hickey or conduit bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways shall be avoided. Care shall be taken to prevent the lodgement of plaster, dirt or trash in raceway boxes, fittings and equipment during the construction. Clogged raceways shall be entirely free of obstructions or shall be replaced. Wooden plugs inserted in concrete or masonry are not acceptable as a base for raceway fastenings nor shall raceways or pipe straps be welded to steel structures. Raceways shall be secured by pipe straps or shall be supported by wall brackets, strap hangers or ceiling trapeze fastened by wood screws on wood, toggle bolts on hollow units, expansion bolts on concrete or brick and machine screws or welded studs on steel work.

3.7 OUTLETS

- A. Each outlet in the wiring or raceway systems shall be provided with an outlet box to suit the conditions encountered. Each box shall have sufficient volume to accommodate the number of conductors entering the box in accordance with the requirements of the National Electrical Code. Boxes shall not be less than 1-1/2" deep unless shallower boxes are required by structural conditions and are specifically approved.
- B. Ceiling and bracket outlet boxes shall be not less than 4" except that smaller boxes may be used where required by the particular fixture to be installed. Boxes shall be installed in a rigid and satisfactory manner and shall be fastened directly with wood screws on wood, bolts and expansion shield on concrete or brick, toggle bolts on hollow masonry units and machine screws or welded threaded studs on steel work.

3.8 FIXTURES

- A. Incandescent and fluorescent fixtures shall be supported by building structural elements independent of furred or suspended ceilings.
- B. Subsequent to review of shop drawings and prior to ordering fixtures, verify voltage at each fixture, also consult with others to determine the type of ceiling and ceiling suspension system in each and every room and order fixtures to suit and fit the particular ceiling and ceiling suspension system. Any extra costs because of failure on the part of this Contractor to verify voltage or ceiling requirements shall be paid for by this Contractor. It is not the intent of fixture catalog numbers shown to classify the voltage, ceiling or ceiling suspension.

3.9 WIRING DEVICES

- A. Switches and convenience outlets shall have a rating as indicated on the drawings. Light switches shall be silent type. Outlets connected to exposed conduits shall be installed in a surface mounted, conduit device box, 4-1/2" long by 2-1/8" wide and with a suitable cover for the device to be installed (box shall be galvanized). Plates on finished walls and on boxes connected to concealed cable and conduits shall be as noted in the specifications.

3.10 INTENT OF DRAWINGS

- A. It is not intended that the drawings show in detail every conduit, junction box, etc., but material necessary to complete the electrical system in accordance with the best practices of the trade and to the complete satisfaction of the Architect, shall be furnished without additional recompense under this section of the specifications. No deviation from the layout shall be made without written approval from the Architect.

3.11 RECORD DRAWINGS

- A. During the progress of the work, keep a set of drawings marked up to record deviations and changes from the Contract Drawings due to field conditions, change orders, amendments, revisions, addenda and other reasons to represent an accurate record of all work as actually installed. Include an accurate layout of all in-slab, under-slab, and buried conduits.
- B. Deviations from the Contract Documents shall be approved by the Architect before installation.
- C. At the completion of the work, furnish to the Architect a complete set of prints of the original Contract Drawings on polyester film, corrected in a neat manner to reflect all the above changes and representing an accurate record of all work as actually installed.
- D. The record drawings shall be submitted to the Architect for approval and corrected as deemed necessary.
- E. After approval, the record drawings shall become the property of the Owner.

3.12 INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. At the completion of the work, turn over to the Owner, one (1) set of operating and maintenance instructions of equipment and systems. Submit name and address of nearest available source of repair service and replacement equipment and parts to the Owner and Architect. Explain and demonstrate the operation of the fire alarm system and the apartment intercom/security system to the Owner's representative. The manufacturer's field technician shall be present at this demonstration.
- B. Arrange data in complete sets, properly indexed and marked.

- C. Data shall include a complete set of shop drawings.
- D. Material shall first be submitted in preliminary form for review by the Architect. After review, submit two (2) copies in bound volumes to the Architect for distribution.

****END OF SECTION****

Part II
Division 31
Earthwork

SECTION 31 05 12

SITE EARTHWORK

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes
 - 1. Removals - The Contractor shall perform all work necessary for clearing and grubbing and/or removal, backfill and disposal of all existing materials noted on the Drawings, as well as temporary structures installed for construction.
 - 2. Limit of Work - Take special care to keep all operations within the Limit of Work as shown on the Drawings. The Contractor shall take all necessary precautions to protect existing site elements to remain.
 - 3. Grade and Elevation
 - a. The Drawings indicate, in general, the alignment and finished grade elevations. The Owner's Authorized Representative, Engineer or Landscape Architect, however, may make such adjustments in grades and alignment as are found necessary in order to avoid interference or to adapt piping to other special conditions encountered.
 - b. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain by means of suitable stakes placed in the field.
 - 4. Protection of Existing Structures and Utilities
 - a. Barricade open excavations occurring as part of this work and post with warning signs. Backfilling or secured covering of excavations shall be required.
 - b. Provide necessary supports, bracing and covering to protect existing and new structures and utilities during all phases of excavation and backfill.
 - c. Notify appropriate owners before excavating adjacent to poles, cables, pipes, and other utilities.
 - d. Note that location of existing underground utilities on plans is approximate and may be incomplete. Responsibility for exact locations and protection of all utilities rest with the Contractor.
 - e. Conflicts between existing and new utilities and/or structures to be built under this contract shall be reported to the Owner's Authorized Representative, Engineer or Landscape Architect

C. Related work:

1. Erosion Control: Section 31 25 13
2. Pipe Installation: Section 33 09 10

1.2 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Tests for soil density and/or gradations as herein designated shall be taken at the option of the Architect, Engineer and or Landscape Architect. Costs of testing shall be paid by the Owner.
2. Soil samples representative of the borrow source and suitable laboratory testing shall be furnished by the Contractor for each material listed in Section 2.1. Test results shall be submitted at least two (2) weeks prior to their proposed use or placement on the site. In the event a proposed material does not meet the specified gradation requirements, the material type shall not be placed on-site until an alternative borrow source is selected and the laboratory test results indicate the material meets the specified gradation requirements.

Note: Contractor shall provide testing for loam in accordance with Section 32-90-00.

3. Compaction tests shall be determined on the basis of laboratory Proctor tests (ASTM D.1557, Modified Proctor).
4. Field density tests not specified on a comparative basis shall be to the percent density specified in this Section for both earth excavation and earth and granular type fills. Tests shall be in accordance with ASTM D.1556, ASTM D.2167, ASTM D.2922 OR ASTM D.3017.

1.3 QUALITY ASSURANCE:

- A. Conform to all applicable town, county and state codes for excavation, earthwork and disposal of debris.
- B. Conform to all applicable standards of the various utility companies.
- C. References - Where M.D.O.T. appears it shall be taken to mean The State of Maine Department of Transportation Specifications, Highways and Bridges - (Latest Revision).
- D. Reference Standards

The following most current publications form part of this specification to the extent indicated by references thereto and shall be followed for all construction testing:

American Society for Testing and Materials (ASTM):

- | | |
|--------|--|
| D 422 | Method for Particle Size Analysis of Soils |
| D 698 | Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) hammer and 12-inch (304.8mm) Drop (Standard Proctor) |
| D 1556 | Test for Density of Soil in Place by the Sand Cone Method |

- D 1557 Test for Moisture-Density Relations of Soils Using 10-lb (4.5 Kg) hammer and 18-inch (457 mm) Drop (Modified Proctor)
- D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- D 2167 Test for Density of Soil in Place by the Rubber Balloon Method
- D 2216 Laboratory Determination of Moisture Content of Soil
- D 2487 Classification of Soils for Engineering Purposes
- D 2922 Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D 3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D 4318 Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils
- C 25 Chemical Analysis of Limestone, Quicklime and Hydrated Lime
- C 110 Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method
- C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

- E. Drawings do not purport to show above ground objects existing on site. Contractor shall visit site and acquaint himself with all observable conditions as they exist before submitting his Bid.

2 PART 2 PRODUCTS

2.1 MATERIAL:

- A. Fill Materials: Backfill and ordinary fill materials shall be as follows:

1. Materials from excavation: Excavated material which can be readily spread and compacted, and consists of mineral soil, substantially free of organic materials, loam, wood, rubbish or other perishable substance may be used for common fill. Boulders (rocks over eight (8) inches) shall be removed from excavated material before using for fill.
2. Backfill over drainage pipes shall be free of stones over one (1) inch diameter for first one (1) foot over pipes.
3. Aggregate Base, Crushed - M.D.O.T. 703.06, (a), Type A. (No rocks larger than two inches). - Compacted at 95% ASTM D-1557
4. Aggregate Subbase Gravel - M.D.O.T. 703.06, (a), Type C, Size of stone no larger than six (6) inches. - Compacted at 95% ASTM D-1557.
5. Aggregate Subbase Gravel, M.D.O.T. 703.06 (b) Type D (no stone larger than 4 inches – compacted at 95% ASTM D – 1557.
6. Structural Fill - M.D.O.T. 703.06, (a), Type C. Size of stone no larger than six (6) inches, and further limited to a maximum particle size equal to three (3) inches within twelve (12) inches of slab grade. Compacted at 95% ASTM D-1557
7. Aggregate for Foundation Backfill: M.D.O.T. 703.6 (a) Type B. Size of stone no larger than four (4) inches.
8. Gravel Borrow - M.D.O.T. 703.20. Size of stone no larger than six (6) inches. Compacted at 95% ASTM D-1557.

9. Drainage Stone - M.D.O.T. 703.22, Type C. - Vibrated with hand vibrating plate.

B. Pipe Bedding Material:

1. Granular Pipe Bedding Material: Shall be clean and free of organic matter, silt, or clay lumps, and deleterious materials. The material shall meet the following gradation requirements:

<u>Sieve Designation</u>	<u>% by Weight Passing Square Mesh Sieve</u>
1/2"	100
#4	95-100
#40	20-45
#200	0-5

2. Stone Pipe Bedding Material: Shall be screened or crushed stone free of organic matter, silt, or clay lumps, and deleterious material. The material shall meet the following gradation requirements.

100% passing a 1-inch square mesh sieve and not more than 5% passing a ¼-inch square mesh sieve.

C. Suitable Backfill Material

1. Structural fill or natural material excavated during the course of construction, excluding debris, pieces of pavement, organic matter, topsoil, all wet or soft muck, peat, or clay, all excavated ledge material, and all rocks over six (6) inches in largest dimension, or any material which will not provide sufficient support or maintain the completed construction in a stable condition, all approved by the Owner's Authorized Representative, Engineer or Landscape Architect.

D. Geotextile Materials

1. Acceptable Geotextiles and Geogrids:

- a. Mirafi 600x
- b. Phillips 66 Supac 6WS
- c. Dupont Tyvar 3401 and 3601
- d. Trevira S1114 and S1120
- e. AMOCO 2006
- f. Tensar SS-1 and SS-2
- g. Exxon GTF-200 or 350
- h. Conwed Stratagrid GB-5033
- i. Miragrid 3xT

2. Filter/Drainage Geotextiles:

- a. Mirafi 160N or equal

3 PART 3 EXECUTION

3.1 EXECUTION:

- A. Earth Excavation - Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, any material indicated in the data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.
- B. Rock Excavation - Removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment except such materials that are classed as earth excavation.
 - 1. Typical Materials: Boulders 2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.
 - 2. Intermittent drilling performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- C. Unauthorized Excavation
 - 1. Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect, Engineer and/or Owner's Representative.
 - 2. Under footings or foundation bases, fill unauthorized excavation by filling with Structural Fill and compacting to 95 percent of ASTM D-1557 without altering top elevation.
- D. Topsoil Removal – Topsoil shall be stripped to its entire depth from area within the Limit Of Work and reusable materials shall be temporarily removed from the site, screened, and returned to the site as needed. Stripped topsoil shall be free from clay, large stones, debris, and peat. Topsoil for reuse on site shall be screened and tested in accordance with Section 32 90 00 – Planting.
- E. General Excavation
 - 1. Grades, Dimensions - excavate where indicated and as necessary to obtain subgrades as shown on the Drawings and hereinafter specified. All excavation shall include the satisfactory removal of all materials of whatever substance encountered within the indicated limits. Only suitable materials shall be used or stockpiled for later use in backfill preparation. Disturbed subgrade material shall be removed prior to pouring of footings and replaced with either compacted structural fill or thickened footing concrete. All footing subgrades shall be approved by the owner's representative prior to pouring concrete for footings.
 - 2. The Contractor shall provide temporary drains, ditches and the necessary equipment, as required, to maintain the site of work and adjacent areas in a well drained condition. Keep all excavations free of both ground and surface water at all times. All water pumped or drained from the work shall be disposed of so as not to endanger public health, property or any portion of the work under construction or completed.

3. The Contractor shall provide shoring, sheeting and bracing as may be required to maintain excavations and trenches secure and safe from collapse and to protect adjacent structures.
4. Excavation shall not be made below specified subgrades except where rock or unstable material is encountered. If suitable bearing is not found at levels shown on the Drawings, the Architect, Engineer and or the Owner's Representative shall be notified in writing immediately so that adjustments or changes may be made. Material removed below specified subgrade without the approval of the Project Engineer and or Owner's Representative shall be replaced and compacted with an approved gravel at the Contractor's expense.
5. All work shall be carried out in a manner consistent with the regulations of such Federal, State and Local authorities as may have jurisdiction over such activities.

F. Summary of Utility Installation

1. Set all lines, elevations and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments or other reference points.
2. Perform all excavation for underground piping and utility systems to the depths indicated on the Drawings or as otherwise specified. Trenches shall be excavated by open cut.
3. Maintain in operating condition existing utilities, active utilities and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.
4. Verify location, size, elevation and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.
5. Inspection of stormwater system excavation, utility excavation and backfilling subject to review by utility company, city engineer, if necessary, by Project Engineer and or Owner's Representative.

G. Excavation, Trenching and Backfilling

1. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in an orderly manner far enough from bank of trench to avoid overloading, slides or cave-ins.
2. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.
3. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.

4. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.
5. Excavations for all foundation work shall be backfilled with structural fill meeting specifications set forth herein.

H. Trench Excavation

1. The Contractor shall contact the local utility companies, if necessary, before excavation begins. Dig trench at proper width and depth for laying pipe, conduit or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over-excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.
 2. All trench excavation side walls greater than five (5) feet in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches four (4) feet or deeper.
 3. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer or wider than needed to make joint connection properly.
 4. Trench width requirements below the top of the pipe shall not be less than 12 inches nor more than 18 inches wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit or cable shall be least practical width that will allow for proper compaction of trench backfill.
 5. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:
 - a. Water Mains: 66 inches to top of pipe barrel.
 - b. Sanitary Sewer: Elevations and grades as indicated on Drawings. Note: Pipe with less than five (5) feet of cover in pavement areas or four (4) feet in landscaped areas, provide two (2) inches of rigid insulation as shown on detail.
 - c. Electrical Conduits: 40 inches minimum to top of conduit for primary and 30 inches to top of conduit for secondary or as required by NEC 300-5, NE 710-36 codes, or the local utility company requirements, whichever is deeper.
 - d. Telephone Conduits: 18 inches minimum to top of conduit, or as required by the local utility company, whichever is deeper.
- I. Sheeting and Bracing - Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen is required.

Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

- J. Pipe Bedding - Accurately cut trenches for pipe or conduit that is to be installed to designated elevations and grades to line and grade as specified below bottom of pipe and to width as specified. Place specified depth of bedding material, compact in bottom of trench, and accurately shape to conform to low portion of pipe barrel. After pipe installation, place select bedding material in accordance with details and compact as required.

K. Trench Backfilling

1. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact as specified, to properly correct condition in an acceptable manner.
2. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in eight (8) inch maximum loose lifts.
3. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. Compact to minimum density of 95% of maximum dry density in accordance with ASTM D 698 (or 92% of maximum dry density in accordance with ASTM D1557). For utility trenches located in pavement and sidewalk areas, place backfill in eight (8) inch maximum loose lifts and compaction to 95% of ASTM D.1557 maximum dry density.

L. Structural Excavation

1. Earth shall be excavated to the depth and sections required for installation of all footings, floor slabs or other appurtenant facilities to the extent indicated on the Plans. Care shall be taken that the foundation areas of structures are not excavated below subgrade or are disturbed so as to lessen their bearing capacity.
2. All excavations for structures shall be sheeted, braced, sloped, or otherwise protected in the same manner and meeting the safety requirements and conditions specified above under paragraph Section 3.6 (B). Any excess excavated material shall be removed from the site.

M. Drainage

1. The Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to intercept and/or remove promptly and dispose of properly all water entering excavations. Such excavations shall be kept dry until the structures and appurtenances to be built therein, have been completed to such extent that they will not be damaged.

2. Dewatering shall be accomplished in a manner that will preserve the undisturbed state of the foundation soils. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, other surfaces, or property. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work.
3. Temporary underdrains, if used, shall be laid in trenches beneath the grade of the structure. Trenches shall be of suitable dimensions to provide room for the chosen size of underdrain and its surrounding screened gravel.
4. Temporary underdrains, if used, shall be laid at an approved distance below the bottom of the normal excavation and entirely surrounded by screened gravel. The distance between the bottom of the pipe or structure and the top of the bell of the underdrain pipe shall be at least three (3) inches, unless otherwise permitted. The space between the underdrain and the pipe or structure shall be filled with sand meeting the requirements of ASTM Designation C-33 which shall be rammed if necessary and left with a surface suitable for laying the pipe or building structure. Following their use, underdrains shall be plugged as directed by the Engineer and or Owner's Representative.

N. Compaction

1. Compaction densities specified herein shall be the percentage of the maximum dry density obtainable at optimum moisture content as determined and controlled in accordance with ASTM D.1557. Field density tests shall be made in accordance with ASTM D.1556, D.2167 or D.2922. Each layer of backfill shall be moistened or dried as required, and shall be compacted to the required densities unless otherwise specified in the project specifications.
2. Fills placed under footings, floor slabs, roads, parking areas and walks shall be compacted to not less than 95 percent of the ASTM D - 1557 maximum dry density.
3. The subbase material placed under the road gravel base in fill areas shall be compacted to not less than 95 percent of the ASTM D1557 maximum density.
4. Fills adjacent to building walls from the exterior face of the building and/or retaining walls to a point not less than 10'-0" from the exterior face of the wall shall be compacted to not less than 92 percent of the ASTM D. 698 maximum compaction dry densities as herein before specified.
5. Bedding material and trench sand under pavement: 95%
6. Bedding material and trench sand non-pavement areas: 92%
7. Loam areas: 90%
8. All other areas: 85%

9. Methods and equipment proposed for compaction shall be subject to the prior acceptance by Project Engineer and or the Owner's Representative. Compaction generally shall be done with vibrating equipment. Displacement of, or injury to the pipe and structure shall be avoided. Movement of in-place pipe or structures shall be at the Contractor's risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the Project Engineer and or Owner's Representative and at the expense of the Contractor.
- O. Filling and Subgrade Preparation
1. All materials shall be placed and compacted to conform to the lines, elevations and cross-sections indicated on the Drawings. Do not start fills until the area has been inspected and approved by the Project Engineer and or Owner's Representative..
 2. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. All materials shall be approved by the Project Engineer and or Owner's Representative. before being placed.
 3. Unless specifically stated otherwise on the Drawings, areas exposed by excavation, removal of structural foundations or stripping and on which subgrade preparations are to be performed, shall be compacted to a minimum of 95% of maximum dry density, in accordance with ASTM D 1557. Subgrades consisting of native sands or silty sands shall be compacted with a 15 ton highway roller. These areas shall then be proof-rolled to detect any areas of insufficient compaction. Proof-rolling shall be accomplished by making a minimum of two (2) complete passes with a fully-loaded tandem-axle dump truck, or approved equivalent, in each of the two perpendicular directions. Areas of failure shall be excavated and recompacted as stated above.
 4. If sufficient suitable fill material is not available from excavations under this Contract, additional fill, suitable for use, shall be brought to the site from other sources. Subgrade fill in pavement areas shall consist of Gravel Borrow (M.D.O.T. 703.20) or Structural Fill (MeDOT 703.06 (a) Type C. Place in maximum 12 inch layers and compact to 92 percent of maximum density in accordance with ASTM D 1557. Each layer shall be free from ruts and shall meet compaction requirements before next layer is placed. Maintain layers with crown or other practical means of drainage.
 5. Stones in fills shall be well distributed. Do not have stones over six (6) inches in diameter within twelve (12) inches of subgrade.
- P. Finish Grading
1. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10 feet above or below established finished subgrade elevation, and all ground surfaces shall vary uniformly between indicated elevations. Ditches and swales shall be graded to allow for proper drainage without ponding and in a manner that will minimize erosion potential. For topsoil application, refer to Section 32 90 00, Plantings.

2. Correct all settlement and eroded areas within one year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace any grass, shrubs, trees or other vegetation disturbed by construction using corrective measures.

3.2 INSPECTION:

- A. If Owner elects to test, an independent testing laboratory selected and paid by the Owner shall be retained to perform construction testing on site.
- B. If compaction requirements are not complied with at any time during the construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.
- C. The independent testing laboratory shall prepare test reports that indicate test location, elevation data and test results. The Owner, Architect and Contractor shall be provided with copies of reports within 72 hours of time test was performed. In the event that any test performed fails to meet these Specifications, the Owner's Representative and Contractor shall be notified immediately by the independent testing laboratory.
- D. All costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to the Owner. The Owner reserves the right to employ an independent testing laboratory and to direct any testing that is deemed necessary. Contractor shall provide free access to site for testing activities.

3.3 CLEAN-UP:

- A. The Contractor shall remove all debris, construction equipment, and material from the areas to be loamed and seeded.

...END OF SECTION 31 05 12

SECTION 31 21 13

RADON MITIGATION

1 PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Slab on grade base course.
 - 2. Under slab vapor retarder.
 - 3. Gas vent pipe.
 - 4. Joint sealants.
 - 5. Electrical junction box for fan connection.

1.2 SYSTEM DESCRIPTION

- A. Radon venting system consists of the following:
 - 1. Permeable basement floor slab base course.
 - 2. Sealing joints, cracks, and other penetrations through [basement floor slab and foundation walls.
 - 3. Active gas venting system with active Radon fans.
- B. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, layout of vent piping, roof flashing details, location of electrical junction box.
- B. Product Data: Submit data on base course, pipe, vapor retarder, sealants, and accessories.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record locations and invert elevations of concealed piping, connections.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with EPA 402-R-94-009.
- B. Maintain one copy of each document on site.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

2 PART 2 PRODUCTS

2.1 SLAB ON GRADE BASE COURSE (At new slab locations only)

- A. Base Course: Coarse stone graded within the following limits:
 - 1. Minimum Size: 1/2 inch.
 - 2. Maximum Size: 3/4 inch.

2.2 VAPOR RETARDER

- A. Vapor Retarder: ASTM E1745 Class A; fabric reinforced plastic film, minimum 6 mil thick.

2.3 PIPE MATERIALS

- A. Pipe: ASTM D2729; polyvinyl chloride pipe.
 - 1. Joints: Socket ends for solvent welding.
 - 2. Joint Cement: ASTM D2564, solvent type.
 - 3. Fittings: Polyvinyl chloride.
- B. Gas Collection Pipe: Perforated pipe, 4 inch nominal size with geotextile filter wrap.
- C. Gas Vent Pipe: Unperforated pipe, 4 inch nominal size.

2.4 JOINT SEALERS

- A. Joint Backing: Round foam rod compatible with sealant; oversized 30 to 50 percent larger than joint width.
- B. Sealants:
 - 1. Vapor Retarder Joints: Butyl sealant as specified in Section 07 90 00.
 - 2. Slab on Grade Joints: Polyurethane traffic sealant as specified in Section 07 90 00.
 - 3. Foundation Wall Joints: Polyurethane sealant as specified in Section 07 90 00.

2.5 ACCESSORIES

- A. Penetration Boot: Form using vapor retarder with stainless steel clamping ring.
- B. Roof Flashing: Sheet metal as specified in Section 07 62 00.
- C. Vent Cap: Cast iron through roof with screen to prevent insect intrusion.
- D. Joint Filler: Compressible PVC foam type with recovery rate of minimum 95 percent.
- E. Tape: Self-adhering type, 2 inch wide, compatible with vapor retarder.
- F. Electrical Junction Box: As specified in Division 26.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify slab on grade subbase is compacted, graded, and ready to receive work.
- B. Verify subbase elevations are as indicated on Drawings.

3.2 GAS VENT PIPE INSTALLATION

- A. Install gas vent pipe with solvent welded Tee fitting at base of vent pipe.
- B. Install gas collection pipe in loops encircling an area of not more than 2,000 SF, 12" inside exterior foundation walls, connected together. Provide sleeves where loops are interrupted by interior footings.
- C. Stub gas vent pipe minimum 12 inches above top of slab on grade. Temporarily cap pipe stub to prevent material from entering piping.
- D. Install gas vent pipe where indicated on Drawings.
 - 1. Manifold multiple collection pipes from isolated floor areas under slab into single vent through roof via floor sump.
- E. Extend gas vent pipe in concealed location to minimum 12 inches above roof and minimum of 10 feet from fresh air intakes.
 - 1. Make pipe joints gas tight with solvent welded fittings.
 - 2. Support pipe at each floor and attic penetration.
 - 3. Transition to cast iron pipe below and through roof.
- F. Identify gas vent pipe with permanent markings maximum 25 feet on center and within 12 inches of both sides of floor construction and below roof construction. Mark pipe as RADON VENT.
- G. Install 90 degree elbow and vent cap at gas vent pipe termination above roof.
- H. Firestop gas vent pipe penetrations through fire rated assemblies as specified in Section 07 84 00.
- I. Install electrical junction box near gas vent pipe, in-line fan and system failure alarms.
 - 1. Wire junction box to separate circuit on power panel.
 - 2. Label circuit for intended use.
 - 3. Coordinate electrical installation with work of Division 26.

3.3 SLAB ON GRADE BASE COURSE INSTALLATION

- A. Install slab on grade base course minimum 4 inches thick as specified in Section 31 20 00.
- B. Cover gas vent pipe Tee fitting.

3.4 VAPOR RETARDER INSTALLATION

- A. Install vapor retarder over entire base course surface.
- B. Lap joints minimum 12 inches. Seal laps with one continuous bead of sealant. Tape joints to retain retarder in place.
- C. Install penetration boot around penetrations through slab on grade.
 - 1. Extend minimum 4 inches above top of slab on grade and minimum 6 inches onto vapor retarder sheet under slab on grade.
 - 2. Seal laps with one continuous bead of sealant and tape joints.
 - 3. Install one continuous bead of sealant on penetrating item. Embed penetration boot in sealant and install clamping ring to retain penetration boot.
- D. Inspect vapor retarder immediately before placing concrete for slab on grade.
 - 1. Repair tears and punctures with patches extending minimum 12 inches beyond extent of tears and punctures.
 - 2. Seal and tape repairs as specified for lap joints.

3.5 SUMP COVER

- A. Install airtight, gasketed cover on sumps that are connected to radon mitigation system.

3.6 SLAB ON GRADE INSTALLATION

- A. Install joint filler around penetrations through slab on grade and slab perimeter.
- B. Install slab on grade as specified in Section 03 30 00.

3.7 JOINT SEALANT INSTALLATION

- A. Remove joint filler to 1/2 inch depth from top of slabs on grade.
- B. Install sealant joints, perimeter, and penetrations of slab on grade and foundation walls as specified in Section 07 90 00 to prevent radon gas from entering building interior.

3.8 FIELD QUALITY CONTROL

- A. Request inspection of vapor retarder before placing slab on grade.

...END OF SECTION 31 21 13

SECTION 31-25-13

EROSION AND SEDIMENTATION CONTROL

1. Part 1 General

1.1 DESCRIPTION:

- A. This Plan has been developed as a strategy to control soil erosion and sedimentation during and after construction of the Munjoy Commons Apartments, Shailer School located on North Street and Emerson School located on Emerson Street in Portland, Maine. This plan is based on the Maine Erosion and Sedimentation Control Handbook for Construction, Best Management Practices, March, 2003.

PROPOSED DEVELOPMENT:

- B. The project consists of the construction of an eighteen foot wide, 1,497 LF gravel road, gravel driveways (alternate, recycled bituminous pavement surface) and associated drainage structures including bioretention areas. The parcel is located on Wildwood Road in Bridgton.

The roadway, driveways, bioretention areas and drainage improvements, future home sites and their associated grading define the limits of proposed earth movement for the development. The horizontal and vertical placement of the road and driveways have been designed to maximize the topographic opportunities available. Bioretention areas shall be protected during construction activity up gradient, until disturbance is permanently stabilized.

2.0 METHOD AND PRODUCTS

2.1 EROSION CONTROL PRACTICES / TEMPORARY MEASURES

- A. The following temporary measures to control erosion and sedimentation shall be utilized:

1. Each ground area, opened or exposed, whether directly or indirectly due to the development, shall be minimized and shall be stabilized within 15 days of initial disturbance of soil and shall be permanently stabilized within seven days of final grading. This statement applies to disturbed areas beyond the limits of the proposed road. Exposed areas shall be stabilized prior to a rain event.
2. Temporary soil stabilization shall be either by temporary mulching, temporary seeding, permanent base gravel, or rip-rap as follows:

Temporary Seeding. Seed shall be Aroostook rye applied at 2.60#/1000 SF. Lime shall be agricultural ground limestone applied at 138#/1000 SF. Fertilizer shall be 10-10-10 classification applied at 13.8#/1000 SF. Mulch shall consist of hay or straw mulch and spread evenly at a rate of 70-90#/1000 SF. Temporary seedings shall only be made between April 15 and October 1, and shall not be placed over snow.

Temporary Mulching. Mulch shall consist of chopped hay or straw mulch and spread by mechanical blower evenly at a rate of 150-200#/1000 SF. Temporary mulch shall be removed prior to permanent soil stabilization. Mulch must not be placed over snow. Snow shall be removed prior to mulching.

- Permanent Base Gravel. Base gravel shall be suitable as temporary soil stabilization under the following conditions:
 - a. Slopes shall be less than eight percent.
 - b. Gravel shall meet the specifications for base or subbase gravel for the proposed completed surface.

2.2. EROSION CONTROL PRACTICES / PERMANENT MEASURES

A. The following permanent measures to control erosion and sedimentation shall be utilized:

1. Permanent seeding shall be performed during construction operations as each disturbed area has been brought to finish grade. Permanent seedings shall be made as dormant seeding after the first killing frost. Dormant seeding and mulch shall be used at two times the permanent seeding and mulching rate shown below for both lawn as well as embankments, avoid application of grass seed in bioretention areas. Seed, loam, lime, fertilizer and mulch are to be as follows:

- Seed. The seed mixture shall consist of seeds proportioned by weight. All seed shall be fresh, clean, "new crop" seed. Harmless inert matter and weed seeds shall be permitted up to one percent of the gross weight of each variety of seed. All seed supplied shall be packed in approved containers bearing the manufacturer's name and analysis of contents. The following materials and application rates shall be required for permanent seeding:

Creeping red fescue:	0.69#/1000 SF	
	Kentucky bluegrass:	0.57#/1000 SF
Perennial ryegrass:	0.46#/1000 SF	
Redtop:	0.12#/1000 SF	
Total:	1.84#/1000 SF	

- Loam. Loam shall be free of grasses, roots, large stone and inorganic debris. Place loam at four inches minimum depth over all disturbed areas. Final grading of all lawn areas to be approved by Landscape Architect prior to seeding.
- Lime. Lime shall be agricultural ground limestone and applied as per recommendation of a State Commercial Soil Testing Laboratory.
- Fertilizer. Fertilizer shall be 10-20-20 classification and applied as per recommendation of a State Commercial Soil Testing Laboratory.
- Mulch. Mulch shall consist of hay or straw mulch. Mulch shall be spread evenly at a rate of two and one half tons per acre over all seeding. After application, the mulch shall be thoroughly wetted. In steep areas, the mulch shall be held in place by the use of jute erosion control netting or approved alternative netting material. Note: All exposed soil must be covered regardless of mulching rates specified.
- Erosion Control Fabrics. Fabrics shall be installed on all slopes exceeding 3:1. Fabric to be placed after seeding has occurred.

- The contractor shall maintain the seeded and mulched areas until final acceptance of the work. Maintenance shall consist of providing proper watering, protection against traffic and repairing any areas damaged due to wind, water, erosion, fire or other causes. Such damaged areas shall be repaired to re-establish the condition and grade of the soil prior to seeding and shall then be refertilized, reseeded and remulched.
2. Winter Construction. The winter construction period is from November 1 through April 15. Winter excavation and earthwork shall be completed such that no more than 1 acre of the site is without stabilization at any one time. Limit the exposed area to those areas in which work is expected to be undertaken during the proceeding 15 days and that can be mulched in one day prior to any snow event. Hay and straw mulch rates shall be a minimum of 150#/1000 SF (3 tons/acre) and shall be properly anchored. The contractor must install any added measures which may be necessary to control erosion/sedimentation from the site dependent upon the actual site and weather conditions. Continuation of earthwork operations on additional areas shall not begin until the exposed soil surface on the area being worked has been stabilized in order to minimize areas without erosion control protection.

3.0 EXECUTION

3.1 CONSTRUCTION SEQUENCE

A. The general sequence of work shall be as follows:

1. Install erosion control devices (silt fence, stabilized construction entrance and or sediment barrier). Note: when frozen ground conditions exist, silt fence shall be replaced with woodwaste filter berms.
2. Demolition of existing school building (1950's) addition. Remove bituminous pavement for building location.
3. Temporarily stabilize disturbed areas by mulching all exposed soil within 15 days of initial disturbance.
4. Excavation for footings and frostwall construction.
5. Install stormwater infrastructure.
6. Install water service and sanitary sewer service.
7. Install underground utilities.
8. Construct parking lot and reconstruct drive/road.
9. Complete site construction work.
10. Install permanent vegetation on all exposed areas within 15 days of final grading.
11. Perform continuing maintenance on all erosion and sedimentation control devices and measures.

3.2 SITE INSPECTION & MAINTENANCE

- A. Weekly inspections, as well as routine inspections following rainfalls of 0.5" over a consecutive 24-hour period, shall be conducted by the Site Contractor, of all temporary and permanent erosion control devices until final acceptance of the project. Necessary repairs shall be made to correct undermining or deterioration. Final acceptance shall include a site inspection to verify the stability of all disturbed areas and slopes. Until final inspection, all erosion and sedimentation control measures shall immediately be cleaned, and repaired by the General Contractor after storm events. Disposal of all temporary erosion control devices shall be the responsibility of the Site Contractor.
- B. Continued temporary maintenance and long-term provisions for permanent maintenance of all erosion and sedimentation control facilities after acceptance of the project shall be the responsibility of Avesta Cousens Housing LP or Assigns.

Part II
Division 32

Exterior Improvements

SECTION 32 12 16

ASPHALT PAVING

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing asphalt paving on the project site and within the City of Portland right-of-way.
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Submit materials certificate to onsite independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

1.3 QUALITY ASSURANCE:

- A. Reference: State of Maine Department of Transportation Standard Specifications Highways and Bridges, latest revision, hereafter designated as MDOT Specifications.

2 PART 2 PRODUCTS

2.1 MATERIAL:

- A. Bituminous Concrete (roadway and parking) – An approved hot plant mix conforming to MDOT Standard Specifications (latest revision). Use Grading B mix for binder and C mix for surface.
- B. Bituminous Concrete (sidewalks) – An approved hot plant mix conforming to MDOT Standard Specifications (latest revision). Pavement shall be grading B mix for binder and C mix for surface.

3 PART 3 EXECUTION

3.1 INSTALLATION:

- A. The Contractor shall be responsible that gravel is in proper condition to pave before starting work.

- B. Proof roll prepared base material surface to check for areas requiring additional compaction and areas requiring removal and recompaction.
- C. Do not begin paving work until deficient base material areas have been corrected and are ready to receive paving.
- D. Pavement mix for roads and parking areas shall be as herein specified and shall consist of the following courses after compaction:

	<u>Binder Course</u>	<u>Wearing Course</u>
Standard Duty Pavement:	2"	1.5"
Sidewalk Pavement	1"	1"

- E. The spreading of bituminous concrete shall be done wherever practicable by an approved mechanical spreader. Place mixture while it is still hot (+250 D.F.). Rolling shall be done as soon as practicable after spreading and in no case after the mixture is cooled. The exposed finished surface shall present a true, smooth plane, free from roller marks, conspicuous joining lines, patches, voids or other imperfections. Where brown spots or other serious imperfections occur they shall be cut down to the base course and replaced by new pavement rather than by attempting to patch the surface. Feathered edge patches will not be permitted.
- F. Apply successive lifts of asphaltic concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10' - 0" wide.
- G. Make joints between old and new pavements or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Joints at existing street paving and new paving shall be saw cut. Clean contact surfaces and apply tack coat.
- H. Mix placed by hand shall be placed on a steel dump board or wheelbarrow from the truck and then shoveled into place.
- I. Rolling and Compaction
 - 1. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. Mixture shall be compacted to a minimum of 92% theoretical maximum density. The number, weight and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in workable condition.
 - 2. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
 - 3. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
 - 4. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

5. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
6. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
7. **Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.**
8. **Do not permit maneuvering of excavating equipment, lifts or other vehicles with tight turning or tracking capabilities on finished surface. Damaged areas shall be restored by Contractor at no additional expense to Owner.**

3.1 INSPECTION:

- A. Grade Control: Establish and maintain required lines and elevations.
- B. Thickness: In-place compacted thickness shall not be less than thickness specified on the Drawings. Areas of deficient paving thickness shall receive a tack coat and a minimum one (1) inch overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Owner's Representative and or Owner; until specified thickness of the course is met or exceeded at no additional expense to the Owner.
- C. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt concrete course for smoothness, using 10' - 0" straightedge applied parallel with, and at right angles to centerline of paved area.

The results of these tests shall be made available to the Owner upon request. Surfaces will not be acceptable if exceeding following tolerances for smoothness:

Base Course Surface:	1/4"
Wearing Course Surface:	3/16"

- D. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner's Representative and or Owner.
- E. Compaction: Field density tests for in-place materials shall be performed by examination of field cores in accordance with one of the following standards:
 1. Bulk specific gravity of paraffin-coated specimens: ASTM D-1188.
 2. Bulk specific gravity using saturated surface-dry specimens: ASTM D-2726.
- F. Rate of testing shall be one (1) core per 20,000 square feet of pavement, with a minimum of three (3) cores from heavy-duty areas and three (3) cores from standard-duty areas. Cores shall be cut from areas representative of the project.
- G. Areas of insufficient compaction shall be delineated, removed and replaced in compliance with the specifications at no expense to the Owner. Areas damaged by construction equipment shall be repaired to satisfaction of Owner at no expense to Owner.

...END OF SECTION 32 12 16

SECTION 32 13 13

CONCRETE PAVING

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing cast-in-place concrete work including (but not bay way of limitation) cast-in-place concrete, reinforcing, accessories, and finishing.
- C. Related work:
 - 1. Section 03 30 00, Cast-in-Place Concrete.
 - 2. Section 31 05 12, Site Earthwork.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Submit materials certificate to onsite independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

1.3 QUALITY ASSURANCE:

- A. Reference: Section 03 30 00, Cast-in-Place Concrete – Part 1.4 Quality Assurance.

2 PART 2 PRODUCTS

2.1 MATERIAL:

- A. All concrete shall meet the requirements as specified in Section 03 30 00, Cast-in-Place Concrete, of these Specifications.
- B. Deicer Protection (exterior concrete): Saltgard as manufactured by Pro So Co., Inc. or approved equal.

3 PART 3 EXECUTION

3.1 INSTALLATION:

- A. Concrete Pavement and Pads
 - 1. All concrete shall meet the requirements as specified in Section 03 30 00, Cast-in-Place Concrete, of these Specifications.

2. After placement of the gravel base, the surface shall be brought to a smooth, uniform surface by grading and rolling the crushed aggregate base and re-rolled until the surface is true and even.
 3. Slabs shall be placed alternately in lengths not to exceed 30 feet, or as directed and shall be separated by an expansion joint of preformed expansion (zip strip) joint filler and sealant 1/3 inch in thickness. The thickness of the slab shall be as shown on the Plans. The sidewalk surface shall be scored 1-3/8 inch deep into block units as shown on the Plans. When a concrete sidewalk is constructed adjacent to a building, fixed or other structures, a 1/2 inch thick preformed (zip strip) joint filler and sealant shall be used between the slab and the structure. Both expansion and control joints are to occur only within score joints.
 4. Broom Finish - Broom finish by drawing a stiff-bristled pushbroom with a long handle over a troweled surface. Concrete walks shall receive a medium broom finish. Direction of brooming shall be perpendicular to major direction of pedestrian movement or as directed by the Landscape Architect.
 5. Concrete pavement shall be **saw cut** (not tooled) after brooming to insure a well-defined and smooth border.
 6. Finished concrete shall be properly cured using a waterproof material, such as Sisal Kraft orange label lapped 6 inch taped. The concrete shall be properly moistened before covering it, and shall be kept tight. Curing shall be a minimum of seven (7) days.
- B. Deicer Protection:
1. Apply Deicer Protection to all exterior slabs on-grade, stairs, sidewalks and related work 30 days after concrete placement in strict accordance with manufacturers written recommendations.

...END OF SECTION 32 13 13

SECTION 32 16 00

CURBING

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing granite and bituminous curbing.
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.
 - 2. Section 32 12 16, Asphalt Paving.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data for granite curbing.

1.3 QUALITY ASSURANCE:

- A. Where M.D.O.T. appears it shall be taken to mean The State of Maine Department of Transportation Specifications, Highways and Bridges - Latest Revision.

1.4 DELIVERY:

- A. Package, handle, deliver and store access brick pavers and truncated dome pavers at the project site in a manner that will avoid damage.

2 PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. Granite curbing to be manufactured by John Swenson Granite Co. or approved equal.

2.2 MATERIALS:

- A. Granite curbing
 - 1. Vertical and Sloped Granite Curb: Granite curb shall conform to M.D.O.T. specifications for TYPE I and TYPE V. Curb shall be acceptable granite from approved quarries.
 - 2. Tip-Down, Transition and Bullnose Granite Curb: Miscellaneous Granite Curb Sections shall conform to M.D.O.T. Specification 712.04 (b).
 - 3. All granite curb shall conform to the following standards.

- a. All granite curb shall be basically light gray in color, free from seams and other structural imperfection or flaws which would impair its structural integrity, and of a smooth splitting appearance. Natural color variation characteristic of the deposit from which the curbing is obtained will be permitted.
- b. The exposed face shall be smooth quarry split to an approximately true plane having no projections or depressions which will cause over one (1) inch to show between a two (2) foot straight-edge and the face when the straight-edge is placed as closely as possible on any part of the face.
- c. If projections on the face are more than that specified they shall be dressed off. The top and bottom lines of the face shall be pitched off to a straight line and shall not show over one (1) inch between stone and straight-edge when straight-edge is placed along the entire length of the top and bottom lines and when viewed from a direction at right angles to the plane of the face, and for the top line only not over (1) inch when viewed from a direction in the plane of the face. The ends shall be square to the length at the face and so cut that when placed end to end as closely as possible, no space shall show in the joint at the face of over 3/8 inch, except that where the edging is to be used on a curve having a radius of ten (10) feet or less, the ends of the stones shall be so cut as to provide a finished joint at the face section of not more than 1/2 inch. The arras formed by the intersection of the plane of the face with the plane of the end joint shall not vary from the plane of the face more than 1/4 inch. Drill holes not more than 3-1/2 inches in length and 1/2 inch in depth will be permitted. The sides shall not be broken under the square more than four (4) inches and the side adjacent to the grass shall not project over one (1) inch.
- d. Dimension Tolerance:

Minimum Length	2 feet
Maximum Length	8 feet
Thickness	4 inches
Width of Face	12 inches

B. Bituminous Concrete Curb (Cape Cod Curb): An approved hot plant mix conforming to curb mix specifications (MDOT Standard Specifications - latest edition).

3 PART 3 EXECUTION

3.1 INSTALLATION:

A. Granite Curb

- 1. Contractor shall install, backfill and protect all granite curb in accordance with M.D.O.T. Subsection 609.03 and as detailed on the Drawings. Provide approved granite tip-down curbs at all curb end sections. Provide approved granite transition curb where curb type and or material changes occur.
- 2. Contractor shall coordinate with the City of Portland inspections for re-use of salvaged granite curbing.

- B. Bituminous Concrete Cape Cod Curb: Place curb by machine in locations and as detailed on the Drawings and conforming with section 609.04 a, b & e bituminous curb (MDOT Standard Specification).

3.2 PROTECTION:

- A. The Contractor shall be responsible to protect and repair as necessary all vertical and sloped granite curbing disturbed during construction at no expense to Owner. Provide temporary barriers at all radius locations where truck entry would impact curbing.
- B. The Contractor shall be responsible to protect all bituminous curb after installation until cooled and hardened. Areas subject to impact from vehicle and or construction equipment shall be protected until completion of project. Damaged curbing shall be replaced upon direction of Owner's Representative and or Project Engineer.

...END OF SECTION 31 16 00

SECTION 32 17 23
PAVEMENT MARKINGS

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes pavement paint markings.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data for pavement paint.

2 PART 2 PRODUCTS

2.1 MATERIAL:

- A. The paint shall be a non-bleeding, quick drying, alkyd petroleum base paint suitable for traffic-bearing surfaces and shall meet FS TTP-85E and mixed in accordance with manufacturer's instructions before application.

3 PART 3 EXECUTION

3.1 INSTALLATION:

- A. Immediately before applying the pavement marking paint to the pavement, the surface shall be dry and entirely free from dirt, grease, oil or other foreign matter which would reduce the bond between the paint and the pavement. The surface shall be thoroughly cleaned by sweeping and blowing, if required, to remove all dust, dirt and loose materials. Areas which cannot be satisfactorily cleaned by sweeping and blowing shall be scrubbed with water, as directed, after which the surface shall be allowed to dry prior to painting.
- B. Apply two (2) coats of paint at manufacturer's recommended rate without the addition of thinner with a maximum of 125 square feet per gallon. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use a straightedge to ensure a uniform, clean, and straight stripe.

...END OF SECTION 32 17 23

SECTION 32 31 00

FENCES

1 PART 1 GENERAL

1.1 DESCRIPTION

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing:
 - 1. Chainlink fence
 - 2. Jerith Ornamental Picket Fencing and Accessories
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.
 - 2. Section 32 12 16, Asphalt Paving.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Changes in specification may not be made after the bid date.
 - 2. Shop Drawings: Layout of fence with dimensions, details, and finishes of component accessories and post foundations.
 - 3. Product Data: Manufacturer's catalogue cuts indicating material compliance and specified options.
 - 4. Samples: If requested, samples of materials are available (e.g. finials, post caps, and accessories).

1.3 DELIVERY

- A. Package, handle, deliver and store fencing at the project site in a manner that will avoid damage.

1.4 REFERENCES

- A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- B. ANSI/ASTM F567 - Installation of Chain-Link Fence.
- C. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.
- D. ASTM A120 – Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

- E. ASTM A153 – Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- F. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
- G. ASTM A428 – Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- H. ASTM A491 – Aluminum-Coated Steel Chain Link Fence Fabric.
- I. ASTM C569 – Steel, Carbon (0.15) Maximum Percent), Hot-rolled Sheet and Strip Commercial Quality.
- J. ASTM C94 – Ready Mixed Concrete.
- K. ASTM F573 – Residential Zinc-Coated Steel Chain Link Fence Fabric.
- L. ASTM F668 – Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
- M. Chain Link Fence Manufacturers Institute (CLFMI) – Product Manual.
- N. FS FF-F-191 – Fencing Wire and Post Metal (and Chain Link Fence Fabric and Accessories).

1.5 SPECIAL WARRANTY:

- A. Ornamental Fence: Provide manufacturer's lifetime warranty that its ornamental fence system is free from defects in material and workmanship including cracking, peeling, blistering and corroding.

2 PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. Chainlink Fence: Acceptable manufacturers subject to compliance with requirements, provide products of one of the following:
 - 1. Allied Tube and Conduit Corporation
 - 2. Anchor Fence, Inc.
 - 3. United States Steel
 - 4. Acme Fence Company

Product of other manufacturers may be considered subject to compliance with the requirements as judged by the Landscape Architect and or Owner's Representative.

- B. Jerith Manufacturing Company, Inc. 14400 McNulty Road Philadelphia, PA 19154. Phone: 800-344-2242 Fax 215-676- 9756 Web: www.jerith.com email: sales@jerith.com
Product of other Manufacturers may be considered subject to compliance with the requirements as judged by the Landscape Architect and or Owner's Representative.

2.2 MATERIALS:

A. Chainlink Fence:

1. Fabric
 - a. No. 9 ga. (0.148"± 0.005") finished size galvanized steel wires, vinyl coated 2" mesh, with both top and bottom salvages twisted.
 - b. Furnish one-piece fabric widths for fencing.
2. End, Corner and Pull Posts: Galvanized steel, minimum sizes and weights as follows:
 - a. 4'-0" Fabric Height: 2.875" OD pipe, 5.79 lbs./lin. ft.
3. Line Posts: Galvanized steel, with exposed portions finished, minimum sizes and weights as follows:
 - a. 4'-0" Fabric Height: 2.375" OD steel pipe, 3.65 lbs./lin. ft.
4. Top Rail: Rails: 1.66" OD pipe, 2.27 lbs./ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs./ft.; galvanized steel, manufacturer's longest lengths.
5. Couplings: Expansion type, approximately 6" long, for each joint.
6. Attaching Devices: Provide means for attaching top rail securely to each corner, pull and end post.
7. Sleeves: Galvanized steel pipe not less than 6" long and with inside diameter not less than ½" greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than 1" greater than outside diameter of sleeve.
8. Tension Wire: 7 gauge galvanized steel, coated coil spring wire, located at bottom of fabric.
9. Wire Ties: 11 gauge galvanized steel.
10. Post Brace Assembly: Manufacturer's standard adjustable brace at end and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.
11. Post Tops: Galvanized steel, weather tight closure cap for each tubular post. Furnish caps with openings to permit passage of top rail.
12. Stretcher Bars: Galvanized steel, one piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x ¾". Provide one stretch bar for each end post, and two for each corner and pull post.
13. Stretch Bar Bands: Manufacturer's standard.
14. Portland Cement: ASTM C150.

15. Aggregates: ASTM C33.
 16. Water: Clean
 17. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-corrosive, non-staining, non-gaseous, exterior grout complying with CE CRD-C621.
 18. Finish
 - a. Framing: Galvanized steel, ASTM A120 or A123, with not less than 1.8 oz. Zinc/sq. ft. of surface.
 - b. Hardware and Accessories: Galvanized, ASTM A153 with zinc weights in accordance with Table I.
- B. Ornamental Metal Picket Fence shall be Jerith Manufacturing Company, Inc., Style # 202. Height 42 inches, see plans.

3 PART 3 EXECUTION

3.1 EXAMINATION:

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

2.2 INSTALLATION:

- A. Chainlink Fence:
 1. Comply with recommended procedures and instructions of fencing manufacturer. Provide secure, aligned installation with line posts spaced at 10'-0" o.c. maximum.
 2. Grade Set Posts: Drill, air drive, or hand excavate using post hole digger in firm undisturbed or compacted soil.
 3. Excavate hole for each post to minimum diameter recommended by fence manufacturer but not less than four times largest cross-section of post. Excavate hole depths approximately 3" lower than post bottom with bottom of posts set not less than 36" below finish grade surface.
 4. Center and align posts in holes 3" above bottom of excavation.
 5. Concrete Mixing: Mix materials to obtain concrete with minimum 28-day comprehensive strength of 2,500 psi; 1" maximum size aggregate, maximum 3" slump, and 2-4% entrained air.
 6. Place concrete around end posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Extend concrete footing 2" above grade and trowel to crown to shed water.

7. Sleeve Set Posts: Anchor posts by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.
8. Top Rails: Run rail continuously, bending to form radius for curved runs. Provide expansion couplings as recommended by manufacturer.
9. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using special offset fittings where necessary.
10. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
11. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 ga. galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.
12. Fabric: Leave approximately 2" between finish grade and bottom salvage. Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
13. Stretcher Bars: Secure at end, corner, pull, and gate posts by threading through or clamping to fabric at 4" o.c., and secure to posts with metal bands spaced at 15" o.c.
14. Tie Wires:
 - a. Use U-shaped wire, conforming with diameter of pipe to which attached, clasping pipe and fabric firmly when ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.
 - b. Tie fabric to line posts with wire ties spaced 12" o.c. Tie fabric to rails and braces with wire ties spaced 24" o.c. Tie fabric to tension wires with hog rings spaced 24" o.c.
 - c. Manufacturer's standard procedure will be accepted if of equal strength and durability.
15. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

B. Ornamental Metal Picket Fence:

1. Install fence in accordance with manufacturer's instructions.

3.3 CLEANING:

- A. Clean up debris and unused material, and remove from site.

...END OF SECTION 32 31 00

SECTION 32 90 00

PLANTING

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section shall include all labor, materials, services, equipment and accessories necessary to furnish and install trees, shrubs, and turf in accordance with the specifications and applicable Drawings.
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.
 - 2. Section 12 93 00, Site Furnishings

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Tests specified in this Section shall be paid for by the Contractor. **Certifications required must be submitted to the Landscape Architect and or Owner's Representative for approval before use of materials on the site.**
- C. **The Contractor shall be required to take representative soil samples of the topsoil** to be provided from several locations (on-site) in the area(s) under consideration for testing. Imported topsoil shall also require test results prior to placement. Tests shall be made by a State Commercial Soil Testing Laboratory using methods approved by the Association of Official Agricultural Chemist or the State Agricultural Experiment Station, or by the University of Maine at Orono. Testing shall include chemical balance (pH) **as well as organic content. The required pH level shall be between 6.6-7.3% and the organic content shall be between 6.5-8%.**
- D. The Contractor shall provide testing data for composted soil amendment if required to supplement the required minimum organic content.
 - 1. Handle bicycle racks with sufficient care to prevent any scratches or damage to the finish.
- E. The Contractor shall provide the Dealer's Guarantee Statement for grass seed mix.

1.3 QUALITY ASSURANCE:

- A. Provide plants which are true to name. Tag one of each bundle or Lot with the name and size of plants and shall conform to ANSI Z260.1 - Nursery Stock, latest edition, of the American Association of Nurserymen, Inc.

- B. Workmanship: Perform work in accordance with the best standards of practice for Landscape work and under the continual supervision of a competent foreman capable of interpreting the Drawings and Specifications.
- C. Submit documentation to Landscape Architect of Record within twenty-five (25) days after award of contract stating that plant material is available. Any and all substitutions due to unavailability must be requested in writing prior to confirmation of ordering.
- D. Plants shall be subject to review and approval of Landscape Architect of Record at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of review and rejections during progress of the work. Submit written request for review of plant material at place of growth or project location to Landscape Architect of Record. Notification for on-site inspection shall be a minimum of 48 hours before inspection. Written request shall state the place of growth and quantity of plants to be reviewed. Landscape Architect of Record reserves the right to refuse review at this time if, in his judgment, sufficient quantity of plants is not available for review. Review shall be for character and form.
- E. Certificate of Acceptability: Inspection of the work covered by this Section to determine completion of the work involved will be made at the conclusion of the Maintenance Period upon written notice requesting such inspection submitted by the Landscape Contractor at least ten (10) days prior to the anticipated date. The condition of turf and plantings will be noted and determination made by the Landscape Architect whether maintenance shall continue.

1.4 GUARANTEE:

- A. Turf and plantings shall be guaranteed for one (1) full year after certification of acceptability by the Landscape Architect and shall be alive and in satisfactory growth at the end of the guarantee period, except for damage resulting from causes beyond the responsibility of the Contractor. The Contractor shall provide the Owner with a written guarantee upon certification of acceptability. For plant material in question at the end of the guarantee, the Landscape Architect, Owner and Contractor shall determine a reasonable extension of the guarantee period.

2 PART 2 PRODUCTS

2.1 MATERIALS:

- A. Topsoil - The Contractor shall furnish and place topsoil to give the specified depths. The Contractor shall furnish and place 18 inches of loam in all shrub beds, and 6 inches under all turf areas. Topsoil mix shall be placed in all tree and shrub pits as shown on the Drawings. Natural loam topsoil shall be of uniform quality, free from hard clods, still clay, hard pan sods, stones over ¾ inches and undesirable inorganic materials. The Owner and/or Landscape Architect reserves the right to reject on or after delivery any materials which do not, in his or her opinion, meet these Specifications.
- B. Additives:
 - 1. Humus - Ground or shredded peat that has been stockpiled at least one year prior to use, or commercial bagged peat.

2. Manure - Well-rotted unleached stable manure with no more than 25% straw, shavings, or sawdust content. A mixture of one (1) cubic yard of peat humus or peat moss and 100 lbs. of commercial dehydrated-bagged manure such as Bovung or Spurigon may be used.
 3. Mulch for Plants - Well-rotted (**black**) shredded pine bark as approved by the Landscape Architect.
 4. Lime - Commercial ground lime with no less than 85% total carbonates, 50% passing a 100 mesh sieve and 90% passing a 200 mesh sieve as approved by the Landscape Architect. Coarser material will be accepted provided that specific rates of application increased proportionately.
 5. Compost soil amendment – Acceptable compost for “compost manufactured topsoil” shall conform to EPA Chapter 40 CFR 503 (pathogen, metals and vector attraction reduction) as well as applicable state regulations.
- C. Commercial Fertilizer
1. Seeding - 19-26-5 dust free homogenous granular material such as Scotts Pro-Turf Starter Fertilizer or an approved equal (application rate as recommended by manufacturer).
 2. Sodding - 10-6-4 with 50% nitrogen derived from urea form, such as Agway Turfwood Special Premium or an approved equal (application rate as recommended by manufacturer).
 3. Super phosphate - 0-20-0 in unopened bags with manufacturer analysis printed on the bag.
- D. Plant Materials - Furnish plants shown and specified on the Drawings and listed in the plant materials list. Discrepancies between the number of plants shown on the Drawings and the number listed in the plant list shall not be grounds for additional remuneration for the Contractor. Plants shall be nursery grown, typical of their species or variety and have a normal habit of growth. Any plant with broken, damaged, or badly bruised branches, trunks, or root balls shall be rejected.
1. Sizes: Plants larger than specified in the plant list may be used if approved by the Landscape Architect but use of such plants shall not increase the contract price. If the use of the larger plants is approved, the spread of roots or ball of earth shall be increased in proportion to the size of the plants.
 2. Substitutions: In the event that trees, shrubs or other plant material specified in the plant list are impossible or unreasonably difficult to obtain, the Contractor shall immediately notify the Landscape Architect to discuss appropriate substitutions. No substitutions of plant material may be made without the approval of the Landscape Architect.

E. Grass Seed

1. Grass Seed mixtures shall be fresh, clean, new crop seed. Seed may be mixed by an approved method on the site, or may be mixed by the dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers which shall bear the dealer's guaranteed statement of the composition of the mixture and the percentage of purity of each variety. The Dealer's Guarantee Statement shall be delivered to the Landscape Architect.

2. Grass seed mixture for Lawn Areas shall be of the following types of seed:

Park Mix by Allen, Sterling & Lothrop or approved equal

35%	Kentucky Bluegrass 85/80
20%	Creeping Red Fescue
15%	Chewings Fescue
15%	Perennial Ryegrass
15%	Ryegrass

- F. Sod - Sod shall be well-established turf of even thickness consisting of a Bluegrass blend, 90% Bluegrass and 10% Fescue. Sod shall be as provided by Winding Brook Sod Farm, Lyman, Maine or approved equal.

3 PART 3 EXECUTION

3.1 INSTALLATION:

A. Pre-Plant Weed Control

1. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide, as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least fifteen days to allow systemic kill or as directed by advisor.
2. Maintain site weed free until final acceptance by Owner utilizing mechanical, manual and/or chemical treatment.
3. Project Planting Beds adjacent to seeded lawn areas from over spray of seed mix. Germinating grass shall be removed before planting and mulching of beds. Contractor shall be responsible for removal of grass and or weeds after installation of plant material during maintenance period.

B. Planting of Trees and Shrubs

1. Plants must be located by the Contractor and approved by the Landscape Architect before pits are dug. The Contractor shall notify the Landscape Architect at least 48 hours prior to scheduling installation of plant material. Locations as shown on the Drawings may be varied due to existing conditions.
2. Preparation of Soil - Manure, peat humus and super phosphate additives shall be incorporated into topsoil by placing the additives over topsoil piles and turning piles at least 3 times or until thoroughly mixed. (Refer to planting detail).

3. Staking and guying: Trees shall be staked at the time of planting as shown on the typical section of Tree Planting Detail.
 4. Pruning and Mulching:
 - a. Remove all dead wood and/or suckers and all broken or badly bruised branches. All pruning shall conform to standards established by the National Arborist Association. Trees damaged during installation shall be removed and replaced at the direction of Project Landscape Architect and or Owner's Representative.
 - b. Immediately after planting operations are completed, cover all tree and shrub pits with three (3) inch layer of specified mulch. The limit of this mulch for trees shall be the area of the pit and for shrubs in beds, the entire area of the shrub bed. Mulch depth shall not exceed (3) inches.
 5. Watering
 - a. The Contractor shall be responsible for thoroughly watering all plant material upon installation.
 - b. Watering shall be monitored on a daily basis when temperatures exceed 70 degrees. The depth of moisture in all tree and shrub plantings shall be adequate to prevent wilting.
 - c. Watering (as required) of plant material shall continue for the duration of the maintenance period until certification of acceptability.
- C. Loaming and Seeding
1. Conduct planting operations under favorable weather conditions. Areas not required to be developed otherwise shall be seeded to turf.
 2. Compost Manufactured Topsoil – The soil (source material) shall be free of lumps, plants, weeds, roots and other debris over 2 inches in any dimension and free of stones over inch in any dimension. The organic compost shall be uniformly incorporated into the loam source by rolling and tumbling, by a front-end loader or by processing in a mixing plant. The material shall be mixed sufficiently to produce a homogenous soil, free of lumps and clods. In addition to the requirements for the compost amendment, the Contractor shall provide documentation that the recommended rate of fertilizer, per the testing analysis, has been applied to lawn areas prior to seeding.
 3. Prior to placing loam, scarify subgrade areas; remove all rocks over two (2) inches and debris; and set grade stakes as necessary. Place topsoil evenly over all areas to be loamed to a minimum thickness of six (6) inches. Hand rake to remove clods, lumps, brush, roots, and stones over ¾ inches in diameter. Hand roll to show depressions and uneven grades. Regrade as necessary to obtain smooth, even grades. Surplus topsoil shall become the property of the Contractor and shall be removed off the site.
 4. Apply additives (lime, fertilizer, compost etc.) as per the recommendation of the testing lab. Apply additives and harrow into top two (2) inches of the seedbed.

5. Sow seed specified by use of a mechanical spreader at the rates specified. Rake lightly in; roll with 200 lb. roller and water with a fine spray. Avoid spreading of grass seed mix in all designated planting beds.
6. Following compaction, apply a one- (1) inch layer of straw to hasten germination.
7. Full even growth in all areas must be guaranteed. The maintenance period shall continue after seeding and until the lawns are certified acceptable by the Landscape Architect. A minimum uniform catch of turf meeting 80% shall be required.
8. Repair damage resulting from erosion, gullies, washouts or other similar causes if such damage occurs before certification of acceptability of turf and planting by the Landscape Architect.
9. Sod - After all grading has been completed, the soil shall be irrigated within 12-24 hours before laying the sod. Sod shall not be laid on soil that is dry and powdery.
10. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to and tightly against each other. Lateral joints shall be staggered to promote a uniform growth and strength. Care shall be exercised to insure that the sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which cause air drying of the roots.
11. The Contractor shall water sod immediately after installation to prevent drying during progress of the work. It shall then be thoroughly irrigated to a depth sufficient that the underside of the new sod pad and soil immediately below the sod is thoroughly wet.
12. Rolling of the sod shall be required to properly join sod to the bed after the sod is installed and twenty-four (24) to forty-eight (48) hours after initial watering. The Contractor shall roll the required area with a roller which weights seventy-five (75) to one hundred (100) pounds per square foot of roller width. The completed sod surface shall be true to finish grades as shown on plans and even and firm at all points.
13. Watering
 - a. First and Second Week - The Contractor shall provide all labor and arrange for all watering necessary for establishment of the turf. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first and second week and in sufficient quantities to maintain moist soil to a depth of at least four (4) inches. Watering should be done during the heat of the day to help prevent wilting.
 - b. Watering shall continue to be the responsibility of the Contractor until such time as the Owner or project Landscape Architect has certified acceptance of lawn areas.

3.2 MAINTENANCE:

- A. General - Maintenance shall begin immediately after each portion of seed and each plant is planted and shall continue in accordance with the following:

1. Lawns: The Contractor shall be responsible for establishing a uniform stand of the specified seed and until a Certification of Acceptability is received. No bare spots shall be allowed. After the seed has started, all areas and parts of areas that fail to show a uniform stand of grass, for any reason whatsoever, shall be seeded or sodded repeatedly until all areas are covered with a satisfactory growth of grass. The Contractor shall be responsible for the first two (2) mowings.
2. New Plantings: Protect and maintain new planting until the end of the lawn maintenance period, or, if installed after the lawn maintenance period, until installation of planting is certified acceptable by the Landscape Architect. Maintenance shall include watering, spraying and dusting for insect and fungal control, mulching, tightening and repairing guys, replacement of sick or dead plants, resetting plants to proper grades or upright position, and restoration of planting saucer, and all other care needed for proper growth and maintenance of the plants. Planting completed after the lawn preparation shall provide proper protection to lawn areas. Any damage resulting from planting operations shall be promptly repaired.
3. Spraying and Dusting: During the maintenance and guarantee periods, the Contractor shall do all seasonal spraying and/or dusting of trees and shrubs as required.
4. Protection: Planting areas and plants shall be protected against trespassing and damage of any kind. If any plants become damaged or injuries occur, they shall be treated or replaced as directed.
5. Damage: Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, tamping, re-fertilizing, and sodding by the Contractor at his own expense if such damage occurs prior to certification of acceptability of turf and plantings by the Landscape Architect.
6. Responsibility: The Contractor's responsibility for maintenance shall cease at the time of certification of acceptability by the Landscape Architect. During the guarantee period, the Contractor shall be held responsible for making replacements, but no maintenance shall be required, other than spraying and dusting.

3.3 REPLACEMENT:

- A. At the end of the guarantee period, inspection will be made by the Landscape Architect upon written notice requesting such inspection and shall be submitted by the Contractor at least ten (10) days before the anticipated date. Any plant required under this Contract that is dead or not in satisfactory condition, as determined by the Landscape Architect, shall be removed from the site. These, and any other plants missing due to the negligence of the Contractor, shall be replaced with plants of the same type and size as originally specified. Replanting shall be done as soon as conditions permit, but during the normal planting season. Plant items in accordance with these specifications.

3.4 CLEANUP:

- A. The Landscape Contractor shall remove all debris, construction equipment, excess fill, rocks, and other excess material caused by his work, from the site upon completion of his portion of the work.

...END OF SECTION 32 90 00

Part II
Division 33

Utilities

SECTION 33 40 00
STORM DRAINAGE UTILITIES

1 PART 1 GENERAL

1.1 DESCRIPTION:

- A. Bidding requirements, conditions of the contract and pertinent portions of sections in Division One of these specifications, apply to the section as fully as though repeated herein.
- B. Work under this section includes furnishing and installing pipes, manholes and catchbasins.
- C. Related work:
 - 1. Section 31 05 12, Site Earthwork.
 - 2. Section 32 12 16, Asphalt Paving.

1.2 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. The Contractor shall submit the following information with sets of As-Built Drawings:
 - a. Shop Drawings of pipe and pre-cast units, catch basins manholes, and field inlets.
 - b. Manufacturer's information of joint sealants, gaskets and waterproofing.
 - c. Storm drain pipe. Pipe of the same manufacturer shall be used throughout the project.
 - d. Source and gradation reports for soil materials.
 - e. Manufacturer's information of physical, filtration/hydraulic and mechanical properties of geotextile fabrics.
 - f. Drainage stone source and gradation analysis report.
 - g. Structural fill source and gradation analysis report.

1.3 DELIVERY:

- A. Exercise care when handling pipe to prevent damage to pipe and finish.
- B. Immediately remove damaged materials and replace at no additional cost to the Owner.
- C. Store materials above ground on platforms, skids, or other adequate supports.
- D. Protect geotextiles from ultraviolet light in accordance with manufacturer's requirements

1.4 QUALITY ASSURANCE:

- A. It is the intention of this Section that the catch basins, manholes and other structures, including all component parts, have adequate space and strength considered necessary for the intended service. Space requirements and configurations shall be as shown on the Drawings.
- B. Catch basins and manholes shall be an assembly of pre-cast sections with or without steel reinforcement, with approved jointing. In any approved structures, the complete structure shall be of such material and quality as to withstand loads of eight (8) tons (H-20 loading) without failure, continuously for the life of the structure. Assume a period in excess of 25 years for all structures.

2 PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. Catch basin and Manhole structures listed as follows as provided by Superior Concrete, Oldcastle Precast, Inc., 982 Minot Avenue, Auburn, ME 04212-3719. Phone: (207) 784-9144 Fax: (207) 784-9647, or equal. Product of other manufacturers may be considered subject to compliance with the requirements as judged by the Engineer and or Owner's Representative.

2.2 MATERIALS:

- A. Catch basin and Manhole Sections: Structures shall be pre-cast concrete structures, 4 foot interior diameter, unless otherwise specified, with T & G joints and rubber ring or asphalt filler seals.
 - 1. Bases – Pre-cast sumps conforming to ASTM C478. Holes for pipes cast into the base section shall have a three (3) foot minimum clear distance between the inside bottom of the base section and the pipe invert.
 - 2. Barrels – Pre-cast sections of correct height, conforming to ASTM C478 or solid concrete barrel blocks conforming to ASTM C-139.
 - 3. Cones – Pre-cast, hunched type, conforming to ASTM C478.
 - 4. Pipe to Catch-basin and Field Inlet Joints: Only as approved by the Engineer or Owner's Representative and, in general, will depend on water-tightness upon a rubber boot either cast-in-place or press-wedged in place.
 - 5. Frames and Grates to conform to AASHTO M-105, Class 30, of gray cast iron by Etheridge Foundry. Refer to Drawings for type and size.
 - 6. Each section of the pre-cast structure shall have two holes for the purpose of handling and setting. The holes shall be tapered and shall be plugged with nonshrink mortar or grout in combination with concrete plugs after installation. Note: For storm drain sections that serve as cutoff drains for groundwater, provide 1/4 inch perforations along the top of pipe. Refer to project details and plans.

- B. Storm Drain Pipe: PVC Pipe or Corrugated Polyethylene Pipe (refer to Drawings). Furnish as indicated on Drawings and of size shown. Provide couplings and special bends or elbows as shown or required by the work.
 - 1. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.
 - 2. Corrugated Polyethylene Pipe (CPP) Smooth Interior: Conform with AASHTO Designations M 294 and M252. Pipe must be installed in accordance with pipe manufacturer's installation Guidelines for Culvert and Other Heavy-Duty Drainage Applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. (ADS) N-12) & Hancore, Inc. (Hi-Q smooth interior).
 - 3. Underdrains:
 - 1. Perforated PVC pipe having a SDR of 35 or equivalent. Perforations shall consist of 3/8 inch diameter holes.
 - 2. Perforated Polyethylene Pipe (cpp) Smooth Interior: Conform to ASSHTO Designations M252 Type S.
- C. Brick: Comply with the ASTM Standard Specifications for Sewer Brick, Designation C32, for Grade SS, hard brick.
- D. Cement: Shall be Type II. Concrete shall have a minimum strength of 3,000 psi at 28 days.
- E. Drainage Stone: M.D.O.T. 703.22 Type C. 3/8 - inch, pea stone or 3/4- inch crushed stone.
- F. Geotextiles: Shall be Mirafi 160 N or equivalent for filtration fabric or equivalent.

3 PART 3 EXECUTION

3.1 INSTALLATION:

- A. Catch basins and manholes
 - 1. After the excavation has been done and leveled, six (6) inches of bedding material shall be put in the bottom of the excavation, leveled and thoroughly compacted.
 - 2. Pre-cast concrete sections shall be set so as to be vertical and with section in true alignment, 1/4-inch maximum tolerance to be allowed.
 - 3. Invert channels of manholes may be formed in 3,000 psi concrete or using brick. When brick is used, use Portland cement, ASTM C 150, Type II. Masonry cements shall not be used. The top shelf shall slope to drain towards the flowing through channel.

4. The top of the pre-cast reinforced concrete unit shall be set at a grade that will allow a minimum of two (2) courses and a maximum of three (3) courses of brick and mortar before setting the cast-iron frame. Mortar for brick masonry shall be Portland cement, Type II, mixed in the proportion of one part cement to two parts sand, worked to the proper consistency.
 5. The inside and outside of the masonry work of all catch basins shall be plastered with 1:2 Portland cement mortar. The thickness of the mortar shall be one-half (1/2) inch and the mortar shall be carefully spread and thoroughly troweled, leaving a smooth, substantially waterproof surface. The mortar shall be extended to completely cover the outside and inside surfaces of all masonry work. To enhance proper curing, completed masonry shall be covered with a polyethylene plastic sheet or other appropriate means for a minimum of 24 hours before backfilling. The inside and outside of each horizontal joint in the pre-cast manholes shall be filled with joint mortar and troweled smooth.
 6. Backfilling shall be done in a careful manner in 6"-12" lifts and compacted with a vibratory compactor, bringing the fill up evenly on all sides.
 7. If any leaks appear in catch basins, manholes or field inlets the Contractor shall uncover the structure and disassemble the sections and reconstruct the catch basin, or perform other acceptable repairs approved by the Engineer or Owner's Representative so as to secure a watertight structure. The Contractor shall install the pre-cast units and pipeline connectors in a manner that will result in a watertight joint.
 8. Catch basins, manholes or field inlets, shall be constructed as the sections of the pipelines between them are completed, and unless this is done, the Engineer or Owner's Representative shall have the authority to stop trenching and pipe laying until manhole construction is brought up properly. All ground water shall be kept away from any newly placed concrete or freshly laid masonry work until cement has properly set and until a watertight job is obtained.
- B. Catch basin and manholes, frames and grates
1. Catch basin, manholes and frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface, or as directed.
 2. Frames shall be set concentric with the top of the masonry and in full bed of mortar so that the space between the top of the masonry and the bottom flange of the frame shall be completely filled and made watertight.
 3. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on top of the bottom flange. Mortar shall be smoothly finished and have a slight slope to shed water away from the frame.
 4. Manholes and catch basin grates shall be left in place in the frames on completion of the other work at the manholes and catch basins.

C. Drain pipes

1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.
2. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade, without high spots. Do not drive the pipe down to grade by striking it with a shovel handle, timber, hammer, or any other unyielding object. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawing. Take all necessary precautions to prevent floatation of the pipe in the trench.
3. Temporary Plugs - When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated. Do not use the pipelines as conductors for trench drainage during construction.
4. Jointing - Connect pipe in accordance with the latest manufacturer's instructions and recommendations. Clear each pipe length, coupling and fitting of all debris and dirt before installing. Provide and use coupling pullers for jointing the pipe. Provide gasket feeler gauges for use by the pipe layer for checking the position of the rubber gaskets in the completed joints.
5. Shove home each length of pipe against the pipe previously laid and hold securely in position. Do not pull or cramp joints. Make all pipe joints as watertight as possible with no visible leakage and no sand, silt, clay, or soil of any description entering the pipeline at the joints.
6. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.
7. Pipe Cutting - Cut in accordance with manufacturer's recommendations. Cut the pipe with a hand saw, metal-inserted abrasive wheel or pipe cutter with blades (not rollers). Examine all cut ends for possible cracks caused by cutting.

D. Under drain pipe

1. Bed all under drains in Drainage Stone, wrapped in Mirafi 160 N geotextile filter fabric or approved equal, as shown on the drawings.
2. Shape subgrade to drain outlets as shown on the grading and drainage plan.
3. Install geotextile stabilization fabric between subgrade and road subbase gravel, as determined by the Engineer or Owner's Representative.

E. Pipe insulation

1. Install two (2) inch thick by four (4) feet wide styrofoam SM insulation as manufactured by Dow Chemical Co., or approved equal, as shown on Detail Drawing.
2. Install over and along the sides of the pipe when there is less than four (4) feet of cover between the top of pipe and original ground grade.

3.2 INSPECTION:

- A. Pipe installation shall be subject to inspection by the Engineer or Owner's Representative for quality, adherence to line and grade, jointing, and proper backfill. Any joint not satisfactory to the Engineer or Owner's Representative shall be removed and remade to his satisfaction at the Contractor's expense. No pipe shall be backfilled until it has been approved by the Engineer or Owner's Representative.

...END OF SECTION 33 40 00