

**PEAKS ISLAND VOA
ELDERLY HOUSING
PEAKS ISLAND, MAINE**

**Tsomides Associates
Architects Planners**

February 23, 2004

PROJECT MANUAL

TITLE PAGE
PROJECT DIRECTORY

Peaks Island VOA ELDERLY HOUSING
CENTRAL AVENUE
PEAKS ISLAND, MAINE

HUD PROJECT NO. 024-EE058

Volunteers of America, Inc.
#2 Sanctuary Boulevard, Suite 301
Mandeville, LA 70471
Tel: 504/674-5477; Fax: 504/674-6658

HOUSING DEVELOPMENT CONSULTANTS

Gagnier, Hicks Assoc., Inc.
P.O. Box 60725
Longmeadow, MA 01116
Tel: 413/732-4615; Fax: 413/732-5825

ARCHITECTS

Tsomides Associates Architects Planners/TAAP
389 Elliot Street
Newton Upper Falls, MA 02464
Tel: 617/969-4774; Fax: 617/969-4793

STRUCTURAL ENGINEERS:

Foley and Buhl Engineering, Inc.
9 Galen Street
Watertown, MA 02172
Tel: 617/929-9150; Fax: 617/924-4467

MECHANICAL & ELECTRICAL ENGINEERS

Mechanical: Edward W. Hollidge, P.E
Electrical: Bennett Engineering
Bennett Road, PO Box 297
Freeport, ME 04032
Tel: 207/865-9475

CIVIL/SITE ENGINEERS

DeLuca-Hoffman Associates, Inc.
778 Main Street, Suite 8
South Portland, ME 04106
Tel: 207/775-1121; Fax: 207/879-0896

GENERAL CONTRACTOR

C. M. Cimino, Inc.
3 Warren Avenue
Westbrook, ME 04092
Tel: 207/854-8876; Fax: 207/856-2254

IDENTIFICATION

PROJECT MANUAL FOR:

PEAKS ISLAND VOA ELDERLY HOUSING
CENTRAL AVENUE
PEAKS ISLAND, MAINE

HUD PROJECT NO. 024-EE058

ARCHITECTS: TSOMIDES ASSOCIATES

BY: _____

TITLE: _____ DATE: _____

OWNER: VOLUNTEERS OF AMERICA, INC.

BY: _____

TITLE: _____ DATE: _____

CONTRACTOR: C. M. CIMINO, INC.

BY: _____

TITLE: _____ DATE: _____

BONDING CO:

BY: _____

TITLE: _____ DATE: _____

TABLE OF CONTENTS

PEAKS ISLAND VOA ELDERLY HOUSING
PEAKS ISLAND, MAINE
 February 23, 2004

<u>PART I</u>	<u>GENERAL INFORMATION</u>		<u>Page</u> <u>Number</u>
	Cover Sheet		
	Title Page		1
	Identification		2
	Table of Contents		3-5
	List of Drawings		6-7
<u>PART II</u>	<u>BIDDING REQUIREMENTS, CONTRACT FORM, AND CONDITIONS OF THE CONTRACT</u>		
	<u>Document - No. of Pages: Description</u>		
	00700-24 AIA Document A201, General Conditions of the Contract for Construction		8-31
	00800-7 Supplementary Conditions		32-38
	HUD 2554-4 HUD Supplementary Conditions of the Contract for Construction		39-42
	ME950017-2 General Wage Decision No. ME 020013		43-44
	00900-1 Sub-Surface Conditions		45
<u>PART III</u>	<u>SPECIFICATIONS: DIVISIONS 1 THRU 16</u>		
<u>SECTION</u>	<u>NO. OF PAGES</u>	<u>TITLE</u>	
DIVISION 1 - GENERAL REQUIREMENTS			
	01010-3	Summary of the Work	46-48
	01045-1	Cutting and Patching	49
	01300-9	Submittals, Products and Substitutions	50-58
	01500-6	Temporary Facilities	59-64
	01505-2	Mobilization/Demobilization	65-66
	01507-2	Traffic control And Signage	67-68
	01600-5	Materials and Equipment	69-73
	01700-7	Project Close Out	74-80
DIVISION 2 - SITE WORK			
		Omitted	81-82
	02001-2	Civil Engineering Requests For Information	83-85
	02010-3	Layout Of Work	86-88
		Omitted	89-93
	02100-4	Site Preparation	94-97
	02200-10	Earthwork	98-107
	02221-6	Excavation, Compacting, Backfilling for Structures	108-113
	02222-6	Excavation, Backfilling, Compaction for Utilities	114-119

	<u>Page Number</u>
DIVISION 2 - SITE WORK- Continued	
02223-6 Excavation, Backfilling, Compacting for Pavement	120-125
02227-4 Aggregate Material	126-129
	Omitted 130-138
02230-3 Subbase And Base Gravel	139-141
02270-3 Soil Stabilization, Slope Protection, Erosion Control	142-144
02511-7 Asphalt Concrete Paving	145-151
02511-8 Asphalt Concrete Paving, Appendix A	152-159
02520-6 Portland Cement Concrete for Site Improvements	160-165
02525-7 Curb and Sidewalks	166-172
02584-2 Pavement Markings	173-174
02605-11 Water, Sewer, Storm & Catch Basin Structures	175-185
02660-14 Water Distribution Systems & Table 1	186-199
02720-7 Storm Sewer Systems	200-205
02730-7 Sanitary Sewer Systems & Table 1	206-212
02831-6 Site Work Fencing and Gates	213-218
02846-2 Signage	219-220
02900-10 Loam and Seed	221-230
02950-17 Trees, Plants and Ground Covers	231-247
DIVISION 3 - CONCRETE	
03300-14 Cast-In-Place Concrete	248-261
DIVISION 4 - MASONRY	
Omitted	
DIVISION 5 - METALS	
05500-9 Metal Fabrications	262-270
DIVISION 6 - WOOD	
06100-9 Rough Carpentry	271-279
	Omitted 280
06190-5 Prefabricated Wood Trusses	281-285
	Omitted 286-295
06400-6 Architectural Woodwork	296-301
	Omitted 302
DIVISION 7 - THERMAL AND MOISTURE PROTECTION	
07200-3 Building Insulation	303-305
07310-4 Shingles	306-309
	Omitted 310-312
07460-2 Cladding/Siding	313-314
07500-4 Flexible Sheet Roofing System	315-318
07600-6 Flashing and Sheet Metal	319-324
07700-5 Roof Specialties and Accessories	325
07900-7 Joint Sealers	326-332

	<u>Page Number</u>
DIVISION 8 - DOORS AND WINDOWS	
08111-8 Standard Metal Doors and Frames	333-340
08210-3 Wood Doors	341-343
08212-7 Panel Wood Doors	344-350
08305-4 Access Doors	351-354
	Omitted 355-357
08630-10 Vinyl Windows	358-367
08710-11 Finish Hardware	368-378
08800-7 Glass and Glazing	379-385
DIVISION 9 - FINISHES	
09000-6 Room Finish Schedule	386-389
09250-4 Gypsum Board (Drywall)	390-393
	Omitted 394-401
09300-4 Tile	402-405
09510-3 Acoustical Ceilings	406-408
09650-5 Resilient Flooring	409-413
09680-3 Carpet	414-416
09900-4 Painting	417-420
DIVISION 10 - SPECIALTIES	
	Omitted 421-422
10400-4 Specialty Signs	423-426
10950-6 Miscellaneous Specialties	427-432
1. Omitted	
2. Fire Extinguishers and Fire Extinguisher Cabinets	
3. Postal Specialties	
4. Omitted	
5. Horizontal Blinds in Apartments	
6. Floor Entry Mats	
7. Knox Box	
8. Residential Kitchen Appliances	
9. Toilet Accessories	
DIVISION 11 - EQUIPMENT - NOT USED	
DIVISION 12 - FURNISHINGS	
12372-6 Kitchen Casework, Bathroom Vanities	433-438
DIVISION 13 - SPECIAL CONSTRUCTION - NOT USED	
DIVISION 14 - CONVEYING EQUIPMENT - NOT USED	
DIVISION 15 -- MECHANICAL & FIRE PROTECTION	
15000 General Mechanical	439-449
15250 Insulation	450-456
15400 Plumbing	457-470
15700 HVAC	471-493
15800 Ductwork And Accessories	494-501
15900 Automatic Temperature Controls	502-514
15990 Testing And Balancing	515-523
15500 Sprinklers	524-526
DIVISION 16 - ELECTRICAL	
1600 Electrical Work	527-538

End of Table of Contents

VOA PEAKS ISLAND, ME LIST OF DRAWINGS

Drawings Dated:

COVER SHEET

February 23, 2004

SITE SURVEY

April 9, 2002

CIVIL / LANDSCAPE

November, 2003

C-1	COVER SHEET, GENERAL NOTES & LEGEND
C-2	EXISTING CONDITIONS PLAN
C-3	SITE LAYOUT PLAN
C-4	GRADING, DRAINAGE & EROSION CONTROL PLAN
C-5	UTILITY PLAN
C-6	LANDSCAPE PLAN
C-7	SITE DETAILS
C-8	UTILITY AND STORM DRAIN DETAILS
C-9	EROSION CONTROL & LANDSCAPE DETAILS
C-10	EROSION CONTROL NOTES
C-11	ENLARGED SITE LAYOUT PLAN

ARCHITECTURAL

February 23, 2004

A-200	FIRST FLOOR PLAN
A-201	ROOF PLAN
A-202	UNIT PLANS AND INTERIOR ELEVATIONS
A-203	PARTITION TYPES, WINDOW ELEVATIONS & DETAILS
A-300	FIRST FLOOR REFLECTED CEILING PLAN
A-400	ELEVATIONS
A-500	WALL SECTIONS & DETAILS
A-600	DOOR SCHEDULE AND DETAILS
A-700	PUBLIC AREA INTERIOR ELEVATIONS & MILLWORK DETAILS

STRUCTURAL

February 23, 2004

S-200	FIRST FLOOR FOUNDATION PLAN, GENERAL NOTES, DETAILS
S-201	ROOF FRAMING PLAN, DETAILS & SECTIONS

VOA PEAKS ISLAND, ME LIST OF DRAWINGS

Drawings Dated:

PLUMBING

February 10, 2004

- P-1 FIRST FLOOR PLUMBING DWV PLAN
- P-2 FIRST FLOOR WATER PIPING PLAN

FIRE PROTECTION

February 4, 2004

- S-1 FIRST FLOOR SPRINKLER PLAN

MECHANICAL

February 10, 2003

- M-1 FIRST FLOOR PIPING PLAN, BOILER ROOM DETAIL, SCHEDULES
- M-2 FIRST FLOOR CUT WORK PLAN

ELECTRICAL

February 11, 2004

- E-100 LEGEND
 - E-300 UNIT PLAN DETAILS
 - E-400 FIRST FLOOR - HOUSE POWER PLAN
 - E-500 DETAILS & SCHEDULES
-



AIA Document A201

General Conditions of the Contract for Construction

*THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION
WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS MODIFICATION*

1987 EDITION TABLE OF ARTICLES

- | | |
|--|--|
| 1. GENERAL PROVISIONS | 8. TIME |
| 2. OWNER | 9. PAYMENTS AND COMPLETION |
| 3. CONTRACTOR | 10. PROTECTION OF PERSONS AND PROPERTY |
| 4. ADMINISTRATION OF THE CONTRACT | 11. INSURANCE AND BONDS |
| 5. SUBCONTRACTORS | 12. UNCOVERING AND CORRECTION OF WORK |
| 6. CONSTRUCTION BY OWNER OR BY
SEPARATE CONTRACTORS | 13. MISCELLANEOUS PROVISIONS |
| 7. CHANGES IN THE WORK | 14. TERMINATION OR SUSPENSION OF THE
CONTRACT |

This document has been approved and endorsed by the Associated General Contractors of America.

Copyright 1911, 1915, 1918, 1925, 1937, 1951, 1958, 1961, 1963, 1966, 1967, 1970, 1976, ©1987 by The American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C., 20006. Reproduction of the material herein or substantial quotation of its provisions without written permission of the AIA violates the copyright laws of the United States and will be subject to legal prosecutions.

INDEX

Acceptance of Nonconforming Work	9.6.6, 9.9.3, 12.3
Acceptance of Work	9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3
Access to Work	3.16, 6.2.1, 12.1
Accident Prevention	4.2.3, 10
Acts and Omissions	3.2.1, 3.2.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 4.3.2, 4.3.9, 8.3.1, 10.1.9, 10.2.5, 13.4.2, 13.7, 14.1
Addenda	1.1.1, 3.11
Additional Cost, Claims for	4.3.6, 4.3.7, 4.3.9, 6.1.1, 10.3
Additional Inspections and Testing	4.2.6, 9.8.2, 12.2.1, 13.5
Additional Time, Claims for	4.3.6, 4.3.8, 4.3.9, 8.3.2
ADMINISTRATION OF THE CONTRACT	3.3.3, 4, 9.4, 9.5
Advertisement or Invitation to Bid	1.1.1
Aesthetic Effect	4.2.13, 4.5.1
Allowances	3.8
All-risk Insurance	11.3.1.1
Applications for Payment	4.2.5, 7.3.7, 9.2, 9.3, 9.4, 9.5.1, 9.6.3, 9.8.3, 9.10.1, 9.10.3, 9.10.4, 11.1.3, 14.2.4
Approvals	2.4, 3.3.3, 3.5, 3.10.2, 3.12.4 through 3.12.8, 3.18.3, 4.2.7, 9.3.2, 11.3.1.4, 13.4.2, 13.5
Arbitration	4.1.4, 4.3.2, 4.5.1, 4.4.4, 4.5, 8.3.1, 10.1.2, 11.3.9, 11.3.10
Architect	4.1
Architect, Definition of	4.1.1
Architect, Extent of Authority	2.4, 3.12.6, 4.2, 4.3.2, 4.3.6, 4.4, 5.2, 6.3, 7.1.2, 7.2.1, 7.3.6, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8.2, 9.8.3, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4
Architect, Limitations of Authority and Responsibility	3.3.3, 3.12.8, 3.12.11, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 4.3.2, 5.2.1, 7.4, 9.4.2, 9.6.4, 9.6.6
Architect's Additional Services and Expenses	2.4, 9.8.2, 11.3.1.1, 12.2.1, 12.2.4, 13.5.2, 13.5.3, 14.2.4
Architect's Administration of the Contract	4.2, 4.3.6, 13.7, 14, 9.4, 9.5
Architect's Approvals	2.4, 3.5.1, 3.10.2, 3.12.6, 3.12.8, 3.18.3, 4.2.7
Architect's Authority to Reject Work	3.5.1, 4.2.6, 12.1.2, 12.2.1
Architect's Copyright	1.5
Architect's Decisions	4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.3.2, 4.3.6, 4.4.1, 4.4.4, 4.5, 6.3, 7.3.6, 7.3.8, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.2, 9.9.1, 10.1.2, 13.5.2, 14.2.2, 14.2.4
Architect's Inspections	4.2.2, 4.2.9, 4.3.6, 9.4.2, 9.8.2, 9.9.2, 9.10.1, 13.5
Architect's Instructions	4.2.6, 4.2.7, 4.2.8, 4.3.7, 4.1, 12.1, 13.5.2
Architect's Interpretations	4.2.11, 4.2.12, 4.3.7
Architect's On-Site Observations	4.2.2, 4.2.5, 4.3.6, 9.4.2, 9.5.1, 9.10.1, 13.5
Architect's Project Representative	4.2.10
Architect's Relationship with Contractor	1.1.2, 3.2.1, 3.2.2, 3.3.3, 3.5.1, 3.7.3, 3.11, 3.12.8, 3.12.11, 3.16, 3.18, 4.2.3, 4.2.4, 4.2.6, 4.2.12, 5.2, 6.2.2, 7.3.4, 9.8.2, 11.3.7, 12.1, 13.5
Architect's Relationship with Subcontractors	1.1.2, 1.2.5, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7
Architect's Representations	9.4.2, 9.5.1, 9.10.1
Architect's Site Visits	4.2.2, 4.2.5, 4.2.9, 4.3.6, 9.4.2, 9.5.1, 9.8.2, 9.9.2, 9.10.1, 13.5
Asbestos	10.1
Attorneys' Fees	3.18.1, 9.10.2, 10.1.4
Award of Separate Contracts	6.1.1
Award of Subcontracts and Other Contracts for Portions of the Work	5.2
Basic Definitions	1.1
Bidding Requirements	1.1.1, 1.1.7, 5.2.1, 11.4.1
Boiler and Machinery Insurance	11.3.2
Bonds, Lien	9.10.2
Bonds, Performance and Payment	7.3.6.4, 9.10.3, 11.3.9, 11.4

Building Permit	3.7.1
Capitalization	1.4
Certificate of Substantial Completion	9.8.2
Certificates for Payment	4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.8.3, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4
Certificates of Inspection, Testing or Approval	3.12.11, 13.5.4
Certificates of Insurance	9.3.2, 9.10.2, 11.1.3
Change Orders	1.1.1, 2.4.1, 3.8.2.4, 3.11, 4.2.8, 4.3.3, 5.2.3, 7.1, 7.2, 7.3.2, 8.3.1, 9.3.1.1, 9.10.3, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2
Change Orders, Definition of	7.2.1
Changes	7.1
CHANGES IN THE WORK	3.11, 4.2.8, 7, 8.3.1, 9.3.1.1, 10.1.3
Claim, Definition of	4.3.1
Claims and Disputes	4.3, 4.4, 4.5, 6.2.5, 8.3.2, 9.3.1.2, 9.3.3, 9.10.4, 10.1.4
Claims and Timely Assertion of Claims	4.5.6
Claims for Additional Cost	4.3.6, 4.3.7, 4.3.9, 6.1.1, 10.3
Claims for Additional Time	4.3.6, 4.3.8, 4.3.9, 8.3.2
Claims for Concealed or Unknown Conditions	4.3.6
Claims for Damages	3.18, 4.3.9, 6.1.1, 6.2.5, 8.3.2, 9.5.1.2, 10.1.4
Claims Subject to Arbitration	4.3.2, 4.4.4, 4.5.1
Cleaning Up	3.15, 6.3
Commencement of Statutory Limitation Period	13.7
Commencement of the Work, Conditions Relating to	2.1.2, 2.2.1, 3.2.1, 3.2.2, 3.7.1, 3.10.1.3, 3.12.6, 4.3.7, 5.2.1, 6.2.2, 8.1.2, 8.2.2, 9.2, 11.1.3, 11.3.6, 11.4.1
Commencement of the Work, Definition of	8.1.2
Communications Facilitating Contract Administration	3.9.1, 4.2.4, 5.2.1
Completion, Conditions Relating to	3.11, 3.15, 4.2.2, 4.2.9, 4.3.2, 9.4.2, 9.8, 9.9.1, 9.10, 11.3.5, 12.2.2, 13.7.1
COMPLETION, PAYMENTS AND	9
Completion, Substantial	4.2.9, 4.3.5, 5.2, 8.1.1, 8.1.3, 8.2.3, 9.8, 9.9.1, 12.2.2, 13.7
Compliance with Laws	1.3, 3.6, 3.7, 3.13, 4.1.1, 10.2.2, 11.1, 11.3, 13.1, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3
Concealed or Unknown Conditions	4.3.6
Conditions of the Contract	1.1.1, 1.1.7, 6.1.1
Consent, Written	1.3.1, 3.12.8, 3.14.2, 4.1.2, 4.3.1, 4.5.5, 9.3.2, 9.8.2, 9.9.1, 9.10.2, 9.10.3, 10.1.2, 10.1.3, 11.3.1, 11.3.1.4, 11.3.1.1, 13.2, 13.4.2
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS	11.4.6
Construction Change Directive, Definition of	7.3.1
Construction Change Directives	1.1.1, 4.2.8, 7.1, 7.3, 9.3.1.1
Construction Schedules, Contractors	3.10, 6.1.3
Contingent Assignment of Subcontracts	5.4
Continuing Contract Performance	4.3.4
Contract, Definition of	1.1.2
CONTRACT, TERMINATION OR SUSPENSION OF THE	4.3.7, 5.4.1.1, 14
Contract Administration	3.3.3, 9.9.4, 9.5
Contract Award and Execution, Conditions Relating to	5.7.1, 3.10, 5.2, 9.2, 11.1.3, 11.3.6, 11.4.1
Contract Documents, The	1.1, 1.2, 7
Contract Documents, Copies Furnished and Use of	1.3, 2.2, 5, 5.3
Contract Documents, Definition of	1.1.1
Contract Performance During Arbitration	4.3.4, 4.5.3
Contract Sum	3.8, 4.3.6, 4.3.7, 4.4.4, 5.2.3, 6.1.3, 7.2, 7.3, 9.1, 9.7, 11.3.1, 12.2.4, 12.3, 14.2.4
Contract Sum, Definition of	9.1
Contract Time	4.3.6, 4.3.8, 4.4.4, 7.2.1.3, 7.3, 8.2.1, 8.3.1, 9.7, 12.1.1
Contract Time, Definition of	8.1.1

CONTRACTOR	3
Contractor, Definition of	3.1, 6.1.2
Contractor's Bid	1.1.1
Contractor's Construction Schedules	3.10 , 6.1.3
Contractor's Employees	3.3.2, 3.4.2, 3.8.1, 3.9, 3.18, 4.2.3, 4.2.6, 8.1.2, 10.2, 10.3, 11.1.1, 14.2.1.1
Contractor's Liability Insurance	11.1
Contractor's Relationship with Separate Contractors and Owner's Forces	2.2.6, 3.12.5, 3.14.2, 4.2.4, 6, 12.2.5
Contractor's Relationship with Subcontractors	1.2.4, 3.3.2, 3.18.1, 3.18.2, 5.2, 5.3, 5.4, 9.6.2, 11.3.7, 11.3.8, 14.2.1.2
Contractor's Relationship with the Architect	1.1.2, 3.2.1, 3.2.2, 3.3.3, 3.5.1, 3.7.3, 3.11, 3.12.8, 3.16, 3.18, 4.2.3, 4.2.4, 4.2.6, 4.2.12, 5.2, 6.2.2, 7.3.4, 9.8.2, 11.3.7, 12.1, 13.5
Contractor's Representations	1.2.2, 3.5.1, 3.12.7, 6.2.2, 8.2.1, 9.3.3
Contractor's Responsibility for Those Performing the Work	3.3.2, 3.18, 4.2.3, 10
Contractor's Review of Contract Documents	1.2.2, 3.2, 3.7.3
Contractor's Right to Stop the Work	9.7
Contractor's Right to Terminate the Contract	14.1
Contractor's Submittals	3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.6, 9.2, 9.3.1, 9.8.2, 9.9.1, 9.10.2, 9.10.3, 10.1.2, 11.4.2, 11.4.3
Contractor's Superintendent	3.9, 10.2.6
Contractor's Supervision and Construction Procedures	1.2.4, 3.3, 3.4, 4.2.3, 8.2.2, 8.2.3, 10
Contractual Liability Insurance	11.1.7, 11.2.1
Coordination and Correlation	1.2.2, 1.2.4, 3.3.1, 3.10, 3.12.7, 6.1.3, 6.2.1
Copies Furnished of Drawings and Specifications	1.3, 2.2.5, 3.11
Correction of Work	2.3, 2.4, 4.2.1, 9.8.2, 9.9.1, 12.1.2, 12.2, 13.7.1.3
Cost, Definition of	7.3.6, 14.3.5
Costs	2.4, 3.2.1, 3.7.4, 3.8.2, 3.15.2, 4.3.6, 4.3.7, 4.3.8.1, 5.2.3, 6.1.1, 6.2.3, 6.3, 7.3.3, 7.3.6, 7.3.7, 9.7, 9.8.2, 9.10.2, 11.3.1.2, 11.3.1.3, 11.3.4, 11.3.9, 12.1, 12.2.1, 12.2.4, 12.2.5, 13.5, 14
Cutting and Patching	3.14 , 6.2.6
Damage to Construction of Owner or Separate Contractors	3.14.2, 6.2.4, 9.5.1.5, 10.2.1.2, 10.2.5, 10.3, 11.1, 11.3, 12.2.5
Damage to the Work	3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.3, 11.3
Damages, Claims for	3.18, 4.3.9, 6.1.1, 6.2.5, 8.3.2, 9.5.1.2, 10.1.4
Damages for Delay	6.1.1, 8.3.3, 9.5.1.6, 9.7
Date of Commencement of the Work, Definition of	8.1.2
Date of Substantial Completion, Definition of	8.1.3
Day, Definition of	8.1.4
Decisions of the Architect	4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.3.2, 4.3.6, 4.4.1, 4.4.4, 4.5, 6.3, 7.3.6, 7.3.8, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.2, 9.9.1, 10.1.2, 13.5.2, 14.2.2, 14.2.4
Decisions to Withhold Certification	9.5 , 9.7, 14.1.3
Defective or Nonconforming Work, Acceptance, Rejection and Correction of	2.3, 2.4, 3.5.1, 4.2.1, 4.2.6, 4.3.5, 9.5.2, 9.8.2, 9.9.1, 10.2.5, 12, 13.7.1.3
Defective Work, Definition of	3.5.1
Definitions	1.1, 2.1.1, 3.1, 3.5.1, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 4.3.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 7.3.6, 8.1, 9.1, 9.8.1
Delays and Extensions of Time	4.3.1 , 4.3.8.1, 4.3.8.2, 6.1.1, 6.2.3, 7.2.1, 7.3.1, 7.3.4, 7.3.5, 7.3.8, 7.3.9, 8.1.1, 8.3 , 10.3.1, 14.1.1.4
Disputes	4.1.4, 4.3, 4.4, 4.5, 6.2.5, 6.3, 7.3.8, 9.3.1.2
Documents and Samples at the Site	3.11
Drawings, Definition of	1.1.5
Drawings and Specifications, Use and Ownership of	1.1.1, 1.3, 2.2.5, 3.11, 5.3
Duty to Review Contract Documents and Field Conditions	3.2
Effective Date of Insurance	8.2.2, 11.1.2

Emergencies	4.3.7 , 10.3
Employees, Contractor's	3.3.2, 3.4.2, 3.8.1, 3.9, 3.18.1, 3.18.2, 4.2.3, 4.2.6, 8.1.2, 10.2, 10.3, 11.1.1, 14.2.1.1
Equipment, Labor, Materials and	1.1.3, 1.1.6, 3.4, 3.5.1, 3.8.2, 3.12.3, 3.12.7, 3.12.11, 3.13, 3.15.1, 4.2.7, 6.2.1, 7.3.6, 9.3.2, 9.3.3, 11.3, 12.2.4, 14
Execution and Progress of the Work	1.1.3, 1.2.3, 3.2, 3.4.1, 3.5.1, 4.2.2, 4.2.3, 4.3.4, 4.3.8, 6.2.2, 7.1.3, 7.3.9, 8.2, 8.3, 9.5, 9.9.1, 10.2, 14.2, 14.3
Execution, Correlation and Intent of the Contract Documents	1.2 , 3.7.1
Extensions of Time	4.3.1, 4.3.8, 7.2.1.3, 8.3, 10.3.1
Failure of Payment by Contractor	9.5.1.3, 14.2.1.2
Failure of Payment by Owner	4.3.7, 9.7, 14.1.3
Faulty Work (See Defective or Nonconforming Work)	
Final Completion and Final Payment	4.2.1 , 4.2.9, 4.3.2, 4.3.5, 9.10 , 11.1.2, 11.1.3, 11.3.5, 12.3.1, 13.7
Financial Arrangements, Owner's	2.2.1
Fire and Extended Coverage Insurance	11.3
GENERAL PROVISIONS	1
Governing Law	13.1
Guarantees (See Warranty and Warranties)	
Hazardous Materials	10.1, 10.2.4
Identification of Contract Documents	1.2.1
Identification of Subcontractors and Suppliers	5.2.1
Indemnification	3.17 , 3.18 , 9.10.2, 10.1.4, 11.3.1.2, 11.3.7
Information and Services Required of the Owner	2.1.2 , 2.2 , 4.3.4, 6.1.3, 6.1.4, 6.2.6, 9.3.2, 9.6.1, 9.6.4, 9.8.3, 9.9.2, 9.10.3, 10.1.4, 11.2, 11.3, 13.5.1, 13.5.2
Injury or Damage to Person or Property	4.3.9
Inspections	3.3.3, 3.3.4, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 4.3.6, 9.4.2, 9.8.2, 9.9.2, 9.10.1, 13.5
Instructions to Bidders	1.1.1
Instructions to the Contractor	3.8.1, 4.2.8, 5.2.1.7, 12.1, 13.5.2
Insurance	4.3.9, 6.1.1, 7.3.6.4, 9.3.2, 9.8.2, 9.9.1, 9.10.2, 11
Insurance, Boiler and Machinery	11.3.2
Insurance, Contractor's Liability	11.1
Insurance, Effective Date of	8.2.2, 11.1.2
Insurance, Loss of Use	11.3.3
Insurance, Owner's Liability	11.2
Insurance, Property	10.2.5 , 11.3
Insurance, Stored Materials	9.3.2, 11.3.1.4
INSURANCE AND BONDS	11
Insurance Companies, Consent to Partial Occupancy	9.9.1, 11.3.11
Insurance Companies, Settlement with	11.3.10
Intent of the Contract Documents	1.2.3, 3.12.4, 4.2.6, 4.2.7, 4.2.12, 4.2.13, 7.4
Interest	13.6
Interpretation	1.2.5 , 1.4, 1.5 , 4.1.1, 4.3.1, 5.1, 6.1.2, 8.1.4
Interpretations, Written	4.2.11, 4.2.12, 4.3.7
Joinder and Consolidation of Claims Required	4.5.6
Judgment on Final Award	4.5.1 , 4.5.4.1, 4.5.7
Labor and Materials, Equipment	1.1.3 , 1.1.6, 3.4 , 3.5.1, 3.8.2, 3.12.2, 3.12.3, 3.12.7, 3.12.11, 3.13, 3.15.1, 4.2.7, 6.2.1, 7.3.6, 9.3.2, 9.3.3, 12.2.4, 14
Labor Disputes	8.3.1
Laws and Regulations	1.3, 3.6, 3.7, 3.13, 4.1.1, 4.5.5, 4.5.7, 9.9.1, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6
Liens	2.1.2, 4.3.2, 4.3.5.1, 8.2.2, 9.3.3, 9.10.2
Limitation on Consolidation or Joinder	4.5.5
Limitations, Statutes of	4.5.4.2, 12.2.6, 13.7
Limitations of Authority	3.3.1, 4.1.2, 4.2.1, 4.2.3, 4.2.7, 4.2.10, 5.2.2, 5.2.4, 7.4, 11.3.10

Limitations of Liability 2.3, 3.2.1, 3.5.1, 3.7.3, 3.12.8, 3.12.11, 3.17, 3.18, 4.2.6, 4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.10.4, 10.1.4, 10.2.5, 11.1.2, 11.2.1, 11.3.7, 13.4.2, 13.5.2

Limitations of Time, General 2.2.1, 2.2.4, 3.2.1, 3.7.3, 3.8.2, 3.10, 3.12.5, 3.15.1, 4.2.1, 4.2.7, 4.2.11, 4.3.2, 4.3.3, 4.3.4, 4.3.6, 4.3.9, 4.5.4.2, 5.2.1, 5.2.3, 6.2.4, 7.3.4, 7.4, 8.2, 9.5, 9.6.2, 9.8, 9.9, 9.10, 11.1.3, 11.3.1, 11.3.2, 11.3.5, 11.3.6, 12.2.1, 12.2.2, 13.5, 13.7

Limitations of Time, Specific 2.1.2, 2.2.1, 2.4, 3.10, 3.11, 3.15.1, 4.2.1, 4.2.11, 4.3, 4.4, 4.5, 5.3, 5.4, 7.3.5, 7.3.9, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.6.1, 9.7, 9.8.2, 9.10.2, 11.1.3, 11.3.6, 11.3.10, 11.3.11, 12.2.2, 12.2.4, 12.2.6, 13.7, 14

Loss of Use Insurance 11.3.3

Material Suppliers 1.3.1, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3.1, 9.3.1.2, 9.3.3, 9.4.2, 9.6.5, 9.10.4

Materials, Hazardous 10.1, 10.2.4

Materials, Labor, Equipment and 1.1.3, 1.1.6, 3.4, 3.5.1, 3.8.2, 3.12.2, 3.12.3, 3.12.7, 3.12.11, 3.13, 3.15.1, 4.2.7, 6.2.1, 7.3.6, 9.3.2, 9.3.3, 12.2.4, 14

Means, Methods, Techniques, Sequences and Procedures of Construction 3.3.1, 4.2.3, 4.2.7, 9.4.2

Minor Changes in the Work 1.1.1, 4.2.8, 4.3.7, 7.1, 7.4

MISCELLANEOUS PROVISIONS 13

Modifications, Definition of 1.1.1

Modifications to the Contract 1.1.1, 1.1.2, 3.7.3, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7

Mutual Responsibility 6.2

Nonconforming Work, Acceptance of 12.3

Nonconforming Work, Rejection and Correction of 2.3.1, 4.3.5, 9.5.2, 9.8.2, 12, 13.7.1.3

Notice 2.3, 2.4, 3.2.1, 3.2.2, 3.7.3, 3.7.4, 3.9, 3.12.8, 3.12.9, 3.17, 4.3, 4.4.4, 4.5, 5.2.1, 5.3, 5.4.1.1, 8.2.2, 9.4.1, 9.5.1, 9.6.1, 9.7, 9.10, 10.1.2, 10.2.6, 11.1.3, 11.3, 12.2.2, 12.2.4, 13.3, 13.5.1, 13.5.2, 14

Notice, Written 2.3, 2.4, 3.9, 3.12.8, 3.12.9, 4.3, 4.4.4, 4.5, 5.2.1, 5.3, 5.4.1.1, 8.2.2, 9.4.1, 9.5.1, 9.7, 9.10, 10.1.2, 10.2.6, 11.1.3, 11.3, 12.2.2, 12.2.4, 13.3, 13.5.2, 14

Notice of Testing and Inspections 13.5.1, 13.5.2

Notice to Proceed 8.2.2

Notices, Permits, Fees and 2.2.3, 3.7, 3.13, 7.3.6.4, 10.2.2

Observations, Architect's On-Site 4.2.2, 4.2.5, 4.3.6, 9.4.2, 9.5.1, 9.10.1, 13.5

Observations, Contractor's 1.2.2, 3.2.2

Occupancy 9.6.6, 9.8.1, 9.9, 11.3.11

On-Site Inspections by the Architect 4.2.2, 4.2.9, 4.3.6, 9.4.2, 9.8.2, 9.9.2, 9.10.1

On-Site Observations by the Architect 4.2.2, 4.2.5, 4.3.6, 9.4.2, 9.5.1, 9.10.1, 13.5

Orders, Written 2.3, 3.9, 4.3.7, 7, 8.2.2, 11.3.9, 12.1, 12.2, 13.5.2, 14.3.1

OWNER 2

Owner, Definition of 2.1

Owner, Information and Services Required of the 2.1.2, 2.2, 4.3.4, 6, 9, 10.1.4, 11.2, 11.3, 13.5.1, 14.1.1.5, 14.1.3

Owner's Authority 3.8.1, 4.1.3, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 7.3.1, 8.2.2, 9.3.1, 9.3.2, 11.4.1, 12.2.4, 13.5.2, 14.2, 14.3.1

Owner's Financial Capability 2.2.1, 14.1.1.5

Owner's Liability Insurance 11.3

Owner's Loss of Use Insurance 11.3.3

Owner's Relationship with Subcontractors 1.1.2, 5.2.1, 5.4.1, 9.6.4

Owner's Right to Carry Out the Work 2.4, 12.2.4, 14.2.2.2

Owner's Right to Clean Up 6.3

Owner's Right to Perform Construction and to Award Separate Contracts 6.1

Owner's Right to Stop the Work 2.3, 4.3.7

Owner's Right to Suspend the Work 14.3

Owner's Right to Terminate the Contract 14.2

Ownership and Use of Architect's Drawings, Specifications and Other Documents 1.1.1, 1.3, 2.2.5, 5.3

Partial Occupancy or Use 9.6.6, 9.9, 11.3.11

Patching, Cutting and 3.14, 6.2.6

Patents, Royalties and 3.17

Payment, Applications for 4.2.5, 9.2, 9.3, 9.4, 9.5.1, 9.8.3, 9.10.1, 9.10.3, 9.10.4, 14.2.4

Payment, Certificates for 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.8.3, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4

Payment, Failure of 4.3.7, 9.5.1.5, 9.7, 9.10.2, 14.1.1.3, 14.2.1.2

Payment, Final 4.2.1, 4.2.9, 4.3.2, 4.3.5, 9.10, 11.1.2, 11.1.3, 11.3.5, 12.3.1

Payment Bond, Performance Bond and 7.3.6.4, 9.10.3, 11.3.9, 11.4

Payments, Progress 4.3.4, 9.3, 9.6, 9.8.3, 9.10.3, 13.6, 14.2.3

PAYMENTS AND COMPLETION 9, 14

Payments to Subcontractors 5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 11.3.8, 14.2.1.2

PCB 10.1

Performance Bond and Payment Bond 7.3.6.4, 9.10.3, 11.3.9, 11.4

Permits, Fees and Notices 2.2.3, 3.7, 3.13, 7.3.6.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF 10

Polychlorinated Biphenyl 10.1

Product Data, Definition of 3.12.2

Product Data and Samples, Shop Drawings 3.11, 3.12, 4.2.7

Progress and Completion 4.2.2, 4.3.4, 8.2

Progress Payments 4.3.4, 9.3, 9.6, 9.8.3, 9.10.3, 13.6, 14.2.3

Project, Definition of the 1.1.4

Project Manual, Definition of the 1.1.7

Project Manuals 2.2.5

Project Representatives 4.2.10

Property Insurance 10.2.5, 11.3

PROTECTION OF PERSONS AND PROPERTY 10

Regulations and Laws 1.3, 3.6, 3.7, 3.13, 4.1.1, 4.5.5, 4.5.7, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14

Rejection of Work 3.5.1, 4.2.6, 12.2

Releases of Waivers and Liens 9.10.2

Representations 1.2.2, 3.5.1, 3.12.7, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1

Representatives 2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.10, 5.1.1, 5.1.2, 13.2.1

Resolution of Claims and Disputes 4.4, 4.5

Responsibility for Those Performing the Work 3.3.2, 4.2.3, 6.1.3, 6.2, 10

Retainage 9.3.1, 9.6.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3

Review of Contract Documents and Field Conditions by Contractor 1.2.2, 3.2, 3.7.3, 3.12.7

Review of Contractor's Submittals by Owner and Architect 3.10.1, 3.10.2, 3.11, 3.12, 4.2.7, 4.2.9, 5.2.1, 5.2.3, 9.2, 9.8.2

Review of Shop Drawings, Product Data and Samples by Contractor 3.12.5

Rights and Remedies 1.1.2, 2.3, 2.4, 3.5.1, 3.15.2, 4.2.6, 4.3.6, 4.5, 5.3, 6.1, 6.3, 7.3.1, 8.3.1, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, 13.4, 14

Royalties and Patents 3.17

Rules and Notices for Arbitration	4.5.2	Suspension by the Owner for Convenience	14.3
Safety of Persons and Property	10.2	Suspension of the Work	4.3.7, 5.4.2, 14.1.1.4, 14.3
Safety Precautions and Programs	4.2.3, 4.2.7, 10.1	Suspension or Termination of the Contract	4.3.7, 5.4.1.1, 14
Samples, Definition of	3.12.3	Taxes	3.6, 7.3.6.4
Samples, Shop Drawings, Product Data and	3.11, 3.12, 4.2.7	Termination by the Contractor	14.1
Samples at the Site, Documents and	3.11	Termination by the Owner for Cause	5.4.1.1, 14.2
Schedule of Values	9.2, 9.3.1	Termination of the Architect	4.1.3
Schedules, Construction	3.10	Termination of the Contractor	14.2.2
Separate Contracts and Contractors	1.1.4, 3.14.2, 4.2.4, 4.5.5, 6, 11.3.7, 12.1.2, 12.2.5	TERMINATION OR SUSPENSION OF THE CONTRACT	14
Shop Drawings, Definition of	3.12.1	Tests and Inspections	3.3.3, 4.2.6, 4.2.9, 9.4.2, 12.2.1, 13.5
Shop Drawings, Product Data and Samples	3.11, 3.12, 4.2.7	TIME	8
Site, Use of	3.13, 6.1.1, 6.2.1	Time, Delays and Extensions of	4.3.8, 7.2.1, 11.3
Site Inspections	1.2.2, 3.3.4, 4.2.2, 4.2.9, 4.3.6, 9.8.2, 9.10.1, 13.5	Time Limits, Specific	2.1.2, 2.2.1, 2.4, 3.10, 3.11, 3.15.1, 4.2.1, 4.2.11, 4.3, 4.4, 4.5, 5.3, 5.4, 7.3.5, 7.3.9, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.6.1, 9.7, 9.8.2, 9.10.2, 11.1.3, 11.3.6, 11.3.10, 11.3.11, 12.2.2, 12.2.4, 12.2.6, 13.7, 14
Site Visits, Architect's	4.2.2, 4.2.5, 4.2.9, 4.3.6, 9.4.2, 9.5.1, 9.8.2, 9.9.2, 9.10.1, 13.5	Time Limits on Claims	4.3.2, 4.3.3, 4.3.6, 4.3.9, 4.4, 4.5
Special Inspections and Testing	4.2.6, 12.2.1, 13.5	Title to Work	9.3.2, 9.3.3
Specifications, Definition of the	1.1.6	UNCOVERING AND CORRECTION OF WORK	12
Specifications, The	1.1.1, 1.1.6, 1.1.7, 1.2.4, 1.3, 3.11	Uncovering of Work	12.1
Statutes of Limitations	4.5.4.2, 12.2.6, 13.7	Unforeseen Conditions	4.3.6, 8.3.1, 10.1
Stopping the Work	2.3, 4.3.7, 9.7, 10.1.2, 10.3, 14.1	Unit Prices	7.1.4, 7.3.3.2
Stored Materials	6.2.1, 9.3.2, 10.2.1.2, 11.3.1.4, 12.2.4	Use of Documents	1.1.1, 1.3, 2.2.5, 3.12.7, 5.3
Subcontractor, Definition of	5.1.1	Use of Site	3.13, 6.1.1, 6.2.1
SUBCONTRACTORS	5	Values, Schedule of	9.2, 9.3.1
Subcontractors, Work by	1.2.4, 3.3.2, 3.12.1, 4.2.3, 5.3, 5.4	Waiver of Claims: Final Payment	4.3.5, 4.5.1, 9.10.3
Subcontractual Relations	5.3, 5.4, 9.3.1.2, 9.6.2, 9.6.3, 9.6.4, 10.2.1, 11.3.7, 11.3.8, 14.1.1, 14.2.1.2, 14.3.2	Waiver of Claims by the Architect	13.4.2
Submittals	1.3, 3.2.3, 3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.6, 9.2, 9.3.1, 9.8.2, 9.9.1, 9.10.2, 9.10.3, 10.1.2, 11.1.3	Waiver of Claims by the Contractor	9.10.4, 11.3.7, 13.4.2
Subrogation, Waivers of	6.1.1, 11.3.5, 11.3.7	Waiver of Claims by the Owner	4.3.5, 4.5.1, 9.9.3, 9.10.3, 11.3.3, 11.3.5, 11.3.7, 13.4.2
Substantial Completion	4.2.9, 4.3.5.2, 8.1.1, 8.1.3, 8.2.3, 9.8, 9.9.1, 12.2.1, 12.2.2, 13.7	Waiver of Liens	9.10.2
Substantial Completion, Definition of	9.8.1	Waivers of Subrogation	6.1.1, 11.3.5, 11.3.7
Substitution of Subcontractors	5.2.3, 5.2.4	Warranty and Warranties	3.5, 4.2.9, 4.3.5.3, 9.3.3, 9.8.2, 9.9.1, 12.2.2, 13.7.1.3
Substitution of the Architect	4.1.3	Weather Delays	4.3.8.2
Substitutions of Materials	3.5.1	When Arbitration May Be Demanded	4.5.4
Sub-subcontractor, Definition of	5.1.2	Work, Definition of	1.1.3
Subsurface Conditions	4.3.6	Written Consent	1.3.1, 3.12.8, 3.14.2, 4.1.2, 4.3.4, 4.5.5, 9.3.2, 9.8.2, 9.9.1, 9.10.2, 9.10.3, 10.1.2, 10.1.3, 11.3.1, 11.3.1.4, 11.3.11, 13.2, 13.4.2
Successors and Assigns	13.2	Written Interpretations	4.2.11, 4.2.12, 4.3.7
Superintendent	3.9, 10.2.6	Written Notice	2.3, 2.4, 3.9, 3.12.8, 3.12.9, 4.3, 4.4.4, 4.5, 5.2.1, 5.3, 5.4.1.1, 8.2.2, 9.4.1, 9.5.1, 9.7, 9.10, 10.1.2, 10.2.6, 11.1.3, 11.3, 12.2.2, 12.2.4, 13.3, 13.5.2, 14
Supervision and Construction Procedures	1.2.4, 3.3, 3.4, 4.2.3, 4.3.4, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 10, 12, 14	Written Orders	2.3, 3.9, 4.3.7, 7, 8.2.2, 11.3.9, 12.1, 12.2, 13.5.2, 14.3.1
Surety	4.4.1, 4.4.4, 5.4.1.2, 9.10.2, 9.10.3, 14.2.2		
Surety, Consent of	9.9.1, 9.10.2, 9.10.3		
Surveys	2.2.2, 3.18.3		

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

ARTICLE 1

GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Agreement between Owner and Contractor (hereinafter the Agreement), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include other documents such as bidding requirements (advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or portions of addenda relating to bidding requirements).

1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Architect and Contractor, (2) between the Owner and a Subcontractor or Sub-subcontractor or (3) between any persons or entities other than the Owner and Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate contractors.

1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equip-

ment, construction systems, standards and workmanship for the Work, and performance of related services.

1.1.7 THE PROJECT MANUAL

The Project Manual is the volume usually assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 The Contract Documents shall be signed by the Owner and Contractor as provided in the Agreement. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.

1.2.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

1.2.4 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

1.2.5 Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.3 OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

1.3.1 The Drawings, Specifications and other documents prepared by the Architect are instruments of the Architect's service through which the Work to be executed by the Contractor is described. The Contractor may retain one contract record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect, and unless otherwise indicated the Architect shall be deemed the author of them and will retain all common law, statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the

Work without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's copyright or other reserved rights.

1.4 CAPITALIZATION

1.4.1 Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in the document or (3) the titles of other documents published by the American Institute of Architects.

1.5 INTERPRETATION

1.5.1 In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

ARTICLE 2

OWNER

2.1 DEFINITION

2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative.

2.1.2 The Owner upon reasonable written request shall furnish to the Contractor in writing information which is necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein at the time of execution of the Agreement and, within five days after any change, information of such change in title, recorded or unrecorded.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 The Owner shall, at the request of the Contractor, prior to execution of the Agreement and promptly from time to time thereafter, furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. *[Note: Unless such reasonable evidence were furnished on request prior to the execution of the Agreement, the prospective contractor would not be required to execute the Agreement or to commence the Work.]*

2.2.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

2.2.3 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assess-

ments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

2.2.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work.

2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

2.2.6 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Article 6 (Construction by Owner or by Separate Contractors), Article 9 (Payments and Completion) and Article 11 (Insurance and Bonds).

2.3 OWNER'S RIGHT TO STOP THE WORK

2.3.1 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Owner, by written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

2.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a second seven-day period. If the Contractor within such second seven-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3

CONTRACTOR

3.1 DEFINITION

3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Owner pursuant to Subparagraph 2.2.2 and shall at once report to the Architect errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor recognized such error, inconsistency or omission and knowingly failed to report it to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.2.2 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once.

3.2.3 The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to Paragraph 3.12.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless Contract Documents give other specific instructions concerning these matters.

3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under a contract with the Contractor.

3.3.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

3.3.4 The Contractor shall be responsible for inspection of portions of Work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.

3.4 LABOR AND MATERIALS

3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

3.4.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

3.5 WARRANTY

3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.6 TAXES

3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

3.7 PERMITS, FEES AND NOTICES

3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded.

3.7.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities bearing on performance of the Work.

3.7.3 It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

3.7.4 If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs.

3.8 ALLOWANCES

3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities against which the Contractor makes reasonable objection.

3.8.2 Unless otherwise provided in the Contract Documents:

- .1 materials and equipment under an allowance shall be selected promptly by the Owner to avoid delay in the Work;
- .2 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

- .3 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances;
- .4 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Clause 3.8.2.2 and (2) changes in Contractor's costs under Clause 3.8.2.3.

3.9 SUPERINTENDENT

3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

3.10.2 The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.

3.10.3 The Contractor shall conform to the most recent schedules.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

3.12.3 Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for

which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect is subject to the limitations of Subparagraph 4.2.7.

3.12.5 The Contractor shall review, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.

3.12.6 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.

3.12.7 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals.

3.12.10 Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents.

3.12.11 When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

3.13 USE OF SITE

3.13.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.14 CUTTING AND PATCHING

3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the

Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.15 CLEANING UP

3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.

3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16 ACCESS TO WORK

3.16.1 The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

3.17 ROYALTIES AND PATENTS

3.17.1 The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

3.18 INDEMNIFICATION

3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 3.18.

3.18.2 In claims against any person or entity indemnified under this Paragraph 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Paragraph 3.18 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

3.18.3 The obligations of the Contractor under this Paragraph 3.18 shall not extend to the liability of the Architect, the Archi-

tect's consultants, and agents and employees of any of them arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the Architect, the Architect's consultants, and agents and employees of any of them provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

4.1.1 The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.

4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

4.1.3 In case of termination of employment of the Architect, the Owner shall appoint an architect against whom the Contractor makes no reasonable objection and whose status under the Contract Documents shall be that of the former architect.

4.1.4 Disputes arising under Subparagraphs 4.1.2 and 4.1.3 shall be subject to arbitration.

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the correction period described in Paragraph 12.2. The Architect will advise and consult with the Owner. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with other provisions of the Contract.

4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work. On the basis of on-site observations as an architect, the Architect will keep the Owner informed of progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.

4.2.3 The Architect will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in Paragraph 3.3. The Architect will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Con-

tractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

4.2.4 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate through the Architect. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

4.2.5 Based on the Architect's observations and evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

4.2.6 The Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, the Architect will have authority to require additional inspection or testing of the Work in accordance with Subparagraphs 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.2.7 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Paragraphs 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.

4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner for the Owner's review and records written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying

out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

4.2.11 The Architect will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made with reasonable promptness and within any time limits agreed upon. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 15 days after written request is made for them.

4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith.

4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

4.3 CLAIMS AND DISPUTES

4.3.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

4.3.2 Decision of Architect. Claims, including those alleging an error or omission by the Architect, shall be referred initially to the Architect for action as provided in Paragraph 4.4. A decision by the Architect, as provided in Subparagraph 4.4.4, shall be required as a condition precedent to arbitration or litigation of a Claim between the Contractor and Owner as to all such matters arising prior to the date final payment is due, regardless of (1) whether such matters relate to execution and progress of the Work or (2) the extent to which the Work has been completed. The decision by the Architect in response to a Claim shall not be a condition precedent to arbitration or litigation in the event (1) the position of Architect is vacant, (2) the Architect has not received evidence or has failed to render a decision within agreed time limits, (3) the Architect has failed to take action required under Subparagraph 4.4.4 within 30 days after the Claim is made, (4) 45 days have passed after the Claim has been referred to the Architect or (5) the Claim relates to a mechanic's lien.

4.3.3 Time Limits on Claims. Claims by either party must be made within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Change Order will not be considered unless submitted in a timely manner.

4.3.4 Continuing Contract Performance. Pending final resolution of a Claim including arbitration, unless otherwise agreed in writing the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

4.3.5 Waiver of Claims: Final Payment. The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

4.3.6 Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Paragraph 4.4.

4.3.7 Claims for Additional Cost. If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Paragraph 10.3. If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with the procedure established herein.

4.3.8 Claims for Additional Time

4.3.8.1 If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

4.3.8.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data

substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that weather conditions had an adverse effect on the scheduled construction.

4.3.9 Injury or Damage to Person or Property. If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in Subparagraphs 4.3.7 or 4.3.8.

4.4 RESOLUTION OF CLAIMS AND DISPUTES

4.4.1 The Architect will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the claimant, (2) submit a schedule to the parties indicating when the Architect expects to take action, (3) reject the Claim in whole or in part, stating reasons for rejection, (4) recommend approval of the Claim by the other party or (5) suggest a compromise. The Architect may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

4.4.2 If a Claim has been resolved, the Architect will prepare or obtain appropriate documentation.

4.4.3 If a Claim has not been resolved, the party making the Claim shall, within ten days after the Architect's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested by the Architect, (2) modify the initial Claim or (3) notify the Architect that the initial Claim stands.

4.4.4 If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Architect, the Architect will notify the parties in writing that the Architect's decision will be made within seven days, which decision shall be final and binding on the parties but subject to arbitration. Upon expiration of such time period, the Architect will render to the parties the Architect's written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Architect may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

4.5 ARBITRATION

4.5.1 Controversies and Claims Subject to Arbitration. Any controversy or Claim arising out of or related to the Contract, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator or arbitrators may be entered in any court having jurisdiction thereof, except controversies or Claims relating to aesthetic effect and except those waived as provided for in Subparagraph 4.3.5. Such controversies or Claims upon which the Architect has given notice and rendered a decision as provided in Subparagraph 4.4.4 shall be subject to arbitration upon written demand of either party. Arbitration may be commenced when 45 days have passed after a Claim has been referred to the Architect as provided in Paragraph 4.3 and no decision has been rendered.

4.5.2 Rules and Notices for Arbitration. Claims between the Owner and Contractor not resolved under Paragraph 4.4 shall, if subject to arbitration under Subparagraph 4.5.1, be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect, unless the parties mutually agree otherwise. Notice of demand for arbitration shall be filed in writing with the other party to the Agreement between the Owner and Contractor and with the American Arbitration Association, and a copy shall be filed with the Architect.

4.5.3 Contract Performance During Arbitration. During arbitration proceedings, the Owner and Contractor shall comply with Subparagraph 4.3.4.

4.5.4 When Arbitration May Be Demanded. Demand for arbitration of any Claim may not be made until the earlier of (1) the date on which the Architect has rendered a final written decision on the Claim, (2) the tenth day after the parties have presented evidence to the Architect or have been given reasonable opportunity to do so, if the Architect has not rendered a final written decision by that date, or (3) any of the five events described in Subparagraph 4.3.2.

4.5.4.1 When a written decision of the Architect states that (1) the decision is final but subject to arbitration and (2) a demand for arbitration of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand arbitration within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence, but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.

4.5.4.2 A demand for arbitration shall be made within the time limits specified in Subparagraphs 4.5.1 and 4.5.4 and Clause 4.5.4.1 as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to Paragraph 13.7.

4.5.5 Limitation on Consolidation or Joinder. No arbitration arising out of or relating to the Contract Documents shall include, by consolidation or joinder or in any other manner, the Architect, the Architect's employees or consultants, except by written consent containing specific reference to the Agreement and signed by the Architect, Owner, Contractor and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a dispute not described therein or with a person or entity not named or described therein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

4.5.6 Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

4.5.7 Judgment on Final Award. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4 The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such change.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. Subcontractors shall similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner provided that:

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Paragraph 14.2 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

5.4.2 If the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted.

ARTICLE 6

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided elsewhere in the Contract Documents.

6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

6.2.3 Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.

6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Subparagraph 10.2.5.

6.2.5 Claims and other disputes and matters in question between the Contractor and a separate contractor shall be subject to the provisions of Paragraph 4.3 provided the separate contractor has reciprocal obligations.

6.2.6 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Paragraph 3.14.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in Paragraph 3.15, the Owner may clean up and allocate the cost among those responsible as the Architect determines to be just.

ARTICLE 7

CHANGES IN THE WORK

7.1 CHANGES

7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

7.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:

- .1 a change in the Work;
- .2 the amount of the adjustment in the Contract Sum, if any; and
- .3 the extent of the adjustment in the Contract Time, if any.

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Subparagraph 7.3.3.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 unit prices stated in the Contract Documents or subsequently agreed upon;

.3 cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 as provided in Subparagraph 7.3.6.

7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Clause 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Subparagraph 7.3.6 shall be limited to the following:

- .1 costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' or workmen's compensation insurance;
- .2 costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 additional costs of supervision and field office personnel directly attributable to the change.

7.3.7 Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.8 If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination.

7.3.9 When the Owner and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

7.4 MINOR CHANGES IN THE WORK

7.4.1 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 8

TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

8.1.2 The date of commencement of the Work is the date established in the Agreement. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Paragraph 9.8.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 PROGRESS AND COMPLETION

8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by a notice to proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending arbitration, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.

8.3.3 This Paragraph 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for operations completed in accordance with the schedule of values. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for elsewhere in the Contract Documents.

9.3.1.1 Such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.

9.3.1.2 Such applications may not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the

Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Subparagraph 9.5.1.

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's observations at the site and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1 The Architect may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Subparagraph 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Subparagraph 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss because of:

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or another contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 persistent failure to carry out the Work in accordance with the Contract Documents.

9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.6 PROGRESS PAYMENTS

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in similar manner.

9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

9.6.4 Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

9.6.5 Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.6.2, 9.6.3 and 9.6.4.

9.6.6 A Certificate for Payment, a progress payment or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by arbitration, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, which shall be accomplished as provided in Article 7.

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or design-

nated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. The Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

9.8.3 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Subparagraph 11.3.11 and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Subparagraph 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make

such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's observations and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in said final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Subparagraph 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims. The making of final payment shall constitute a waiver of claims by the Owner as provided in Subparagraph 4.3.5.

9.10.4 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment. Such waivers shall be in addition to the waiver described in Subparagraph 4.3.5.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

10.1.2 In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect on which arbitration has not been demanded, or by arbitration under Article 4.

10.1.3 The Contractor shall not be required pursuant to Article 7 to perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB).

10.1.4 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner or anyone for whose acts the Owner may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Subparagraph 10.1.4.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.3 EMERGENCIES

10.3.1 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Paragraph 4.3 and Article 7.

ARTICLE 11

INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;

- .2 claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 claims for damages insured by usual personal injury liability coverage which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
- .5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle; and
- .7 claims involving contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18.

11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment.

11.1.3 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These Certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning reduction of coverage shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance. Optionally, the Owner may purchase and maintain other insurance for self-protection against claims which may arise from operations under the Contract. The Contractor shall not be responsible for purchasing and maintaining this optional Owner's liability insurance unless specifically required by the Contract Documents.

11.3 PROPERTY INSURANCE

11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance in the amount of the initial Contract Sum as well as subsequent modifications thereto for the entire Work at the site on a replacement cost basis without voluntary deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Paragraph 9.10 or until no person or entity

other than the Owner has an insurable interest in the property required by this Paragraph 11.3 to be covered, whichever is earlier. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.3.1.1 Property insurance shall be on an all-risk policy form and shall insure against the perils of fire and extended coverage and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, false-work, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's services and expenses required as a result of such insured loss. Coverage for other perils shall not be required unless otherwise provided in the Contract Documents.

11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance which will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor, then the Owner shall bear all reasonable costs properly attributable thereto.

11.3.1.3 If the property insurance requires minimum deductibles and such deductibles are identified in the Contract Documents, the Contractor shall pay costs not covered because of such deductibles. If the Owner or insurer increases the required minimum deductibles above the amounts so identified or if the Owner elects to purchase this insurance with voluntary deductible amounts, the Owner shall be responsible for payment of the additional costs not covered because of such increased or voluntary deductibles. If deductibles are not identified in the Contract Documents, the Owner shall pay costs not covered because of deductibles.

11.3.1.4 Unless otherwise provided in the Contract Documents, this property insurance shall cover portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also portions of the Work in transit.

11.3.2 Boiler and Machinery Insurance. The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

11.3.3 Loss of Use Insurance. The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or for other special hazards be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, adjoining or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Subparagraph 11.3.7 for damages caused by fire or other perils covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Paragraph 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Contractor.

11.3.7 Waivers of Subrogation. The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Paragraph 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.3.8 A loss insured under Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Subparagraph 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or in accordance with an arbitration award in which case the procedure shall be as provided in Paragraph 4.5. If after such loss no other special agreement is made, replacement of damaged property shall be covered by appropriate Change Order.

11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection be made, arbitrators shall be chosen as provided in Paragraph 4.5. The Owner as fiduciary shall, in that case, make settlement with insurers in accordance with directions of such arbitrators. If distribution of insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

11.3.11 Partial occupancy or use in accordance with Paragraph 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.4 PERFORMANCE BOND AND PAYMENT BOND

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall permit a copy to be made.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.

12.1.2 If a portion of the Work has been covered which the Architect has not specifically requested to observe prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2 CORRECTION OF WORK

12.2.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby.

12.2.2 If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date

for commencement of warranties established under Subparagraph 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation under this Subparagraph 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

12.2.3 The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

12.2.4 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Paragraph 2.4. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten days after written notice, the Owner may upon ten additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

12.2.5 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

12.2.6 Nothing contained in this Paragraph 12.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in Subparagraph 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

12.3 ACCEPTANCE OF NONCONFORMING WORK

12.3.1 If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13

MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

13.1.1 The Contract shall be governed by the law of the place where the Project is located.

13.2 SUCCESSORS AND ASSIGNS

13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.3 WRITTEN NOTICE

13.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

13.4 RIGHTS AND REMEDIES

13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.5 TESTS AND INSPECTIONS

13.5.1 Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so the Architect may observe such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Subparagraph 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so the Architect may observe such procedures.

The Owner shall bear such costs except as provided in Subparagraph 13.5.3.

13.5.3 If such procedures for testing, inspection or approval under Subparagraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses

13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing

13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work

13.6 INTEREST

13.6.1 Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

13.7.1 As between the Owner and Contractor:

- .1 Before Substantial Completion.** As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;
- .2 Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
- .3 After Final Certificate for Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 days through no act or fault of the Contractor or a Subcontractor. Sub-subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor, for any of the following reasons:

- .1** issuance of an order of a court or other public authority having jurisdiction;
- .2** an act of government, such as a declaration of national emergency, making material unavailable;
- .3** because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Subparagraph 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents;
- .4** if repeated suspensions, delays or interruptions by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less, or
- .5** the Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Subparagraph 2.2.1.

14.1.2 If one of the above reasons exists, the Contractor may, upon seven additional days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.

14.1.3 If the Work is stopped for a period of 60 days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Subparagraph 14.1.2.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 The Owner may terminate the Contract if the Contractor:

- .1** persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2** fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3** persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or
- .4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

14.2.2 When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to justify

tify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 accept assignment of subcontracts pursuant to Paragraph 5.4; and
- .3 finish the Work by whatever reasonable method the Owner may deem expedient.

14.2.3 When the Owner terminates the Contract for one of the reasons stated in Subparagraph 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the

Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

14.3.2 An adjustment shall be made for increases in the cost of performance of the Contract, including profit on the increased cost of performance, caused by suspension, delay or interruption. No adjustment shall be made to the extent:

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of this Contract.

14.3.3 Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 GENERAL CONDITIONS

- A. Standard Form: The General Conditions of the Contract forming a part of the Contract Documents and of these Specifications, consists of AIA Document A201, 1987 Edition.
 - 1. When any Article, Section, or Subsection in the General Conditions is supplemented as hereinafter provided, the provisions of such Article, Section, or Subsection shall remain in effect and the supplemental provisions shall be considered added hereto.
 - 2. When any Article, Section, or Subsection in the General Conditions is amended, deleted, or superseded as hereinafter provided, the provisions of such Article, Section, or Subsection not so amended, deleted, or superseded shall remain in effect.
- B. Modifications and Additions: Where Contract Documents refer to General Conditions, such reference shall be interpreted to include Supplementary Conditions.

1.02 REFERENCE TO DIVISION 1

- A. Where provisions of General Requirements relate to Project administrative or work-related requirements of the Contract, those paragraphs are deleted from General Conditions, and are specified in Division 1, General Requirements of the Specifications.

1.03 ARTICLE 1; GENERAL PROVISIONS

- A. 1.2 EXECUTION CORRELATION AND INTENT (Add the following to the end of Subparagraph 1.2.3):
 - 1.2.3 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:
 - .1 The Agreement.
 - .2 Addenda, with those of later date having precedence over those of earlier date.
 - .3 The Supplementary Conditions.
 - .4 The General Conditions of the Contract for Construction.
 - .5 Drawings and Specifications.In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

1.04 ARTICLE 2; OWNER

- A. 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER
(Delete Subparagraph 2.2.5 and substitute the following):
- 2.2.5 The Contractor will be furnished free of charge ten copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage, and handling.

1.05 ARTICLE 3; CONTRACTOR

- A. 3.4 LABOR AND MATERIALS (Add the following Subparagraphs 3.4.3 and 3.4.4 to 3.4):
- 3.4.3 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications).
- 3.4.4 By making requests for substitutions based on Subparagraph 3.4.3 above, the Contractor;
- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 - .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
 - .3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
 - .4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

- B. 3.7 PERMITS, FEES, AND NOTICES (Delete Subparagraph 3.7.1 and substitute the following):

3.7.1 The Contractor shall secure and pay for the building, mechanical, electrical and plumbing permits. The Owner shall secure and pay for any health and environmental impact fees due to water and sewer connections, Central Maine Power Co. fees and any zoning regulation fees and permits. The Contractor shall secure and pay for all other permits and governmental fees, licenses, and inspections necessary for proper execution of and completion of the Contract, which are legally required when bids are received or negotiations concluded. The Contractor and his Subcontractors shall not be responsible for hazardous waste removals (i.e. asbestos, etc.). If hazardous waste is discovered on the job site, the Owner shall arrange for and bear all costs for its removal. Owner to pay for soil, conc. testing and framing inspections.

1.06 ARTICLE 4; ADMINISTRATION OF THE CONTRACT

- A. 4.5 ARBITRATION (Add Clause 4.5.1.1 to Subparagraph 4.5.1):
 - 4.5.1.1 In addition to and before arbitration, the parties shall endeavor to settle disputes by mediation under the Construction Industry Mediation Rules and the American Arbitration Association currently in effect. Mediation shall commence, unless otherwise agreed, within the same time limits stipulated in Subparagraphs 4.5.1 and 4.5.4 and Clause 4.5.4.1 for the filing of a notice of a claim in arbitration. Such time limits shall then be extended for arbitration by ten days and the duration of the mediation process.

- 1.07 ARTICLE 5; SUBCONTRACTORS
 - A. There are no changes to this Article.

- 1.08 ARTICLE 6; OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS
 - A. There are no changes to this Article.

- 1.09 ARTICLE 7; CHANGES IN THE WORK
 - A. There are no changes to this Article.

- 1.10 ARTICLE 8; TIME
 - A. 8.1 DEFINITIONS (Delete Subparagraph 8.1.4 and substitute the following):
 - 8.1.4 The term "day" as used in the Contract Documents shall mean working day, excluding week-ends and legal holidays.

- 1.11 ARTICLE 9; PAYMENTS AND COMPLETION
 - A. 9.3 APPLICATIONS FOR PAYMENT (Add the following Sentence to Subparagraph 9.3.1; add the following Clause 9.3.1.3 to 9.3.1):
 - 9.3.1 The form of Application for Payment shall be a notarized AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet.
 - 9.3.1.3 Until Substantial Completion, the Owner shall pay percentage of the amount due the Contractor on account of progress payments as agreed in Agreement between Owner and Contractor.

 - B. 9.6 PROGRESS PAYMENTS (Add the following Subparagraphs 9.6.7 through 9.6.12 to 9.6):
 - 9.6.7 Upon commencement of the Work, an escrow account shall be established in a financial institution chosen by the Contractor and approved by the Owner.

- 9.6.8 The escrow agreement shall provide that the financial institution will act as escrow agent, will pay interest on funds deposited in such account in accordance with the provisions of the escrow agreement, and will disburse funds from the account upon the direction of the Owner as set forth below. Compensation to the escrow agent for establishing and maintaining the escrow account shall be paid from interest accrued in the escrow account.
- 9.6.9 As each progress payment is made, the retainage with respect to that payment shall be deposited by the Owner in the escrow account.
- 9.6.10 The interest earned on funds in the account shall accrue for the benefit of the Contractor until the completion date named in the Construction Contract or the expiration of any authorized extension of such date. Interest earned after such date shall accrue for the benefit of the Owner. Cost of compensation to the escrow agent paid out of interest earned shall be borne by the Contractor.
- 9.6.11 When the Contractor has fulfilled all of the requirements of the Contract providing for reduction of retained funds, the escrow agent shall release to the Contractor one-half of the accrued funds but none of the interest thereon. When the Work has been fully completed in a satisfactory manner and the Architect has issued a final Certificate for Payment, the escrow agent shall pay to the Contractor the full amount of funds remaining in the account, including net balance of the interest paid to the account, but less any interest that may have accrued for the benefit of the Owner, which shall be paid to the Owner.
- 9.6.12 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor, the escrow agent shall make payment to the Contractor as provided in Subparagraph 9.10.3.

1.12 ARTICLE 10; PROTECTION OF PERSONS AND PROPERTY

- A. 10.2 SAFETY OF PERSONS AND PROPERTY (Add Clause 10.2.4.1 to Subparagraph 10.2.4):

10.2.4.1

When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary, the Contractor shall give the Owner reasonable advance notice.

1.13. ARTICLE 11; INSURANCE AND BONDS

- A. 11.1 CONTRACTOR'S LIABILITY INSURANCE (Delete the semicolon at the end of Clause 11.1.1.1 and add the following; delete the semicolon at the end

of Clause 11.1.1.2 and add the following; add Clauses 11.1.1.8 and 11.1.1.9 to follow Clause 11.1.1.7; add the following Clause 11.1.2.1 to 11.1.2; add the following Sentence to Subparagraph 11.1.3; delete the last two Sentences of Subparagraph 11.2.1 and substitute the following):

11.1.1.1

, including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;.

11.1.1.2

or persons or entities excluded by statute from the requirements of Clause 11.1.1.1 but required by the Contract Documents to provide the insurance required by that Clause;.

11.1.1.8

Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

- .1 Premises Operations (including X, C, and U coverages, as applicable).
- .2 Independent Contractors' Protective.
- .3 Products and Completed Operations.
- .4 Personal Injury Liability with Employment Exclusion deleted.
- .5 Contractual, including specified provision for Contractor's obligations under Paragraph 3.18.
- .6 Owner, non-owned, and hired motor vehicles.
- .7 Broad Form Property Damage including Completed Operations.
- .8 Umbrella Excess Liability.

11.1.1.9

If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

11.1.2.1

The insurance required by Subparagraph 11.1.1 shall be written for the amounts determined in bid negotiations with the Owner and executed prior to final execution of the Contract. Limits shall conform to applicable state requirements as required and requirements of the Owner.

11.1.3

If this insurance is written on the Comprehensive General Liability Policy Form, the Certificates shall be AIA Document G705, Cer-

tificate of Insurance. If this insurance is written on a Commercial General Liability Policy form, ACORD Form 25S will be acceptable.

- B. 11.2 OWNER'S LIABILITY INSURANCE (Delete the last two Sentences of Subparagraph 11.2.1 and substitute the following):
 - 11.2.1 The Contractor shall purchase and maintain insurance covering the Owner's contingent liability for claims which may arise from operations under the Contract.

- C. 11.3 PROPERTY INSURANCE (Modify the first Sentence of Subparagraph 11.3.1 as follows; delete Clause 11.3.12.; delete Clause 11.3.1.3; delete Subparagraph 11.3.4; delete Subparagraph 11.3.6 and substitute the following; modify Subparagraph 11.3.7 as follows; modify Subparagraph 11.3.8 as follows; modify Subparagraph 11.3.9 as follows; modify Subparagraph 11.3.10 as follows):
 - 11.3.1 Not Used

 - 11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner two certified copies of the policy or policies providing this Property Insurance coverage, each containing those endorsements specifically related to the Project. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Contractor.
 - 11.3.7 Substitute "Contractor" for "Owner" at the end of the first Sentence.
 - 11.3.8 Substitute "Contractor" for "Owner" as fiduciary; except that at the first reference to "Owner" in the first Sentence, the word "this" should be substituted for "Owner's."
 - 11.3.9 Substitute "Contractor" for "Owner" each time the latter word appears.
 - 11.3.10 Substitute "Contractor" for "Owner" each time the latter word appears.

1.14 ARTICLE 12; UNCOVERING AND CORRECTION OF WORK

- A. There are no changes to this Article.

1.15 ARTICLE 13; MISCELLANEOUS PROVISIONS

- A. There are no changes to this Article.

1.16 ARTICLE 14; TERMINATION OR SUSPENSION OF THE CONTRACT

A. There are no changes to this Article.

Article 11 - Insurance. Article 11.1.2.1 Add the following new paragraph after " requirements of the Owner".
" Subcontractor shall furnish certificates of insurance in triplicate form with Contractor's company project name and number stated on the certificates prior to the beginning of on-site operations. The coverage and amounts below are minimum requirements and do not establish limits to Subcontractor's liability. Other coverages and higher limits may be provided at Subcontractor's expense.

	Statutory Limit
1. Workmen's Compensation	
2. Comprehensive General Liability:	
General Aggregate	\$ 1,000,000
Products/Comp. Ops. Aggregate	1,000,000
Personal & Advertising Injury	1,000,000
Each Occurrence	1,000,000
Fire Damage (Any One Fire)	50,000
Medical Expense (Any One Person)	5,000
3. Automobile: Bodily Injury and Property	
Damage Combined:	500,000
4. Excess Umbrella Liability:	
Each Occurrence	1,000,000
Aggregate	1,000,000"

END OF DOCUMENT

Supplement to the General Conditions of the Contract for Construction

U.S. Department of Housing
and Urban Development

Public and
Indian Housing



Article 1 — Labor Standards

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract or related Instrument pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) **Minimum Wages.** All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4), Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conforming under 29 CFR Part 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove any additional classification action within 30 days of receipt

and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs A.1.(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the

Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in provided benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(iii)(a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR Part 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-1049.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR Part 5.5(a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph A.3.(ii)(b) of this section.

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph A.3.(i) of this section available

for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR Part 5.12.

4. (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman's hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe

benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training program approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as HUD or its designee may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

J. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

B. Contract Work Hours and Safety Standards Act. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

B.1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph 1 of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph 1 of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1 of this section.

3. Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph 1 through 4 of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

Article 2 — Equal Employment Opportunity

The applicant hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the Contractor agrees as follows:

A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided setting forth the provisions of this non-discrimination clause.

B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all

qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

D. The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided advising the said labor union or workers representatives of the Contractor's commitments hereunder, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

D. The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

E. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

F. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulations or order of the Secretary of Labor, or as otherwise provided by law.

G. The Contractor will include the portion of the sentence immediately preceding paragraph A and the provisions of paragraphs A through G in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Secretary of Housing and Urban Development or the Secretary of Labor may direct as a means of enforcing such provisions, including sanctions for noncompliance. *Provided, however,* that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Secretary of Housing and Urban Development or the Secretary of Labor, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

H. The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted con-

struction work: *Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.*

I. The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

J. The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

Article 3 — Equal Opportunity for Businesses and Lower Income Persons Located Within the Project Area

A. The work to be performed under this contract is on a project assisted under a program providing direct Federal financial assistance from the Department of Housing and Urban Development and is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u. Section 3 requires that to the greatest extent feasible opportunities for training and employment be given lower income residents of the unit of local government or the metropolitan area (or nonmetropolitan county) as determined by the Secretary of Housing and Urban Development in which the project is located and contracts for work in connection with the project be awarded to business concerns which are located in, or owned in substantial part by persons residing in the same metropolitan area (or nonmetropolitan county) as the project.

GENERAL DECISION ME020013 03/01/2002 ME13

Date: March 1, 2002

General Decision Number ME020013

Superseded General Decision No. ME010013

State: Maine

Construction Type:
RESIDENTIAL

County(ies):
ANDROSCOGGIN CUMBERLAND PENOBSCOT

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

Modification Number	Publication Date
0	03/01/2002

COUNTY(ies):

ANDROSCOGGIN

CUMBERLAND

PENOBSCOT

SUME4001A 09/06/1994

	Rates	Fringes
ASBESTOS REMOVERS	10.25	.36
BRICKLAYERS	11.63	.47
BRICK MASON TENDER	8.00	
CARPENTERS (Excluding Drywall Hanging)	9.54	.59
CARPENTERS (Acoustical Only)	10.75	.54
ELECTRICIANS	13.78	2.26
LABORERS, UNSKILLED	7.32	
LANDSCAPE WORKERS	6.50	
PLUMBERS	7.83	
SPRINKLERFITTERS	10.00	
TILE SETTERS	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
(29 CFR 5.5(a)(1)(v)).

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

SECTION 00900 SUB-SURFACE CONDITIONS

PART 1 GENERAL

1.01 Description

- A. Test pits including sub-surface formations, are available for information only. The General Contractor must make his own deductions of the conditions which may affect methods or cost of construction of the work.
- B. Test Pits were made by S. W. Cole Engineering
- C. Location of Test Pits are shown on a site plan included in Subsurface Investigation in Geotechnical Report, Dated December 12, 2003, by S. W. Cole Engineering, Inc.

1.02 Additional Information

- A. Provide passive soils underslab venting systems and vent stacks, capped above finish floor slab per Geotechnical Report, page 6. Pursuant to a positive gas test when structure is enclosed, run insulated vent stacks through attic space to roof; cap and screen top of stacks.

A copy of the Geotechnical Report has been provided to the Contractor and the Owner. Copy is also available at the Architect's office.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 00900

SECTION 01010

SUMMARY OF THE WORK

PART 1 GENERAL

1.01 Related Documents

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Section, apply to Work of this Project and each Specification Section.

1.02 NOT USED

1.03 NOT USED

1.04 NOT USED

1.05 COORDINATION RESPONSIBILITIES

A. Subcontractor Coordination:

- 1. Insure subcontractors are knowledgeable of all Sections of Division 1, General Requirements, and are responsible for conforming to applicable requirements and instructions.
- 2. Assume responsibility for administering Work performed by subcontractors in accordance with Division 1, General Requirements.

B. Installation Sequencing:

- 1. Examine materials and installations performed by others before starting next stage or adjacent Work.
- 2. Notify Architect immediately of unsatisfactory conditions which hinder or restrict correct installation of next stage or adjacent Work.
- 3. Start of next stage or adjacent Work will be construed as acceptance of previous or adjacent Work, whether or not conditions are satisfactory.
- 4. Any work requiring subsequent removal or replacement due to unsatisfactory or defective Work shall not be at the expense of the Owner.

C. Contract Document Review:

- 1. Before execution of Work, the Contractor shall review all Drawings and Specifications and shall immediately report all errors, discrepancies, and/or omissions discovered to the Architect, in writing, with one set of Contract Documents marked in red pencil, clearly indicating the discrepancies.

2. Omissions from the Drawings and/or the Specifications or the misdescription of details of Work which are manifestly necessary to carry out the intent of the Drawings and Specifications, or are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the Work; but shall be performed as if fully and correctly set forth and described in the Drawings and Specifications, using the most appropriate method, with final approval issued by the Architect to alleviate conflicts of scheduling, Drawings, Details, and/or Specifications.
3. Design Intent:
 - a. Purpose of Drawings is to graphically depict characteristics and extent of Project.
 - b. Specifications included as part of Project Manual are provided to state material type, function, and source of materials.
 - c. Reference standards are used in Specifications to describe, by inference, specific materials and may include recommended methods of installation or application based on industry standards.

1.06 REFERENCE STANDARDS

- A. Compliance: Work shall conform to standards published by recognized professional and industry organizations when referenced in this Project Manual.
- B. Edition Date of Reference Standards:
 1. Code Listing: Any reference to standards of any society, institute, association, or governmental agency which is a part of the building code in effect for this Project shall comply with the edition date published in the referenced edition of the Building Code.
 2. Non-Code Listing: Any reference to standards of any society, institute, association, or governmental agency which is not a part of the Building Code for this Project shall be the edition in effect at time of opening of Bids, except as otherwise specifically stated in this Project Manual.
 3. Project Manual Listing: Edition dates listed with reference standards in each Section of this Project Manual are included for reference only.
- C. If reference standards are revised before completion of any part of the Work to which such revision would pertain, the Contractor may, if acceptable to the Architect and if not in violation of the Building Code, perform such work in accordance with the revised Specifications.

1.07 CODE Analysis:

- A. The design and construction of Project shall conform to codes, laws, regulations and ordinances of any kind required by governmental authority or other regulatory agency having jurisdiction over this Project and specifically:
 1. Building: BOCA Building Code - 1996
 2. Electrical: National Electrical Code (NEPA 70).
 3. Plumbing: Maine State Plumbing Code
 4. ADA and Barrier Free Design: Rules and Regulations of "Uniform Federal Accessibility Standards" and ADA regulations.

1.08 ABBREVIATIONS

- A. Reference to a technical society, institution, association, or governmental agency made in these Specifications is in the form of a standard acronym or abbreviation as published in the Encyclopedia of Associations, published by Gale Research Co., available in most libraries.
- B. Use of abbreviations for technical terms in text of Specifications are restricted to most commonly used terms and comply with U.S. Government Printing Office Style Manual, published by U.S. Government Printing Office (GPO).

1.09 GENERAL DESCRIPTION

- A. The work under this contract consists of a new 1 story fully sprinklered, hip roof, wood frame, vinyl siding structure consisting of 11 One Bedroom Units, 1 Two Bedroom Manager's Apartment and Common Support Activity Areas.
- B. Health Center Unit, where indicated as such on drawings is Not In Contract and illustrated only to illustrate Health Center Unit building components for concurrent development by the Owner.
- C. Flagpoles and benches indicated on drawings are Not In Contract and will be provided by Owner at Owner's discretion. Ledge removal, if encountered and necessary, is Not In Contract.

END OF SECTION

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide cutting and patching work, complying with project requirements for:
 - 1. Structural work.
 - 2. Mechanical/electrical systems.
 - 3. Visual requirements, including special detailing.
 - 4. Operational and safety limitations.
 - 5. Fire resistance ratings.
 - 6. Inspection, preparation, and performance.
 - 7. Cleaning.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Match existing materials for cutting and patching work with new materials conforming to project requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Inspect conditions prior to work to identify scope and type of work required. Notify Owner of work requiring interruption to building services or Owner's operations. Conform to project requirements listed above.
- B. Perform work with workmen skilled in the trades involved. Prepare sample area of each type of work involved for approval.
- C. Clean work area and areas affected by cutting and patching operations.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Submittals required for performance of the Work, including:
 - 1. Contractor's Construction Schedule.
 - 2. Shop Drawings.
 - 3. Product Data.
 - 4. Samples.

- B. Administrative Submittals:
 - 1. Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals.
 - 2. Such submittals include, but are not limited to:
 - a. Permits.
 - b. Applications for Payment.
 - c. Performance and Payment Bonds.
 - d. Insurance Certificates.

1.02 SUBMITTAL PROCEDURES

- A. Coordination:
 - 1. Coordinate preparation and processing of submittals with performance of construction activities.
 - 2. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 3. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 4. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - 5. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- B. Processing:
 - 1. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
 - 2. Allow 2 weeks for initial review.
 - 3. Allow additional time if processing must be delayed to permit coordination with subsequent submittals.
 - 4. The Architect will promptly advise the Contractor when a submittal being processed must be delayed

- for coordination.
5. If an intermediate submittal is necessary, process the same as the initial submittal.
 6. Allow 2 weeks for reprocessing each submittal.
 7. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

C. Submittal Preparation:

1. Place a permanent label or title block on each submittal for identification.
2. Indicate the name of the entity that prepared each submittal on the label or title block.
3. Provide a space approximately 4 in. x 5 in. on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
4. Include the following information on the label for processing and recording action taken:
 - a. Project Name.
 - b. Date.
 - c. Name and Address of Architect.
 - d. Name and Address of Contractor.
 - e. Name and Address of Subcontractor.
 - f. Name and Address of Supplier.
 - g. Name of Manufacturer.
 - h. Number and Title of appropriate Specification Section.
 - i. Drawing Number and Detail References, as appropriate.

D. Submittal Transmittal:

1. Package each submittal appropriately for transmittal and handling.
2. Transmit each submittal from Contractor to Architect using a transmittal form.
3. Submittals received from sources other than the Contractor will be returned without action.
4. On the transmittal record relevant information and requests for data.
5. On the Form, or Separate Sheet, record deviations from Contract Document requirements, including minor variations and limitations.
6. Include Contractor's certification that information complies with Contract Document requirements.
7. Transmittal Form: AIA Document G810.

1.03 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule:

1. Prepare a fully developed, horizontal bar-chart-type Contractor's Construction Schedule.
2. Submit within 30 days of the date established for Commencement of the Work.
3. Provide a separate time bar for each significant construction activity.

4. Provide a continuous vertical line to identify the first working day of each week.
5. Within each time bar indicate estimated completion percentage in 10 percent increments.
6. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
7. Prepare the Schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
8. Secure time commitments for performing critical elements of the Work from parties involved.
9. Coordinate each element on the Schedule with other construction activities; include minor elements involved in the sequence of the Work.
10. Show each activity in proper sequence.
11. Indicate graphically sequences necessary for completion of related portions of the Work.
12. Indicate Substantial Completion on the Schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
13. Cost Correlation:
 - a. At the head of the Schedule, provide a two-item cost correlation line, indicating precalculated and actual costs.
 - b. On the line shown dollar-volume of Work performed as of the dates used for preparation of payment requests.
14. Distribution:
 - a. Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates.
 - b. Post copies in the Project Meeting Room and Temporary Field Office.
 - c. When revisions are made, distribute to the same parties and post in the same locations.
 - d. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
15. Schedule Updating:
 - a. Revise the Schedule after each meeting or activity, where revisions have been recognized or made.
 - b. Issue the updated Schedule concurrently with report of each meeting.

1.04 SUBMITTAL SCHEDULE

A. General:

1. After development and acceptance of the Contractor's Construction Schedule, prepare a complete Schedule of Submittals.
2. Submit the Schedule within 10 days of the date required for establishment of the Contractor's Construction Schedule.

3. Coordinate Submittal Schedule with the List of Subcontracts, Schedule of Values, and the List of Products, as well as the Contractor's Construction Schedule.

B. Schedule:

1. Prepare the Schedule in chronological order; include submittals required during the first 90 days of construction.
2. Provide the following information:
 - a. Scheduled Date for the First Submittal.
 - b. Related Section Number.
 - c. Submittal Category.
 - d. Name of Subcontractor.
 - e. Description of the Part of the Work Covered.
 - f. Scheduled Date for Resubmittal.
 - g. Scheduled Date the Architect's Final Release or Approval.

C. Distribution:

1. Following response to initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated.
2. Post copies in the Project Meeting Room and Field Office.
3. When revisions are made, distribute to the same parties and post in the same locations.
4. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

D. Schedule Updating:

1. Revise the Schedule after each meeting or activity, where revisions have been recognized or made.
2. Issue the updated Schedule concurrently with report of each meeting.

1.05 DAILY CONSTRUCTION REPORTS

A. General:

1. Prepare a daily Construction Report, recording the following information concerning events at the site.
2. Submit duplicate copies to the Architect at weekly intervals.
 - a. High and Low Temperature, General Weather Conditions.
 - b. Accidents and Unusual Events.
 - c. Meetings and Significant Decisions.
 - d. Stoppages, Delays, Shortages, Losses.
 - e. Change Orders Received, Implemented.
 - f. Services Connected, Disconnected.
 - g. Equipment or System Tests and Start-Ups.
 - h. Partial Completions, Occupancies.
 - i. Substantial Completions Authorized.

1.06 SHOP DRAWINGS

A. General:

1. Submit newly prepared information, drawn to accurate scale.
2. Highlight, encircle, or otherwise indicate deviations from the Contract Documents.
3. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings.
4. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
5. Shop Drawings include Fabrication and Installation Drawings, Setting Diagrams, Schedules, Patterns, Templates, and similar Drawings.
6. Include the following information:
 - a. Dimensions.
 - b. Identification of Products and Materials included.
 - c. Compliance with Specified Standards.
 - d. Notation of Coordination Requirements.
 - e. Notation of Dimensions Established by Field Measurement.
7. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 in. x 11 in., but no larger than 36 in. x 48 in.
8. Submittal: Submit one correctable translucent reproducible print and one blue or black-line print for the Architect's review; the reproducible print will be returned.
9. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

B. Coordination Drawings:

1. A special type of Shop Drawing that shows the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
2. Preparation of Coordination Drawings may include components previously shown in detail on Shop Drawings or Product Data.
3. Submit Coordination Drawings for integration of different construction elements.
4. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.07 PRODUCT DATA

A. General:

1. Collect Product Data into a single Submittal for each element of construction or system.
2. Product Data includes printed information such as Manufacturer's Installation Instructions, Catalog Cuts, Standard Color Charts, Roughing-In Diagrams

- and Templates, Standard Wiring Diagrams, and Performance Curves.
3. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.
 4. Mark each copy to show applicable choices and options.
 5. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information.
 6. Include the following information:
 - a. Manufacturer's Printed Recommendations.
 - b. Compliance with Recognized Trade Association Standards.
 - c. Compliance with Recognized Testing Agency Standards.
 - d. Application of Testing Agency Labels and Seals.
 - e. Notation of Dimensions Verified by Field Measurements.
 - f. Notation of Coordination Requirements.
 7. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- B. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
- C. Submittals:
1. Submit 2 copies of each required Submittal; submit 4 copies where required for Maintenance Manuals.
 2. The Architect will retain one, and will return the other marked with action taken and corrections or modifications required.
 3. Unless noncompliance with Contract Document provisions is observed, the Submittal may serve as the final Submittal.
- D. Distribution:
1. Furnish copies of Final Submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities; show distribution on Transmittal Forms.
 2. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 3. Do not permit use of unmarked copies of Product Data in connection with construction.

1.08 SAMPLES

- A. General:
1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed.
 2. Samples include Partial Sections of Manufactured or

- Fabricated Components, Cuts or Containers of Materials, Color Range Sets, and Swatches showing color, texture, and pattern.
3. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated.
 4. Prepare Samples to match the Architect's sample.
 5. Include the following:
 - a. Generic Description of the Sample.
 - b. Sample Source.
 - c. Product Name or Name of Manufacturer.
 - d. Compliance with Recognized Standards.
 - e. Availability and Delivery Time.
 6. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the Final Submittal and the actual component as delivered and installed.
 7. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units, not less than 3, that show approximate limits of the variations.
 8. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operations, and similar construction characteristics.
 9. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work; such Samples must be undamaged at time of use.
 10. On the Transmittal, indicate special requests regarding disposition of Sample Submittals.
- B. Preliminary Submittals:
1. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 2. Preliminary Submittals will be reviewed and returned with the Architect's mark indicating selection and other action.
- C. Submittals:
1. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
 2. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 3. Unless noncompliance with Contract Document provisions is observed, the Submittal may serve as the Final Submittal.
 4. Sample sets may be used to obtain Final Acceptance

of the construction associated with each set.

D. Distribution of Samples:

1. Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work.
2. Show distribution on Transmittal Forms.

1.09 ARCHITECT'S ACTION

A. General:

1. Except for Submittals for record, information, or similar purposes, where action and return is required or requested, the Architect will review each Submittal, mark to indicate action taken, and return promptly.
2. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp:

1. The Architect will stamp each Submittal with a uniform, self-explanatory action stamp.
2. The stamp will be appropriately marked as follows to indicate the action taken.
3. Final Unrestricted Release: Where submittals are marked Reviewed, that part of the Work covered by the Submittal may proceed provided it complies with requirements of the Contract Documents; Final Acceptance will depend upon that compliance.
4. Final-But-Restricted Release: When Submittals are marked Reviewed as Noted, that part of the Work covered by the Submittal may proceed provided it complies with notations or corrections on the Submittal and requirements of the Contract Documents; Final Acceptance will depend on that compliance.
5. Returned for Resubmittal:
 - a. When Submittal is marked Not Reviewed, Revise and Resubmit, do not proceed with that part of the Work covered by the Submittal, including purchasing, fabrication, delivery, or other activity.
 - b. Revise or prepare a new Submittal in accordance with the notations.
 - c. Resubmit without delay.
 - d. Repeat if necessary to obtain a different action mark.
 - e. Do not permit Submittals marked Not Reviewed, Revise and Resubmit to be used at the Project site, or elsewhere where Work is in progress.
6. Other Action: Where a submittal is primarily for information or record purposes, special processing, or other activity, the Submittal will be returned, marked Action Not Required.

1.10 PROGRESS PHOTOGRAPHS

- A. Before construction is started and on the first work day of each month thereafter until Substantial Completion, the Contractor shall have black and white photographs taken from 6 locations as directed by the Architect, showing as much of the work performed during the previous month as possible. The Architect shall have the right to increase or decrease the number of photographs required each month, maintaining an overall average of 6 per month.
- B. Photographs shall be taken by a competent commercial photographer, and all costs in connection therewith shall be paid by the Contractor.
- C. Photographs shall be 8" x 10". The prints shall bear the date of exposure, name of Project, description of view and name of photographer. Two glossy prints of each photograph shall be delivered to the Architect within 15 days after the exposures are made.
- D. In lieu of conventional black and white photographs and glossy prints as described above, digital images by the Contractor depicting the general progress of the Work and transmitted via email to the Architect are an acceptable and preferable alternate.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary construction and support facilities required include, but are not limited to:
 - 1. Temporary Heat.
 - 2. Sanitary Facilities, including Drinking Water.
 - 3. Temporary Enclosures.
 - 4. Waste Disposal Services.
 - 5. Omitted
 - 6. Construction Aids and Miscellaneous General Services and Facilities.
- C. Security and protection facilities required include, but are not limited to:
 - 1. Temporary Fire Protection.
 - 2. Barricades, Warning Signs, Lights.
 - 3. Environmental Protection.

1.02 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Submit a Schedule indicating implementation and termination of each temporary utility within 15 days of the date established for Commencement of the Work.

1.03 QUALITY ASSURANCE

- A. Regulations:
 - 1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to:
 - a. Building Code Requirements.
 - b. Health and Safety Regulations.
 - c. Utility Company Regulations.
 - d. Police, Fire Department, and Rescue Squad rules.
 - e. Environmental Protection Regulations.
- B. Standards:
 - 1. Comply with NFPA Code 241, Building Construction and Demolition Operations, ANSI A10 Series Standards for Safety Requirements for Construction and

Demolition, and NECA Electrical Design Library
Temporary Electrical Facilities.

2. Refer to Guidelines for Bid Conditions for Temporary Job Utilities and Services, prepared jointly by AGC and ASC, for industry recommendations.
3. Electrical Service:
 - a. Comply with NEMA, NECA, and UL Standards and regulations for temporary electric service.
 - b. Install service in compliance with NEC (NFPA 70).

C. Inspections:

1. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use.
3. Obtain required certifications and permits.

1.04 JOB CONDITIONS

A. Temporary Facilities:

1. Prepare a Schedule indicating dates for implementation and termination of each temporary utility.
2. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

B. Conditions of Use:

1. Keep temporary services and facilities clean and neat in appearance.
2. Operate in a safe and efficient manner.
3. Take necessary fire protection measures.
4. Do not overload facilities or permit them to interfere with progress.
5. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Provide new materials, if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used.
2. Provide materials suitable for the use intended.

2.02 EQUIPMENT

A. General:

1. Provide new equipment if acceptable to the Architect; undamaged, previously used equipment in serviceable condition may be used.
2. Provide equipment suitable for use intended.

B. Electrical Outlets:

1. Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into

- higher voltage outlets.
- 2. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- C. Electrical Power Cords:
 - 1. Provide grounded extension cords; use hard-service cords where exposed to abrasion and traffic.
 - 2. Provide waterproof connectors to connect separate lengths of electric cords; if single lengths will not reach areas where construction activities are in progress.
- D. Lamps and Light Fixtures:
 - 1. Provide general service incandescent lamps of wattage required for adequate illumination.
 - 2. Provide guard cages or tempered glass enclosures, where exposed to breakage.
 - 3. Provide exterior fixtures exposed to moisture.
- E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- F. First Aid Supplies: Comply with governing regulations.
- G. Fire Extinguishers:
 - 1. Provide hand-carried, portable UL rated Class A fire extinguishers for temporary offices and similar spaces.
 - 2. In other locations provide hand-carried, portable UL rated, Class ABC dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 3. Comply with NFPA 10 and 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- H. Telephone, Telephone Answering Machine and FAX Machine at Contractor's job site field office.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Temporary Utilities:
 - 1. Power Distribution System:
 - a. Install wiring overhead, and rise vertically where least exposed to damage.
 - b. Where permitted, wiring circuits not exceeding 125 volts, AC 20 amp rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
 - 2. Temporary Lighting:
 - a. Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.
 - b. Install and operate temporary lighting that will fulfill security and protection require-

ments, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

B. Temporary Construction and Support Facilities:

1. Temporary Heat:

- a. Provide temporary heat required by construction activities for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
- b. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
- c. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

2. Heating Facilities:

- a. Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
- b. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

3. Temporary Enclosures:

- a. Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
- b. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat.
- c. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- d. Install tarpaulins securely with incombustible wood framing and other materials.
- e. Close openings of 25 sq. ft. or less with plywood or similar materials.
- f. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
- g. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use UL labeled fire-retardant treated material for framing and main sheathing.

4. Temporary Lifts and Hoists:

- a. Provide facilities for hoisting materials and employees.
- b. Truck cranes and similar devices used for hoisting materials are considered tools and equipment and not temporary facilities.

5. Collection and Disposal of Wastes:

- a. Collect waste from construction areas and elsewhere daily.

- b. Comply with requirements of NFPA 241 for removal of combustible waste material and debris.
 - c. Enforce requirements strictly.
 - d. Do not hold collected materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg. F (27 deg. C).
 - e. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly.
 - f. Dispose of material in a lawful manner.
- 6 Omitted.

C. Security and Protection Facilities:

1. General: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.
2. Barricades, Warning Signs and Lights:
 - a. Comply with standards and code requirements for erection of structurally adequate barricades.
 - b. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public, of the hazard being protected against.
 - c. Where appropriate and needed, provide lighting including flashing red or amber lights.
3. Environmental Protection:
 - a. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result.
 - b. Avoid use of tools and equipment which produce harmful noise.
 - c. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.02 OPERATION, TERMINATION, AND REMOVAL

A. Supervision:

1. Enforce strict discipline in use of temporary

facilities.

2. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance:

1. Maintain facilities in good operating condition until removal.
2. Protect from damage by freezing temperatures and similar elements.
3. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
4. Protection:
 - a. Prevent water filled piping from freezing.
 - b. Maintain markers for underground lines.
 - c. Protect from damage during excavation operations.

C. Termination and Removal:

1. Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion.
2. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility.
3. Repair damaged Work, clean exposed surfaces, and replace construction that be satisfactorily repaired.
4. Materials and facilities that constitute temporary facilities are property of the Contractor.
5. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period including, but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

3.03 PROJECT SIGN.

- A. The contractor shall provide, where directed by the Architect, a project sign.
- B. The sign shall be constructed of plywood, MDO/Ext-APA, 4ft by 6 ft. supported on two 4 in. by 4 in. post, with adequate bracing. Paint all surfaces of the sign and supports with 2 coats of exterior paint and provide lettering of size and type as directed by the Architect.
- C. No other signs or advertisements will be allowed on the site without the approval of the Architect.
- D. The contractor shall obtain approval, as required, of the local authorities for erection of the sign.

END OF SECTION

01500-6

Temporary Facilities

1812
TA

SECTION 01505 – MOBILIZATION/DEMobilIZATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mobilization shall include the obtaining of all permits, insurance and bonds; moving onto the site of all plant and equipment; furnishing and erecting safety fencing, temporary signs, construction field offices, and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include but not be limited to the following principal items and shall be a portion of the work of this contract.
1. Moving on to the site of all Contractor's plant and equipment required for first month operations.
 2. Installing temporary construction power, wiring, and lighting facilities as required.
 3. Developing construction water supply.
 4. Providing field office trailers for the Contractor, complete with all specified furnishings and utility services including telephones, telephone appurtenances, and copying machine, if required.
 5. Providing all on-site communication facilities, including telephones.
 6. Providing on-site sanitary facilities and potable water facilities.
 7. Arranging for an erection of Contractor's work and storage yard.
 8. Submittal of all required insurance certificates and bonds.
 9. Obtaining all required permits.
 10. Posting all OSHA required notices and establishment of safety programs.
 11. Having the Contractor's superintendent at the job site.
 12. Submittal of Preliminary Construction Schedule.
 13. Notifying the Owner, the City, the Portland Water District and the Fire Department of the planned construction activities.
 14. Conducting a preconstruction conference.
- B. Demobilization shall include, but not be limited to, the removal from the site of all plant and equipment prior to building occupancy; take down and removal of all safety fencing, temporary signs, construction field offices and other construction facilities; all as required for the proper completion and project acceptance by the Owner. Demobilization shall include, but not be limited to, the following principal items and shall be a portion of the work of this contract:
1. Take down and removal from the site of all Contractor's plant, equipment, solid waste, and stored materials remaining upon project completion and building turnover.

2. Take down temporary construction power, wiring, and service panels and other lighting.
3. Removal of any field trailers and proper surface restoration to stockpile areas, staging grounds, etc.
4. Providing start up results and testing for all systems to the Owner with all equipment data, warranties, operations manuals and equipment training including, but not limited to, mechanical equipment, lights, fencing, signage, interior mechanical and electrical systems, underground fuel storage tanks, above ground fuel storage tanks and electrical equipment.
5. Completing all surface restoration and punchlist items.
6. Provide red line record drawings in triplicate to the Owner or as otherwise designated in these specifications.

1.02 PAYMENT FOR MOBILIZATION/DEMobilIZATION

- A. The Contractor's attention is directed to the condition that no separate payment for mobilization or demobilization is to be made under the contract.

END OF SECTION 01505

SECTION 01570 - TRAFFIC CONTROL AND SIGNAGE

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. The work shall not interfere with normal traffic on any Island Streets.
- B.

PART 2 – PRODUCTS

2.01 SIGNS, BARRICADES, AND WARNING DEVICES

- A. General: Comply with requirements in "Manual on Uniform Traffic Control Devices" published by Department of Transportation, Federal Highway Administration and requirements of the Maine Department of Transportation.

PART 3 – EXECUTION

3.01 MAINTENANCE OF TRAFFIC

- A. General: Maintain two-way traffic through the work area during all hours.
- B. Reserved.
- C. Emergency vehicles have the right-of-way at any time and shall be accommodated.

3.02 DETOURS

- A. General: Detours are not allowed on this project.

3.03 SCHEDULING OF WORK

- A. Schedule all work to minimize disruptions and to allow access to all buildings and in accordance with other portions of this contract.
- B. Revise the plan of work, if, in the opinion of the Engineer, Owner, or other regulatory agency, it will create a traffic hazard or an unreasonably long delay.

3.04 SIGNS, BARRICADES, AND WARNING DEVICES

- A. General: The contractor shall erect appropriate signs to warn traffic of construction zone and/or detours. Placement of necessary signs shall be at the discretion of the Engineer/Owner and shall be done so without added cost to the Owner.
- B. Provide adequate warning signs, barricades, signal lights, and take other necessary precautions for the safety of the public.
- C. Provide and illuminate suitable warning signs to show where construction, barricades, or detours exist.
- D. Signal lights: Illuminate at all barricades and obstructions from sunset to sunrise.
- E. Maintain necessary signs, and signs required by the City of Portland, barricades, lights, and other safety precautions during authorized suspension of the work, week-ends, holidays, or other times when construction work is not in progress at no extra expense to the Owner.

3.05 EXISTING SIGNS

- A. Temporarily Reset and maintain street signs which must be moved during construction. Relocate signs so that no traffic hazards are created.
- B. Permanently reset signs at designated locations prior to completion of work unless stipulated otherwise by the contract drawings.

END OF SECTION 01570

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. Definitions:
 - 1. General:
 - a. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as, specialties, systems, structure, finishes, accessories, and similar terms.
 - b. Such terms are self-explanatory and have well recognized meanings in the construction industry.
 - 2. Products:
 - a. Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.
 - b. The term product includes the terms material, equipment, system, and terms of similar intent.
 - c. Named Products: Items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 3. Materials: Products that are substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the Work.
 - 4. Equipment: A product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.02 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. To the fullest extent possible, provide products of the same kind, from a single source.
 - 2. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete Project requirements in a timely manner, consult with the Architect for a determination of the most important product qualities before proceeding.
 - 3. Qualities may include attributes relating to visual appearance, strength, structural, durability, or compatibility.
 - 4. When a determination has been made, select products

from sources that produce products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options:

1. When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
2. Each prime Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate Contractors.
3. If a dispute arises between prime Contractors over concurrently selectable, but incompatible products, the Architect will determine which products shall be retained and which are incompatible and must be replaced.

C. Nameplates:

1. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
2. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
3. Equipment Nameplates:
 - a. Provide a permanent nameplate on each item of service-connected or power-operated equipment.
 - b. Locate on an easily accessible surface which is inconspicuous in occupied spaces.
 - c. The nameplate shall contain the following information and other essential operating data; Name of Product or Manufacturer, Model and Serial Number, Capacity, Speed, Ratings.

1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

B. Delivery:

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery and installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for

- handling, storing, unpacking, protecting, and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.

C. Storage:

1. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
2. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
3. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation.
4. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 PRODUCTS

2.01 PRODUCT SELECTION

A. General Product Requirements:

1. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
2. Provide products complete with all accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for the intended use and effect.
3. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures:

1. Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience.
2. Procedures governing product selection include the following.
3. Proprietary Specification Requirements:
 - a. Where only a single product or manufacturer is named, provide the product indicated.
 - b. No substitutions will be permitted.
4. Semiproprietary Specification Requirements:
 - a. Where two or more products or manufacturers are named, provide one of the products indicated.
 - b. No substitutions will be permitted.
 - c. Where products or manufacturers are specified by name, accompanied by the term "or equal", or "or approved equal", comply with the Contract Document provisions concerning "substitutions to obtain approval for use of an unnamed product."

5. Non-Proprietary Specifications:
 - a. When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to the use of these products only, the Contractor may propose any available product that complies with Contract requirements.
 - b. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
6. Descriptive Specification Requirements: Where the Specifications describe a product or assembly listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
7. Performance Specification Requirements:
 - a. Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.
 - b. General overall performance of a product is implied where the product is specified for a specific application.
 - c. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
8. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
9. Visual Matching:
 - a. Where Specifications require matching an established sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 - b. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
10. Visual Selection:
 - a. Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements.
 - b. The Architect will select the color, pattern, and texture from the product line selected.

PART 3 EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated.
- B. Anchor each product securely in space, accurately located, and aligned with other work.
- C. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- END OF SECTION -

SECTION 01700

PROJECT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Project Closeout including, but not limited to:
 - 1. Inspection Procedures.
 - 2. Project Record Document Submittal.
 - 3. Operating and Maintenance Manual Submittal.
 - 4. Submittal of Warranties.
 - 5. Final Cleaning.

- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures:
 - 1. Before requesting inspection for certification of Substantial Completion, complete the following.
 - 2. List exceptions in the request.
 - 3. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent Completion for the portion of the Work claimed as Substantially Complete.
 - 4. Include supporting documentation for Completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - 5. If 100 percent Completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 6. Advise Owner of pending insurance change-over requirements.
 - 7. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 8. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
 - 9. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
 - 10. Deliver tools, spare parts, extra stock, and similar items.
 - 11. Make final change-over of permanent locks and transmit keys to the Owner.

12. Advise the Owner's personnel of the change-over in security provisions.
13. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel.
14. Discontinue or change-over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
15. Complete final clean up requirements, including touch-up painting.
16. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures:

1. On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements.
2. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the Certificate will be issued.
3. The Architect will repeat inspection when requested and assured that the Work has been Substantially Completed.
4. Results of the completed inspection will form the basis of requirements for Final Acceptance.

1.03 FINAL ACCEPTANCE

A. Preliminary Procedures:

1. Before requesting final inspection for certification of Final Acceptance and Final Payment, complete the following.
2. List exceptions in the request.
3. Submit the Final Payment Request with final releases and supporting documentation not previously submitted and accepted.
4. Include certificates of insurance for products and completed operations where required.
5. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
6. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for Acceptance and the list has been endorsed and dated by the Architect.
7. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
8. Submit consent of surety to Final Payment.
9. Submit a final Liquidated Damages Settlement Statement.
10. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure:

1. The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
2. Upon completion of reinspection, the Architect will prepare a Certificate of Final Acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Acceptance.
3. If necessary, reinspection will be repeated.

1.04 RECORD DOCUMENT SUBMITTALS

A. General:

1. Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location.
2. Provide access to record documents for the Architect's reference during normal working hours.

B. Record Drawings:

1. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings.
2. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown.
3. Mark whichever drawing is most capable of showing conditions fully and accurately.
4. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract Drawings.
5. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
6. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
7. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
8. Note related Change Order numbers where applicable.
9. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.

C. Record Specifications:

1. Maintain one complete copy of the Project Manual, including addenda, and one copy of other written Construction Documents such as Change Orders and modifications issued in printed form during construction.
2. Mark these documents to show substantial variations

- in actual Work performed in comparison with the text of the Specifications and modifications.
3. Give particular attention to substitutions, selection of options, and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
 4. Note related Record Drawing information and Product Data.
 5. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.
- D. Record Product Data:
1. Maintain one copy of each product data submittal.
 2. Mark these documents to show significant variations in actual Work performed in comparison with information submitted.
 3. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 4. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation.
 5. Note related Change Orders and mark-up of Record Drawings and Specifications.
 6. Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.
- E. Record Sample Submittal:
1. Immediately before the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work, are to be transmitted to the Owner for record purposes.
 2. Comply with delivery to the Owner's sample storage area.
- F. Miscellaneous Record Submittals:
1. Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.
 2. Immediately before the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference.
 3. Submit to the Architect for the Owner's records.
- G. Maintenance Manuals:
1. Organize operating and maintenance data into suitable sets of manageable size.
 2. Bind properly indexed data in individual heavy-duty 2 in., 3-ring vinyl-covered binders, with pocket folders for folded sheet information.
 3. Mark appropriate identification on front and spine of each binder.

4. Include the following types of information:
 - a. Emergency Instructions.
 - b. Spare Parts List.
 - c. Copies of Warranties.
 - d. Wiring Diagrams.
 - e. Recommended Turn-around Cycles.
 - f. Inspection Procedures.
 - g. Shop Drawings and Product Data.
 - h. Fixture Lamping Schedule.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instructions:
 1. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance.
 2. If installers are not experienced in procedures, provide instruction by manufacturer's representatives; complete with step-by-step operating manuals written for each operating sequence or combination of sequences.
 3. Include a detailed review of the following items:
 - a. Maintenance Manuals complete with step-by-step instructions for maintenance and troubleshooting.
 - b. Record Documents.
 - c. Spare Parts and Materials.
 - d. Tools.
 - e. Lubricants.
 - f. Fuels.
 - g. Identification Systems.
 - h. Control Sequences.
 - i. Hazards.
 - j. Cleaning.
 - k. Warranties and Bonds.
 - l. Maintenance Agreements and similar continuing commitments.
 4. As part of instruction for operating equipment, demonstrate the following procedures:
 - a. Start-up.
 - b. Shut-down.
 - c. Emergency Operations.
 - d. Noise and Vibration Adjustments.
 - e. Safety Procedures.
 - f. Economy and Efficiency Adjustments.
 - g. Effective Energy Utilization.

3.02 FINAL CLEANING

- A. General: General Cleaning during construction is re-

quired by the General Conditions and is included in Section 01500, Temporary Facilities.

B. Cleaning:

1. Employ experienced workers or professional cleaners for final cleaning.
2. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program.
3. Comply with manufacturer's instructions.
4. Complete the following cleaning operations before requesting inspection for Certificate of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows.
 - c. Remove glazing compound and other substances that are noticeable vision-obscuring materials.
 - d. Replace chipped or broken glass and other damaged transparent materials.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.
 - f. Restore reflective surfaces to their original reflective condition.
 - g. Leave concrete floors broom clean.
 - h. Vacuum carpeted surfaces.
 - i. Wipe surfaces of mechanical and electrical equipment.
 - j. Clean plumbing fixtures to a sanitary condition.
 - k. Clean light fixtures and lamps.
 - l. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances.
 - m. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits.
 - n. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Pest Control: Engage an experienced exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

E. Compliance:

1. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
2. Do not burn waste materials.
3. Do not bury debris or excess materials on the Owner's property.
4. Do not discharge volatile, harmful, or dangerous materials into drainage systems.

5. Remove waste materials from the site and dispose of in a lawful manner.
6. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

- END OF SECTION -

SECTION 02000 - DEVELOPMENT PERMITS

PART 1 - GENERAL

- A. Construction of this project must meet the terms and conditions of the City of Portland Local Site Plan Permit.
- B. Copies of the Permit Applications and Correspondence During Review of the Permits may be inspected during normal working hours at the office of:

DeLuca-Hoffman Associates Inc.
Consulting Engineers
778 Main Street Suite 8
South Portland, Maine 04106
(207) 775-1121

- C. Any Contractor who desires to view the Permit Applications and Associated Correspondence must contact DeLuca-Hoffman Associates Inc. 48 hours prior to inspecting the information.
- D. Certain conditions of the permits will be the responsibility of the Contractor as applicable for the VOA – Peaks Island project. These are expected to include:

Local Permits: The Contractor shall notify the Public Works Department before construction begins. Local street opening permits shall be the responsibility of the Contractor. The Owner is responsible for all other permit conditions.

PART 2 - PERMITS

A copy of the Federal, State, and Local permits will be added by addendum.

The contractor should anticipate the conditions contained in the current specifications. If the permits have additional conditions, they will be negotiated with the contractor prior to award of the contract.

END OF SECTION 02000

State of Maine Site Location of Development Project Modification*
City of Portland Local Site Plan Approval*

*To be added by Addendum

SECTION 02001 - CIVIL ENGINEERING REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.01 - SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for handling and processing "Requests for Information (RFI).
2. "Request for Information" form is attached at the end of this Section.

1.01 - DEFINITION

- A. Requests for Information: A formal process used during the construction phase to facilitate communication between the contractor, the Owner's representative, the Architect's Clerk of the Works, and the Civil Engineer with regard to requests for additional information and clarification of the intent of the Contract Documents (Drawings and Specifications).
- B. Do not use "Request for Information" form during bidding. Direct questions during bidding phase as indicated in the bid documents.

1.03 - PROCEDURE

A. Conditions Requiring Clarification and the Contract Documents:

1. Contractor shall submit a "Request for Information" to the Architect and request review by the Civil Engineer.
2. Submit "Request for Information" from the Contractor's office or field office only. "Requests for Information" submitted directly from subcontractors or suppliers will not be accepted.
3. Generate "Requests for Information" by one source per project and number accordingly.
4. Submit one "Request for Information" per form.

B. Engineer will review RFI from the Contractor with reasonable promptness and the Contractor will be notified in writing of decisions made.

1. The Engineering Consultant's written response to the RFI shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Sum or Contract Time.

- C. Contractor shall maintain a log of "Requests for Information" sent to, and responses from Engineer "Requests for Information" log shall be sent, by Fax, every Friday to the Engineer.
- D. All "Requests for Information" regarding scheduling, costing, and Owner provided equipment coordination shall be directed to the Architect.

1.04 - REQUEST FOR INFORMATION FORM

- A. Submit "Requests for Information" on the attached "Request for Information" form, or format accordingly on letterhead. Engineer will not respond to requests for information unless this form or format is utilized.
- B. Where submittal form or format does not provide space needed for complete information, additional sheets may be attached.

1.05 – REQUEST FOR ELECTRONIC MEDIA

Contractors may request AutoCAD disks for use in determining quantities. Contractors may obtain these disks by submitting the enclosed form to the Architect. This form restricts the use of this data.

END OF SECTION 02001

REQUEST FOR INFORMATION FROM THE ENGINEER

DATE: _____ RFI NO. _____
PROJECT: _____
(City, State)
TO: _____
FROM: _____ DRAWING NO. _____
(General Contractor) _____
(Project Superintendent) _____
(Job Site Fax Number) _____
DETAIL NO. _____
SPECS SECTION NO. _____

RFI Type:

- | | | | |
|---|--|---|--|
| <input type="checkbox"/> Demolition | <input type="checkbox"/> Rock | <input type="checkbox"/> Utilities | <input type="checkbox"/> Site Lighting |
| <input type="checkbox"/> Site Preparation | <input type="checkbox"/> Erosion Control | <input type="checkbox"/> Paving | <input type="checkbox"/> Slope Stabilization |
| <input type="checkbox"/> Earthwork | <input type="checkbox"/> Storm Sewer | <input type="checkbox"/> Landscape/
Irrigation | <input type="checkbox"/> Retaining Walls |
| | | | <input type="checkbox"/> Traffic Related |
| | | | <input type="checkbox"/> Other |

Information Requested: _____

Requested By: _____

Reply: _____

Response By: _____

Date: _____

File Distribution:

SECTION 02010 - LAYOUT OF WORK

PART 1 - GENERAL

1.01 - GENERAL PROVISIONS

- A. The Owner has retained _____, licensed land surveyor, to establish a project benchmark and to establish the site property boundary. For the purposes of this specification, this shall be the limit of Owner provided survey control to the contractor.
- B. The Contractor shall employ a licensed land surveyor in the State of Maine to lay out the work from the established reference points and bench marks, base lines, and the coordinate system indicated on the drawings, and shall be responsible for all measurements in connection with the layout. AutoCAD 2000 files will be furnished to the Contractor upon written request. The licensed land surveyor shall certify in writing that the layout was performed under his/her direct supervision and is correct and meets the requirements of the contract documents. A copy of the certificate shall be furnished to the Architect.

The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Owner. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Owner until authorized to remove them. If such marks are destroyed by the Contractor or through Contractor's negligence before their removal is authorized, the Owner may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

- C. The layout shall establish the locations of silt fence and areas of trees to be protected for review and approval of the Owner prior to clearing.
- D. Establish and plainly mark center lines for the site work and such other lines and grades that are reasonably necessary to properly assure that location, orientation, and elevations established for each structure, roadways, utilities, and parking lots, are in accordance with lines and elevations shown on contract drawings.
- E. Following completion of general mass excavation and before any other permanent work is performed, establish and plainly mark sufficient additional survey control points or system of points as may be necessary to assure proper alignment, orientation, and grade of all major features of work.

1. Such additional survey control points or system of points thus established shall be checked and certified by a registered land surveyor or registered civil engineer. Furnish such certification to the Owner before any work is placed.
 2. A detailed check of all coordinates, resultant pipe lengths, backslopes, and appurtenant locations shall be made by the registered land surveyor or civil engineer and provided to the Owner prior to starting utility lines.
- F. During progress of work, the Contractor shall have line grades and plumbness of all major work checked and certified by a registered land surveyor or registered civil engineer as meeting the requirements of the contract drawings. Furnish such certification to the Owner before any major items are placed. In addition, Contractor shall furnish to the Owner certificates from a registered land surveyor or registered civil engineer that the following work is complete in every respect as required by contract drawings.
1. Elevations of all pavement areas and building pads.
 2. Lines and elevations of sewers, storm drains, utility systems.
 3. Lines of elevations of all swales and drainage areas.
 4. Lines of elevations of parking area.
 5. Horizontal and alignment of all access drives.
 6. Record conditions of the stormwater management system.
- G. The location of catch basins and manholes shall be accurately located by a registered land surveyor. Catch basins and manholes shall be located from the layout data and established on the contract drawings.
- H. Whenever approved changes from contract drawings are made in line or grading requiring certificates, record such changes on a reproducible drawing bearing the registered land surveyor or registered civil engineer seal, and forward these drawings upon completion of work to the Architect.
- I. Changes in location, additions and appurtenant items such as, but not limited to, manholes, inlets, pipe lines and conduits shall be shown in same manner as on contract drawings (by coordinates or dimensions from buildings); however, if no such locations are shown on contract drawings, changes in locations of items shall be shown by a sufficient number of right-angled dimensions from the nearest building.
- J. Contractor is responsible for all costs associated with layout of work, and any costs associated with correcting non-conforming work or with restoring the landscape to its original condition.

- K. The coordinates or data shown on the civil drawings for the building shall be for orientation only. Use the architectural and structural drawings for exact building dimensions and layout data for the building.
- L. The survey data obtained for this section shall be incorporated into the project record drawings.

END OF SECTION 02010

SECTION 02050 - DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Demolition and removal of designated site structures, existing utility poles, fencing, site lighting or other equipment from site.
- B. Demolition and removal of pavements, sidewalks, utilities, storm drains, signage or landscaping.
- C. Disconnecting and capping or removal of identified utilities which are not proposed to be used as part of this project.
- D. Filling voids in subgrade created as a result of removals or demolition.
- E. Removal and disposal of solid waste.

1.02 RELATED SECTIONS

- A. Section 02100 - Site Preparation.
- B. Section 02200 – Earthwork.
- C. The work shall comply with the erosion control plan appended to the end of Section 02270.
- D. Section 02227 - Aggregate Materials: Backfill materials.
- E. Construction drawings.

1.03 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of capped utilities, and subsurface obstructions.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable local code for demolition of structures, safety of adjacent structures, dust control and runoff control.
- B. Obtain required permits and licenses from authorities. Pay associated fees including disposal charges.

Permits, fees, and licenses shall be secured and paid for by the General Contractor. It is the General Contractor's responsibility and obligation as part of

the contract to pay for all charges for containers, transport, tipping fees, and disposal of all solid waste generated during the construction of the project. These fees shall be paid for by the General Contractor and included as part of the base bid. The Owner will not reimburse the General Contractor for these fees separately. The General Contractor shall provide the Owner with appropriate "bills of lading" demonstrating proper disposal of all waste.

- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct roadways or sidewalks without permits.
- E. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.
- F. Test soils around buried tanks for contamination.

1.05 JOB CONDITIONS

- A. The existing Public Works garage shall be demolished as part of this project.
- B. Owner assumes no responsibility for condition of items to be demolished.
- C. Removed items of salvageable value to Contractor may be removed from the site with the Owner's permission except where noted on the Drawings to be salvaged or reused. Storage or sale of removed items on site will be permitted but shall not interfere with any other work in the contract documents.
- D. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable.
- E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. The performance of any required blasting shall comply with governing regulations and Section 02229 of these specifications.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

Aggregate materials specified in Section 02227.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices at locations indicated.
- B. Protect existing landscaping materials, appurtenances and structures which are not to be demolished. Repair damage caused by demolition operations at no cost to Owner.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- D. Mark location of utilities. Protect and maintain in safe and operable condition the utilities to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities.

3.02 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent structures or pavements.
- B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed.
- C. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.
- D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
- E. Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.
- F. Comply with governing regulations pertaining to environmental protection.
- G. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3.03 DEMOLITION

- A. Proceed in the demolition and remove materials from site using methods as required to complete work within limitations of governing regulations.

3.04 FILLING VOIDS

- A. Completely fill below grade areas and voids resulting from demolition using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots and other organic matter.
- B. Ensure that areas to be filled are free of standing water, frost, frozen, or unsuitable material, trash and debris prior to fill placement.
- C. Place fill materials in horizontal layers not exceeding 8" in loose depth and compact each layer at optimum moisture content of fill material to proposed density, unless subsequent excavation for new work is required.
- D. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from site debris, rubbish, and other materials resulting from demolition operations. All demolished or removed items shall be disposed of in accordance with the applicable State, Local and Federal regulations.
- B. Stumps and grubblings may be stockpiled, chipped or burned in accordance with Local and State regulations.
- C. Transport materials removed with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities and appropriate property owners.
- E. The permits issued for this project prohibit the placement of any material in wetlands not specifically shown on the Contract Documents.
- F. Areas of any existing on-site solid waste shall be disposed of in accordance with applicable State, Local and Federal regulations. The Contractor shall review the site conditions to determine the quantity and composition of waste.

3.06 UTILITY SERVICES

- A. Demolish and remove outside utility lines as follows:
 - 1. Any utility which is to be abandoned and located within 36 inches of the final finish grade.
 - 2. Any storm drain which is to be abandoned.
 - 3. Any overhead utility which is discontinued.
 - 4. Other abandoned lines which would interfere with performance of this contract.

- B. Plug and seal any abandoned utility lines not scheduled for removal as follows:
1. All pipelines shall be plugged at any appurtenant opening or point of breakage which occurs during construction of the work.
 2. The portion of the appurtenant utility structures which is more than 36 inches below grade shall be dewatered, all entry lines shall be sealed, and the void shall be filled with clean stone gravel or sand and compacted.

END OF SECTION 02050

SECTION 02100 - SITE PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Clearing site of debris, grass, trees and other plant life in preparation for site or building excavation work.
- B. Protection of existing structures, trees or vegetation indicated on the contract documents to remain. Unless otherwise shown, the grading limit is the work limit. The centerlines of the access drive shall be surveyed and marked with hubs or PKs at 50' centers prior to construction. Owner shall be contacted in writing 48 hours prior to the time clearing is scheduled to commence. The Owner or his designated representative shall meet with the Contractor within three (3) working days to review the layout and clearing limits. The Owner reserves the right to adjust the layout or clearing limit to protect major trees.
- C. Stripping topsoil from areas that are to be incorporated into the limits of the project and where so indicated on the construction drawings.

1.02 RELATED SECTIONS

- A. Section 02000 - Site Location of Development Permit
- B. Section 02050 - Demolition
- C. Section 02200 - Earthwork
- D. Section 02270 - Slope Protection and Erosion Control
- E. Construction Drawings
- F. Geotechnical Report

An erosion/sedimentation control program has been prepared for this project and is a part of the Permit Applications. The program is appended to Section 02270, Slope Protection and Erosion Control, of these specifications. Scheduling constraints, stabilization of disturbed areas, and the other requirements of this program shall be strictly adhered to. Any and all penalties which are imposed on the Owner for the failure to comply with these provisions shall be paid by the Contractor.

A subsurface geotechnical investigation of the site was undertaken as a part of this project. A copy of the geotechnical investigation is being provided under separate cover. This document was obtained only for the Owner's use in design, and interpretation of the data for purposes of construction is the responsibility of the Contractor. The report is being made available for information purposes, but is not a warranty of subsurface conditions. Bidders shall visit the site and acquaint themselves with existing conditions.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Construct temporary erosion control systems as shown on the plans or as described in the erosion control report appended to Section 02270, and as required by the Permits to protect the project grounds and adjacent properties from erosion and sedimentation.
- B. VACANT

1.04 JOB CONDITIONS

- A. Conditions existing at time of inspection for bidding purposes will be maintained by the Owner in so far as practical.
- B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to the attention of the Owner prior to the commencement of any site work.

PART 2 - PRODUCTS

Off-site materials shall be transported to the project site using well maintained and operating vehicles. Once onsite, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations. Mark the clearing limits for review by the Owner.

3.02 PROTECTION

- A. Locate and identify existing utilities that are to remain and protect them from damage.
- B. Protect trees, plant growth and features designated to remain as final landscape.
- C. Conduct operations with minimum interference to public or private accesses and facilities. Maintain access and egress at all times and clean or sweep any roadways daily or as required by the governing authority. At such times as deemed necessary by the Owner, dust control shall be provided with sprinkling systems or equipment provided by the Contractor.

- D. Protect bench marks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same at no extra expense to the Owner.
- E. Provide traffic control as required, in accordance with the U.S. Department of Transportation "Manual of the Uniform Traffic Control Devices" and the state highway department requirements. The Contractor shall be responsible for preparing, submitting and receiving approval of a traffic control plan, if required, from the Maine Department of Transportation and the City of Portland for all work within the public right-of-way.

3.03 CLEARING – GENERAL

- A. The Contractor shall identify by means of flagging or other suitable measures the proposed work clearing limits for approval by the Owner prior to clearing activity. Clear areas required for access to site and execution of work.
- B. Unless otherwise indicated on the drawings or modified by the Owner, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid water ponding. Satisfactory fill material shall be placed in horizontal layers not exceeding 8" loose depth, and thoroughly compacted per fill requirements of this section and Section 02200.
- C. VACANT.

3.04 TOPSOIL EXCAVATION – GENERAL

- A. Strip topsoil from areas that are to be filled, excavated, landscaped or re-graded to such a depth that it prevents intermingling with underlying subsoil or questionable materials. It is very important to avoid intermixing topsoil with underlying material.
- B. Cut heavy growths of grass from areas before stripping and remove with the rest of the cleared vegetative material.
- C. Topsoil shall consist of organic surficial soil found in depths of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 1" in diameter, weeds, roots, and other objectionable material.
- D. Stockpile topsoil in storage piles in areas shown or where directed. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Stockpiles shall be stabilized in accordance with the Erosion and Sedimentation Control Report, appended to Specification Section 02270. Dispose of unsuitable topsoil as specified for waste material, unless otherwise specified by Owner. Excess topsoil shall not be removed from the site by the Contractor unless specifically noted otherwise on the Drawings.

3.05 SITE PREPARATION: BUILDING PAD ZONES

Building pad fill zones for all buildings are defined to extend from a point of 10'-0" from the perimeter building wall at the finished ground surface and extending downward and outward at an imaginary slope of 1 horizontal to 1 vertical to the native soil surface after grubbing.

Site preparation in the building pad zone shall include complete removal of all surface vegetation, topsoil, rootmat, tree stumps, organic soils, or any softened or disturbed soil or to the layer of material suitable for structural fill and select fill in accordance with the Geotechnical recommendations. The removal to subgrade shall be completed with a smooth-edged backhoe bucket to limit the amount of subgrade disturbance.

3.06 SITE PREPARATION – PARKING AREAS, AND PAVED DRIVES

All areas directly below paved areas should be cleared and grubbed. The final subgrade shall be shaped with a backhoe bucket with a smooth edge to avoid disturbance to the subgrade.

3.07 PROTECTION OF PREPARED AREAS

Prepared areas of the site shall be protected with erosion control measures. Positive surface drainage away from prepared subgrade areas shall be maintained throughout the period of construction.

END OF SECTION 02100

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Protection, modification and/or installation of utilities as sitework progresses paying particular attention to grade changes and any necessary staging of work.
- B. Cutting, filling and grading to required lines, dimensions, contours and proposed elevations for proposed improvements.
- C. Scarifying, compaction, drying and removal of unsuitable material to ensure proper preparation of areas for fills or proposed improvements.
- D. Sequencing the construction is necessary to protect the subgrades, the work and to comply with the Erosion/Sediment Control Plan for this project.
- E. Section 02000 of these specifications defines the building pad zones. Application of this specification shall be based upon the building pad zone description provided in Section 02000.

1.02 RELATED REQUIREMENTS

- A. Section 02000 - Development Permits
- B. Section 02050 - Demolition
- C. Section 02100 - Site Preparation
- D. Section 02221 – Excavation, Backfilling and Compacting for Structures
- E. Section 02222 – Excavation, Backfilling and Compacting for Utilities
- F. Section 02223 – Excavation, Backfilling and Compacting for Pavement and Other Site Work
- G. Section 02227 – Aggregate Materials
- H. Section 02229 – Rock Removal
- I. Section 02245 – Soil Stabilization
- J. Section 02270 – Slope Protection and Erosion Control
- K. Section 02900 – Landscaping, Seeding and Sodding
- L. Geotechnical Report for boring locations and findings of subsurface materials and conditions.
- M. Contract Drawings
- N. Architectural Plans and Specifications as they related specifically to the earthwork beneath the building, where the architectural requirements are more stringent than the Civil requirements.

98

A copy of the Erosion and Sediment Control Report is appended to Specification Section 02270 and shall be considered part of the Contract Documents.

1.03 REFERENCE STANDARDS

American Society for Testing and Materials (ASTM), Latest Edition:

D422 Method for Particle Size Analysis of Soils

D698 Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8mm) Drop (**Standard Proctor**)

D1556 Test for Density of soil in Place by the Sand Cone Method

D1557 Test for Moisture-Density Relations of Soils using 10-lb (4.5 kg) Rammer and 18-inch (457 mm) Drop (**Modified Proctor**)

D1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

D2167 Test for Density of Soil in Place by the Rubber Balloon Method

D2216 Laboratory Determination of Moisture content of Soil

D2487 Classification of Soils for Engineering Purposes

D2922 Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D4318 Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils

American Association of State Highway and Transportation Officials (AASHTO), Latest Edition:

T88 Mechanical Analysis of Soils

1.04 ENVIRONMENTAL REQUIREMENTS

Construct temporary erosion control systems as shown on the plans as directed by the Engineer or to comply with environmental permits to protect adjacent properties and water resources from erosion and sediment damages.

1.05 QUALITY ASSURANCE

- A. The Owner will retain a geotechnical testing laboratory (independent testing laboratory) to perform construction testing. (The Contractor may retain his own test laboratory for purposes of insuring quality control). The Contractor shall provide access to the test agency for testing based on the following anticipated test frequency.
1. Building Subgrade Areas, including 10'-0" Outside Exterior Building Lines: In cut areas, not less than one field density test for every 2,500 square feet. In fill areas, same rate of testing for each lift of fill (measured loose).
 2. Areas of Construction exclusive of building subgrade: In cut areas, not less than one field density test for every 10,000 square feet. In fill areas, same rate of testing for each lift of fill (measured loose).
- B. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to the Owner.
- C. The following tests shall be performed on each type of on-site or imported soil material used as compacted fill as part of construction testing requirements:
1. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557
 2. Mechanical Analysis: AASHTO T-88 or ASTM D422
 3. Plasticity Index: ASTM D 4318
- D. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements:
1. Sand-Cone Method: ASTM D 1556
 2. Balloon Method: ASTM D 2167
 3. Nuclear Method: ASTM D 2922 (Method B- Direct Transmission)
- E. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, Architect, and Contractor shall be provided with copies of reports within 96 hours of time test was performed. In the event that any test performance fails to meet these Specifications, the Owner and Contractor shall be notified immediately by Testing Laboratory.
- F. Unless stipulated otherwise, the following compaction requirements shall be required for this project and placed in accordance with the following maximum lift (layer) thicknesses.

Material Type	Maximum Lift Thickness (in.)	Minimum Compaction in Percent of Maximum Dry Density (ASTM D-1557)
Common Borrow	12	90%
Select Fill	12	95%
Aggregate Base (Base Gravel)	6	95%
Aggregate Subbase (Subbase Gravel)	12	95%
Granular Borrow	12	95%

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.

1.06 SUBMITTALS

- A. Submit a sample and gradation test results of each type of off-site fill materials that is to be used at the site in an air tight, 10 lb container for the testing laboratory.
- B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the Owner and engineer.
- C. For use of fabrics or geogrids, an Owner approved design shall be submitted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Excavated and re-used materials for subsoil fill as specified herein.
- B. Aggregate fill as specified in Section 02227.
- C. Imported subsoil material approved by the owner and specified herein or in Section 02227.
- D. Topsoil fill as specified in Section 02100.

E. Acceptable stabilization fabrics as Geogrids:

1. Mirafi 500X or 600X
2. Phillips 66 Supac 6WS
3. Dupont Typar 3401 and 3601
4. Trevira S1114 and S1120
5. Tensar SS-1 and SS-2
6. Exxon GTF-200 or 350

F. Filter/Drainage Fabrics

1. Mirafi 140NS
2. Phillips 66 Supac 4NP
3. Dupont Typar 3341

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Locate and identify existing utilities that are to remain and protect them from damage.
- C. Notify utility companies to remove and/or relocate any utilities that are in conflict with the proposed improvements.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from excavation equipment and vehicular traffic.
- E. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same.
- F. Remove from site material encountered in grading operations that, in opinion of Owner or Owner's representative, is unsuitable or undesirable for backfilling, subgrade or foundation purposes. Dispose of in a manner satisfactory to Owner and in accordance with the applicable State, Local, and Federal Regulations.
- G. Prepare the site as specified in Section 02100.
- H. VACANT

3.02 EXCAVATION FOR FILLING AND GRADING

- A. Classification of Excavation: Contractor by submitting bid acknowledges that he has investigated site to determine type, quantity, quality, and character of excavation work to be performed. All excavation shall be considered unclassified excavation.

- B. Perform excavation using capable, well-maintained equipment and methods acceptable to Owner and governing agencies.
- C. When performing grading operations during periods of wet weather, provide adequate drainage and ground water management to control moisture of soils. Protect clay and silt soils from runoff.
- D. Shore, brace, and drain excavations as necessary to maintain safe, secure, and free of water at all times.
- E. Excavated material containing rock or stone exceeding 9" in size limitations is unacceptable as fill within the proposed building and paving area.
- F. Protect excavated materials from moisture and condition as required for placement in parking lot subgrades, embankments, and general site fills. (Material excavated from the site shall not be used in the building pad zones.)
- G. Excavation shall consist of the removal of all materials encountered in grading the project and disposal where necessary.
- H. Excavation shall be accomplished in a manner which complies with the erosion control measures for this site, meets all OSHA and related requirements, and maintains positive drainage of the subgrade throughout construction.

3.03 FILLING AND SUBGRADE PREPARATION

A. BUILDING SUBGRADE AREAS:

1. Remove topsoil and densify building pads with 3 passes of a 10-ton vibratory roller compactor, densify soil footing subgrades with ½-ton vibratory sled or double drum roller. Densify pavement subgrades with 3 passes of a 10-ton vibratory roller compactor. Areas of failure shall be excavated, replaced with granular borrow and recompact as stated above.
2. Unless specifically indicated otherwise on the Drawings, fill materials used in preparation of building subgrade shall be placed in lifts or layers not to exceed 12" loose measure compacted to a minimum density of 95% of maximum dry density, in accordance with ASTM D 1557 at a moisture content of not less than 3% below and not more than 3% above the optimum moisture content.

B. AREA OF CONSTRUCTION EXCLUSIVE OF THE BUILDING SUBGRADE:

1. Remove topsoil and densify building pads with 3 passes of a 10-ton vibratory roller compactor, densify soil footing subgrades with ½-ton vibratory sled or double drum roller. Densify pavement subgrades with 3 passes of a 10-ton vibratory roller compactor. Areas of failure shall be excavated, replaced with granular borrow and recompacted as stated above.
2. Unless specifically stated otherwise on the Drawings, fill materials used in preparation of subgrade shall be placed in lifts or layers not to exceed the lift thickness specified in Section 1.05 of this specification and compacted to a minimum density specified in Section 1.05 of this specification.
3. Material imported to the site shall meet the material specifications of Section 02227 of these specifications.

3.04 PLACEMENT OF EMBANKMENTS AND BUILDING PAD FILLS

Place embankments and fills in the lift thickness specified in Section 1.05 and compact to meet the density specified in Section 1.05. The embankments and fills shall be placed using the materials specified, incorporate the drainage and material layers required by the drawings, and using appropriate compaction equipment. In building fill zones, the compaction equipment should include a vibratory drum compactor with a minimum static weight of 10,000 pounds and a minimum dynamic force of 20,000 lbs. In areas close to retaining walls and buried manholes or appurtenances, the use of hand-held vibratory equipment is anticipated.

The selection of compaction equipment, their use, and operation to achieve the specified compaction is the sole responsibility of the Contractor.

The embankments and fills shall be protected from inclement weather including:

- 3.04.1 Rolling any exposed embankments and parking lot fills constructed of on-site material with a smooth drum roller at the end of each workday.
- 3.04.2 Covering all exposed embankments with a compacted sand layer prior to any significant rainfall.
- 3.04.3 Maintaining positive drainage from the parking lot subgrades throughout construction.
- 3.04.4 Providing drainage chutes and winrows the top edge of embankments to avoid concentrated runoff from traveling down embankment sideslopes.
- 3.04.5 Staging and phasing the work to meet the requirements of the erosion control plan and specific sequences shown on the drawings.

3.04.6 Compliance with the recommendations of the project geotechnical report.

Materials for fills and embankments shall be as shown in the following table:

Material Types for Fills and Embankments		
Material	MDOT Designation	Permissible Uses
Aggregate Base (Base Gravel)	MDOT 703.06(a) Type A	- Pavement base course layer
Aggregate Subbase (Subbase Gravel)	MDOT 703.06(a) Type D	- Pavement subbase course layer - Subbase of sidewalks
Drainage Stone	¾" Crushed Stone or MDOT 703.22, Type C	- Backfill around foundation drains - Backfill around underdrains - Backfill around storm drain pipe - Soft ground working mat
Common Borrow	MDOT 703.18	- Landscape area subgrade fill
Granular Borrow	MDOT 703.19	- General site fill - Road subgrade fill - Beneath footings - Beneath floor slab - Beneath entrance slabs - Within 24" of appurtenances, such as light pole bases, manholes, and catch basins
Select Fill	MDOT 703.06(b) Type D, or S.W. Cole select fill	- Greater than 12" below floor slab (top) - Greater than 4' behind walls - Adjacent to foundations
Geotextile (Cushion)	Between floor slab vapor barrier and drainage blanket	- Mirafi 160N or equal
Geotextile (Filtration)	Footing drains, site underdrains if necessary	- Mirafi 140N or equal
- Note: (1) Onsite materials that are stockpiled and reused must meet the indicated specification and have a water content suitable for the required level of compaction.		

3.05 MAINTENANCE OF SUBGRADE

- A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be uniform, smooth, stable, unyielding, and true to grade and cross-section.

- D. Grading of building and paving areas shall be checked by string line from grade stakes (blue tops) set at not more than 50' centers. Tolerance of + 0.10 feet will be permitted. Contractor to provide engineering and field staking necessary for verification of lines, grades, and elevations.
- E. Maintain subgrade for area to be paved and building pad subgrades. Make adjustments that may be required in accordance with Specifications at no additional expense to Owner.

The Contractor shall protect all soils, compacted gravel, sand, and drainage fill material under poured slabs and in areas where slabs will be poured within the building; from surface runoff and excessive moisture. All expenses associated with protective measures, temporary heating, removal, replacement, and recompaction shall be at the expense of the Contractor.

3.06 RIPRAP

- A. Place riprap in all areas where indicated on the Drawings. The stone for riprap shall be washed and consist of field stone or rough unhewn quarry stone as nearly uniform, in section as is practical.

The stones shall be dense, resistant to the action of air and water, and suitable in all aspects for the purpose intended. The riprap shall be composed of a well-graded mixture down to the one-inch size particle such that 50 percent of the mixture by weight shall be larger than the D50 size specified on the drawings.

A well-graded mixture is defined as a mixture composed primarily of the larger stone size but with a sufficient mixture of other sizes to fill the progressively smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the D50 size. When subjected to the magnesium sulfate soundness test (ASTM C-88), the percent weight loss shall be less than 15%. When tested according to ASTM C-131, the crushed stone shall have a maximum loss of 45% at 5,000 revolution.

- B. Slopes and other areas to be protected shall be dressed to the line and grade shown on the plans prior to the placing of riprap. Contractor shall then undercut the areas to receive riprap to an elevation equal to the final elevation less the specified thickness of riprap as shown on the drawings.
- C. Filter fabric and bedding material shall be installed prior to the placement of the riprap if so indicated on the drawings. The bedding material shall be in accordance with Section 02227 and shall be 6" in depth. Filter fabric shall be as specified herein and as detailed on the plans.
- D. Stones shall be placed so that the greater portion of their weight is carried by the earth and not by the adjacent stones. These stones shall be placed uniformly with close joints. The upright areas of the stone shall make an angle of approximately 90 degree with the embankment slope. The courses shall be placed from the bottom of the embankment upward, the larger stones being placed in the lower courses. Open joints shall be filled with spalls. Stones shall

be embedded in the embankment as necessary to present a uniform top surface such that the variation between tops of adjacent stones shall not exceed 3".

3.07 FINISH GRADING

- A. 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 of 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. Finish ditches shall be graded to allow for proper drainage without ponding and in manner that will minimize erosion potential. For topsoil application, refer to Section 02900 (LANDSCAPING, SEEDING, AND SODDING).
- B. 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, bushes, or other vegetation disturbed by construction using corrective measures. Refer to Section 02270 for slope protection and erosion control.
- C. Refer to Section 02245 for soil stabilization using lime, cement, and geotextile fabric methods for subbase materials.

3.08 ROCK EXCAVATION

See Section 02229 – Rock Removal

END OF SECTION 02200

SECTION 02221 -EXCAVATION, BACKFILLING AND COMPACTING FOR STRUCTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavate to line, grade and configuration as shown in the plans and specifications for proposed structures.
- B. Fill to line, grade and configuration as shown in the plans and specifications for proposed structures.
- C. Compacting for materials in an acceptable manner as stated herein.
- D. The work of this section applies to the building pad zone as defined by Section 02000 of these specifications.

1.02 RELATED REQUIREMENTS

- A. Section 02200 - Earthwork
- B. Section 02227 - Aggregate Material
- C. Section 02229 - Rock Removal
- D. Section 02270 - Soil Stabilization, Slope Protection and Erosion Control
- E. Section 02230 – Subbase and Base Gravel
- F. Section 02511 - Asphaltic Concrete Paving
- G. Section 02520 - Portland Cement Concrete for Site Improvements
- H. Geotechnical Report for boring locations and findings of subsurface materials and conditions.
- I. Construction Drawings

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - D422 Method for Particle and Size Analysis of Soils
 - D698 Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8mm) Drop (**Standard Proctor**)

108

D1556 Test for Density of soil in Place by the Sand Cone Method

D1557 Test for Moisture-Density Relations of Soils using 10-lb (4.5 kg) Rammer and 18-inch (457 mm) Drop (**Modified Proctor**)

D1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

D2167 Test for Density of Soil in Place by the Rubber Balloon Method

D2216 Laboratory Determination of Moisture content of Soil

D2487 Classification of Soils for Engineering Purposes

D2922 Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

D4318 Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils

- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.

T88 Mechanical Analysis of Soils

1.04 QUALITY ASSURANCE

Independent testing laboratory selected and paid by owner shall be retained to perform construction testing on filling operations and subgrade analysis as specified in Section 02200 and as stated herein.

1.05 SUBMITTALS

- A. Shop drawings or details pertaining to excavating and filling for structures are not required unless otherwise shown on the drawings or specifications or if contrary procedures to the project documents are proposed.
- B. Submit a sample of each type of off-site fill material that is to be used in backfilling in an air-tight, 10 lb. container and submit a gradation and certification of the aggregate material that is to be used to the testing laboratory for review.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill material from on-site as specified in Section 02200 and approved by the owner or owner's representative.
- B. Fill material from off-site as specified in Section 02200 and approved by the owner or owner's representative.
- C. Aggregate material as specified in Section 02227.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify all lines, elevations and grades necessary to construct building subgrades as shown in the plans and specifications. The Contractor's attention is directed specifically to Section 02200.
- B. Carefully protect bench marks, property corners, monuments or other reference points.
- C. Locate and identify all site utilities that have previously been installed and may be in danger of damage by grading operations.
- D. Locate and identify all existing utilities that are to remain and protect them from damage.
- E. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill materials placed and compacted as specified, filter fabrics and/or aggregate materials.

3.02 EXCAVATION FOR FILLING AND GRADING

- A. Excavate building areas to line and grade as shown in the plans and specifications being careful not to over excavate beyond the elevations needed for building subgrades. Refer to Sections 02000 and 02200.
- B. Incorporate all suitable material into the project fill areas as specified in Section 02200.
- C. Unsuitable excavated material is to be disposed of in a manner and location that is acceptable to the owner and local governing agencies and is in accordance with State, local and federal regulations. Prior to any off-site disposal of spoil material, the Contractor shall at a minimum notify the Owner of the proposed haul route, disposal location and quantity of materials.

- D. Perform excavation using capable, well maintained equipment and methods acceptable to the owner and the project document requirements.

3.03 FILLING AND SUBGRADE PREPARATION

- A. Building area subgrade zone shall be as defined in Section 02200 of these specifications.
- B. The building area subgrade pad shall be that portion of the site directly beneath and ten feet (10') beyond the building and appurtenances as shown on the civil site drawings.

A minimum of eight inches (8") (or as directed by the Geotechnical Engineer or depicted on the Structural drawings, whichever is greatest), of Structural Fill shall be placed beneath the building floor slab. Additional fill placed below the floor slab, and/or beneath footings, shall consist of compacted Structural Fill. Fill placed adjacent to foundations shall consist of compacted Structural Fill extending laterally from the perimeter of the building area subgrade pad to at least the limits defined by one (1) horizontal to one (1) vertical lines sloped outward.

As an alternate, use of compacted Select Fill shall be permitted at areas greater than 12" below the building floor slab and greater than 4 feet behind the interior face of perimeter building walls.

Rock larger than six inches (6") shall not be part of building subgrade fill.

- C. VACANT
- D. Stumps and the major portions of root systems and other deleterious material shall be removed in all building areas as defined in Section 02200. Topsoil, organic soils, and other unsuitable materials shall be stripped in all building areas to expose native soils or bedrock.
- E. Construction dewatering shall begin as early as is practicable during site grading work to keep on-site soils as well drained as possible. Effective dewatering and surface runoff control shall be accomplished with a network of drains, swales, and sumps.
- F. VACANT
- G. Dry subgrades exposed in fill areas after grubbing and stripping shall be proofrolled with at least six passes of a minimum 10,000 pound static weight roller, shall be covered with at least a 12" layer of Select Fill and as early as practicable. The fill will provide a working mat to protect the subgrade from disturbance. Soft areas identified during proofrolling or under subsequent traffic prior to subsequent filling activities shall be excavated and replaced with compacted Structural Fill.

- H. Where excavations encounter wet natural soils, the work shall proceed carefully in a manner that avoids subgrade disturbance including: using smooth edged cutting buckets when making excavations, placement of a non-woven geotextile fabric, and placement of the Select Fill and Structural Fill (floor slab areas) as soon as practicable to protect the subgrade from disturbance. In fill areas, the initial lift of fill on wet, natural subgrades should consist of 12 inches of Structural Fill or Select Fill, depending upon depth. Fill materials and/or subgrade materials that become contaminated with fines during construction shall be replaced with the appropriate clean materials immediately prior to placing overlying Subbase Course, Base Course, or engineered fill material.
- I. Fill materials used in preparation of building subgrade shall be Structural Fill meeting the requirements of Section 02227. The Structural Fill should be placed in uniform lifts not exceeding 8 inches in uncompacted thickness and be compacted with large, self-propelled compaction equipment. In confined areas, the Structural Fill should be placed in uniform lifts not exceeding 6 inches in uncompacted thickness and compacted with hand operated compaction equipment. Structural Fill should be compacted to at least 95 percent of maximum dry density determined by ASTM D1557.
- J. To aid in maintaining stable cut and fill slope conditions, surface water runoff shall be diverted away from the top of slopes. Likewise, surface runoff shall be diverted away from footing excavations and floor slab excavations.
- K. Any fill materials that become wet or disturbed before the overlying lift of fill can be placed (e.g. due to a rainstorm during the work day, overnight, or over a weekend) shall be proofrolled, recompacted and/or excavated and replaced with drier fill at no extra expense to the Owner.

3.04 COMPACTION

- A. Maintain optimum moisture content of fill materials to attain required compaction density.
- B. All material shall be tested in accordance with Section 02200.
- C. An Independent Testing Laboratory retained by the Owner, shall perform testing on site. The Contractor may, at his option, retain his own test laboratory for quality control, production schedules, or for any other reason at no cost to the Owner.
- D. Field density tests will be as specified in Section 02200 together with the following for building subgrade areas including 10'-0" outside exterior building lines:

In cut areas, not less than one field density test for every 2,500 square feet. In fill areas, same rate of testing for each 9" lift (measured loose).

- E. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to the Owner.

3.05 MAINTENANCE OF SUBGRADE

- A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density of depth necessary and replace in a manner that will comply with compaction requirements by use of materials equal to or better than best subgrade materials on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable and true to grade and cross-section.

3.06 FINISH GRADING

- A. Finish grading shall be in accordance with Section 02200 and as more specifically stated herein.
- B. Grading of building areas shall be checked by string line from grade stakes (blue tops) set at not more than 50' centers. Tolerance of 0.10 feet, more or less, will be permitted. Contractor to provide engineering and field staking necessary for verification of lines, and elevations.

3.07 ROCK EXCAVATION

See Section 02229 - Rock Removal.

END OF SECTION 02221

SECTION 02222 - EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavating trenches for the installation of utilities and appurtenances.
- B. Backfilling trench with bedding materials as specified and indicated and finishing filling trench with suitable material to proposed subgrade.
- C. Compacting backfill materials in an acceptable manner.

1.02 RELATED REQUIREMENTS

- A. Section 02200 - Earthwork
- B. Section 02227 - Aggregate Materials
- C. Section 02229 - Rock Removal
- D. Section 02605 - Sewer and Catch Basin Structures
- E. Section 02660 - Water Distribution Systems
- F. Section 02720 - Storm Sewer Systems
- G. Section 02730 - Sanitary Sewer Systems
- H. Geotechnical Report for boring locations and findings of subsurface materials and conditions.
- I. Construction Drawings.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM):
 - D422 Method for Particle Size Analysis of Soils
 - D698 Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8mm) Drop (**Standard Proctor**)
 - D1556 Test for Density of Soil in Place by the Sand Cone Method
 - D1557 Test for Moisture-Density Relations of Soils using 10-lb (4.5 kg) Rammer and 18-inch (457 mm) Drop (**Modified Proctor**)
 - D1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
 - D2216 Laboratory Determination of Moisture Content of Soil
 - D2487 Classification of Soils for Engineering Purposes

- D2922 Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- D4318 Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils
- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.
- T88 Mechanical Analysis of Soils

1.04 QUALITY ASSURANCE

Independent Testing Laboratory retained by the Owner shall perform construction testing on backfilling operations as specified in Section 02200 and as stated herein. It shall be the responsibility of the Contractor to accurately establish locations for all utilities. The Contractor may, at his option, retain his own test laboratory for quality control, production schedules, or for any other reason at no cost to the Owner.

1.05 SUBMITTALS

- A. Shop drawings or details pertaining to site utilities are not required unless use of materials, methods or procedures contrary to Drawings or these specifications is proposed. Do not perform work until required shop drawings have been accepted by the Owner.
- B. The Contractor shall contact all utility companies and determine if additional easements will be required to complete the project. Contractor shall provide written confirmation of the status of all easements to the Owner at the time of the preconstruction conference.
- C. Submit a sample of each type of off-site fill material that is to be used in backfilling in an air-tight container of a size appropriate for the material for the testing laboratory or submit a gradation and certification of the aggregate material that is to be used to the testing laboratory for review.

1.06 PROJECT RECORD DOCUMENTS

Accurately record actual locations of all subsurface utilities, structures and obstructions encountered.

PART 2 - PRODUCTS

- A. Aggregate Material as specified in Section 02227.

- B. Acceptive Stabilization Fabrics and Geogrids
 - 1. Mirafi 500x or 600x
 - 2. Phillips 66 Supac 6WS
 - 3. Dupont Typar 3401 and 3601
 - 4. Trevira S1114 and S1120
 - 5. Tensar SS-1 and SS-2
 - 6. Exxon GTF-200 or 350

- C. Filter/Drainage Fabrics
 - 1. Mirafi 140 NS
 - 2. Phillips 66 Supac 4NP
 - 3. Dupont Typar 3341

PART 3 - EXECUTION

3.01 SUMMARY

- A. 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.

- B. Maintain in operating condition existing utilities, active utilities, and drainage systems encountered in utility installation fill the ends and cap utilities disrupted during construction and scheduled to be abandoned. Repair any surface or subsurface improvements disrupted by construction.

- C. 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.

- D. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill material placed and compacted as specified, filter fabrics and/or additional bedding material at no extra expense to the Owner. The Contractor shall notify the Owner when overdepth excavation and fill placement is necessary.

- E. Install dewatering systems that will be required to construct the proposed utilities in a manner that is described herein.

3.02 EXCAVATION

- A. The local utility companies shall be contacted before excavation shall begin. 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 at no extra expense to the Owner.

- B. All trench excavation side walls greater than 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 4 feet or deeper.
- C. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.
- D. 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 at no extra expense to the Owner.
- E. Utilities placed in embankment areas shall be placed by the induced trench method wherein the embankment is formed first and the utility is trenched into the embankment. In such situations, the embankment shall have been formed to a height at least 24" above the crown of the pipe.
- F. 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.
- G. 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 the Owner.
- H. 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.
- I. Trench width requirements below the top of the pipe shall not be less than 12" nor more than 18" 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.

- J. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances unless otherwise shown on the Drawings:
1. Water Mains: 66" to top of pipe barrel or 6" below the frost line (established by the local building official), whichever is deeper except where insulation is shown on the drawings.
 2. Sanitary Sewer: Depths, elevations, and grades as indicated on Drawings.
 3. Storm Sewer: Depths, elevations, and grades as shown on Drawings.
 4. Electrical Conduits: 29" minimum to top of conduit or as required by NEC 300-5, NEC 710-36 codes, or the local utility company requirements, whichever is deeper.
 5. TV Conduits: 29" minimum to top of conduit or as required by the local utility company, whichever is deeper.
 6. Telephone Conduits: 29" minimum to top of conduit, or as required by the local utility company, whichever is deeper.
 7. Gas Mains and Service: 30" minimum to top of pipe, or as required by the local utility company, whichever is deeper.
 8. Fire Alarm Conduit: 29" minimum to top of conduit, or as required by the local Fire Department, whichever is deeper.
- K. 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.
- L. Maintain groundwater below bottom of excavation until all appurtenance and structures are backfilled and compacted to grade.

3.03 PIPE BEDDING

- A. Accurately cut trenches for pipe or conduit that is installed to designated elevations and grades to line and grade from 6" below bottom of pipe and to width as specified. Place 6" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 6" layers measured loose to the top of the trench.
- B. Place geotextile fabrics as specified on the plans and specifications.

3.04 BACKFILLING

- A. 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 at no extra expense to the owner.

- B. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in 8" maximum loose lifts.
- C. Backfill trenches to the contours and elevations shown on the plans with unfrozen materials.
- D. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

3.05 COMPACTION

- A. Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.
- B. Maintain optimum moisture content of fill materials to attain required in-place density.
- C. An Independent Testing Laboratory shall perform field density tests at intervals not exceeding 200'-0" of trench for the first and every other eight-inch (8") lift of compacted trench backfill and furnish copies of test results as specified. Compact to minimum density of 95% of maximum dry density as determined by ASTM D 1557.
- D. All materials used for backfilling shall be tested in accordance with Section 02200.

3.06 ROCK EXCAVATION

See Section 02229 - Rock Removal

END OF SECTION 02222

SECTION 02223 - EXCAVATION, BACKFILLING, AND COMPACTING FOR
PAVEMENT AND OTHER SITE WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Excavate to line, grade and configuration as shown in the plans and specifications for proposed pavements.
- B. Fill to line, grade and configuration as shown in the plans and specifications for proposed pavements.
- C. Compacting fill materials in acceptable manner as stated herein.

1.02 RELATED REQUIREMENTS

- A. Section 02200 - Earthwork
- B. Section 02227 - Aggregate Materials
- C. Section 02229 - Rock Removal
- D. Section 02270 - Soil Stabilization, Slope Protection and Erosion Control
- E. Section 02511 - Asphaltic Concrete Paving
- F. Section 02520 - Portland Cement Concrete for Site Improvements
- G. Section 02525 - Curb and Sidewalks
- H. Geotechnical Report for boring locations and findings of subsurface materials and conditions.
- I. Construction Drawings.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM) latest edition:
 - D.422 Method for Particle and Size Analysis of Soils
 - D.698 Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer 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) Rammer 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, and Plasticity Index of Soils
- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.
 - T.88 Mechanical Analysis of Soils

1.04 QUALITY ASSURANCE

An Independent Testing Laboratory, retained by the Owner, shall be retained to perform construction testing of in-place base courses for compliance with the density and aggregate specified for the work. The Contractor shall have the independent surveyors check the paving base course tolerances (by rod and level readings on no more than fifty-foot centers) to +0.05' of design elevation that allow for paving thickness as shown in the Drawings.

1.05 SUBMITTALS

- A. Shop drawings or details pertaining to excavating and filling for pavement are not required unless otherwise shown on the drawings or specifications or if contrary procedures to the project documents are proposed.
- B. Submit a sample of each type of off-site fill material that is to be used in backfilling in an air-tight, 10 lb. container for the testing laboratory or submit a gradation and certification of the aggregate material that is to be used to the testing laboratory for review.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fill material from onsite as specified in Section 02200 and approved by the owner or owner's representative.
- B. Fill material from offsite as specified in Section 02200 and approved by the owner or owner's representative.
- C. Aggregate material as specified in Section 02227.

- D. Acceptable stabilization fabrics and geogrids.
 - 1. Mirafi 500x or 600x
 - 2. Phillips 66 Supac 6WS
 - 3. Dupont Typar 3401 and 3601
 - 4. Trevira S1114 and S1120
 - 5. Tensar SS-1 and SS-2
 - 6. Exxon GTF-200 or 350

- E. Acceptable filter and drainage fabrics as specified in Section 02245.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify all lines, elevations and grades necessary to construct pavements, curb and gutter, bases, walkways and roadways as shown in the plans and specifications.
- B. Carefully protect benchmarks, property corners, monuments or other reference points.
- C. Locate and identify all site utilities that have previously been installed and may be in danger of damage by grading operations.
- D. Locate and identify all existing utilities that are to remain and protect them from damage.
- E. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill materials placed and compacted as specified, filter fabrics and/or additional aggregate material.

3.02 EXCAVATION

- A. Excavate roadway and pavement areas to line and grade as shown in the plans and specifications.
- B. Engage all suitable materials into the project fill areas as specified in Section 02200.
- C. Unsuitable excavated material is to be disposed of in a manner and location that is acceptable to the owner and the local governing agencies.
- D. Perform excavation using capable, well maintained equipment and methods acceptable to the owner and the project document requirements.

3.03 FILLING

- A. Unless specifically stated otherwise on the Drawings, areas exposed by excavation or stripping and on which the subgrade preparations are to be performed shall be scarified to minimum depth of 8" and compacted to a minimum depth 8" and compacted to minimum of 90% of maximum dry density, in accordance with ASTM D 1557, at a moisture content of not less than 1% below and not more than 3% above the optimum moisture content. These areas shall then be proofrolled to detect any areas of insufficient compaction. Proof rolling shall be accomplished by making a minimum of two (2) complete passes with a vibratory roller, or approved equivalent, in each of the two perpendicular directions under the supervision and direction of a field geotechnical engineer. Areas of failure shall be excavated and recompactd as stated above.
- B. Unless specifically stated otherwise on the Drawings, Structural Fill materials used in preparation of subgrade shall be placed in lifts or layers not to exceed 8" loose measure and compacted to a minimum density of 95% of maximum dry density, in accordance with ASTM D 1557 at a moisture content of not less than 1% below and not more than 3% above the optimum moisture content.
- C. The following table stipulates maximum allowable values for plasticity index (PI) and liquid limit (LL) of suitable fill material in the specified areas; unless specifically stated otherwise on the Drawings:

<u>Location*</u>	<u>PI</u>	<u>LL</u>
Paving Area Below Upper Two Feet	20	50
Paving Area Above Upper Two Feet	15	40

* Reference to depth are to proposed subgrade elevations.

- D. Material imported from off-site shall have a CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above the pavement design subgrade CBR or LBR value indicated on the Drawings.
- E. Where excavations encounter wet natural soils, the work shall proceed carefully in a manner that avoids subgrade disturbance including: using smooth-edged cutting buckets when making excavations within one foot of the final subgrade elevation, and placement of the Subbase Course (pavement areas) as soon as practicable to protect the subgrade from disturbance. In fill areas, the initial lift of fill on wet, natural subgrades should consist of 12 inches of Structural Fill.

Fill materials and/or subgrade materials that become contaminated with fines during construction shall be replaced with the appropriate clean materials immediately prior to placing overlying subbase course, base course, or engineered fill material at no extra expense to the Owner.

- F. Any fill materials that become wet or disturbed before the overlying lift of fill can be placed (e.g., due to a rainstorm during the work day, overnight, or over a weekend) shall be proofrolled, recompactd and/or excavated and replaced with drier fill at no extra expense to the Owner.

3.04 COMPACTION

- A. Maintain optimum moisture content of fill materials to attain required compaction density.
- B. All material shall be tested in accordance with Section 02200.
- C. An independent testing laboratory retained by the Owner shall perform testing onsite. The Contractor may, at his option, retain his own test laboratory for quality control, production schedules, or for any other reason at no cost to the Owner.
- D. Compaction test will be as specified in Section 02200 together with the following for paving areas:
 - 1. In cut areas not less than one compaction test for every 20,000 square feet.
 - 2. In fill areas, same rate of testing for each 8" lift (measured loose).
- E. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to owner.

3.05 MAINTENANCE OF SUBGRADE

- A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction including concrete trucks and dump trucks.
- C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site at no extra expense to the owner. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross section.

3.06 FINISH GRADING

- A. Finish grading shall be in accordance with Section 02200 and as more specifically stated herein.

- B. Grading of pavement and recreational field areas shall be checked by string line from grade stakes (blue tops) set at not more than 50' centers. Tolerances of 0.10 feet, more or less, will be permitted provided that positive drainage is maintained. Contractor to provide engineering and field staking necessary for verification of lines, grades, and elevations.

3.07 ROCK EXCAVATION

(See Section 02229 Rock Removal)

END OF SECTION 02223

SECTION 02227 - AGGREGATE MATERIAL

PART 1 - GENERAL

1.01 SECTION INCLUDES

Aggregate Materials

1.02 RELATED SECTIONS

- A. Section 02050 – Demolition
- B. Section 02100 – Site Preparation
- C. Section 02200 – Earthwork
- D. Section 02221 – Excavation, Backfilling and Compacting for Structures
- E. Section 02222 – Excavation, Backfilling and Compacting for Utilities
- F. Section 02223 – Excavation, Backfilling and Compacting for Pavement
- G. Section 02270 – Slope Protection and Erosion Control
- H. Construction Drawings

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM): latest edition.
ASTM D422 Method for Particle and Size Analysis – Soils

ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop. (Standard Proctor)

ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lbs (4.54 Kg) Rammer and 18 inch (457 mm) Drop. (Modified Proctor)

ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

ASTM D2487 - Classification of Soils for Engineering Purposes.

ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

ASTM D4318 - Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition.

AASHTO T180 - Moisture-Density Relations of Soils Using A 10 lb (4.54 Kg) Rammer and an 18 inch (457 mm) Drop.

AASHTO M147 - Materials for Aggregate and Soil Aggregate.

1.04 QUALITY ASSURANCE

Test and analysis of aggregate material will be performed in accordance with standard ASTM and AASHTO procedures listed herein.

1.05 SUBMITTALS

- A. Submit in air tight containers a 10 pound sample of each aggregate or mixture that is to be incorporated into the project to the testing laboratory retained by the Owner.
- B. Submit the names of each material supplier and specific type and source of each material. Any changes in source throughout the job require approval of the Owner or engineer.
- C. 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.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All construction and materials shall meet or exceed the requirements of this section and any state highway department specification section referred to or noted on the drawings which pertain to paving base course design, materials, preparation, and/or execution.

All materials shall be as indicated on Drawings and shall comply with applicable state highway specification regarding source, quality, gradation, liquid, limit, plasticity index, and mix proportioning.

- B. The following table provides the backfill material specifications. The contractor shall indicate when submitting materials to be tested what the various applications will be.

Material Type	Area	Material Specification	Lift (inches)	Compaction
Select Fill	Adjacent to foundations, beneath footings and floor slabs, within 5' beneath entrance slabs, within 24" of appurtenances such as light pole bases, manholes and catch basins	See Geotechnical Report or MDOT 703.06 (b) Type D	9	95% ASTM D-1557
Drainage Stone	Footing drains, floor slab drainage blanket, rec. field underdrains, backfill around foundation drains, backfill around storm drain pipe, soft ground working mat	MDOT 703.22, Type C (3/8 inch, pea stone), or 3/4 inch crushed stone	12	Vibrated with 3 passes of a hand vibrating plate.
Aggregate Base	Pavement Base Course Layer	MDOT 703.06(a), Type A	4	95% ASTM D-1557
Aggregate Subbase	Pavement Subbase Course Layer	MDOT 703.06(b), Type D, or Type E (below upper 9 in.)	9	95% ASTM D-1557
Structural Fill	Greater than 12" below floor slab, Greater than 4' behind walls, Road subgrade fill	MDOT 703.06(b), Type D (preferred), or Type E (alternate)	12	95% ASTM D-1557
Gravel Borrow	Roadway subgrade fill (>4'), general site fill	MDOT 703.20	12	95% ASTM D-1557
Blast Rock	Roadway subgrade fill (>4'), general site fill	MDOT 703.21	12	See Geotechnical Report
Common Borrow	Landscape area subgrade fill	MDOT 703.18	12	ASTM D-1557 93% for berm, 90% for other
Native on-site soils from excavations ⁽¹⁾	Same as for Common Borrow	MDOT 703.18 ⁽¹⁾	12	93% ASTM D-1557

Note:

- (1) On-site materials that are stockpiled and reused must meet the indicated specification and have a water content suitable for the required level of compaction.

PART 3 - EXECUTION

3.01 STOCKPILING

Stockpile onsite at locations indicated by the Owner in such a manner that there will be no standing water or mixing with other materials.

3.02 BORROW SITES

Upon completion of borrow operations, clean up borrow areas as indicated on the plans and in neat and reasonable manner to the satisfaction of the property Owner or the engineer.

3.03 TRANSPORTATION

Offsite materials shall be transported to the project using well-maintained and operating vehicles. Once on the job site, all transporting vehicles shall stay on designated haul roads and shall at no time endanger any of the improvements by rutting, overloading or pumping the haul road.

END OF SECTION 02227

SECTION 02230 - SUBBASE AND BASE GRAVEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Granular Base and Subbase (also referred to as subbase and base aggregates or subbase and base gravels).

1.02 RELATED REQUIREMENTS

- A. Section 02100 - Site Preparation
- B. Section 02200 - Earthwork
- C. Section 02227 - Aggregate Materials
- D. Section 02245 - Soil Stabilization
- E. Section 02511 - Asphaltic Concrete Paving
- F. Section 02520 - Portland Cement Concrete for Site Improvements
- G. Section 02525 - Curbs and Sidewalks
- H. Section 02900 – Loam, Seeding and Sod
- I. Geotechnical Report

1.03 REFERENCES

- A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ANSI/ASTM D1157 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lbs (4.54 Kg) Rammer and 18 inch (457 mm) Drop.
- C. ASTM D2167 - Test for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- D. ASTM D1556 - Test Method for Density of Soil in-place by the Sand-Cone Method.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) Method B (Direct Transmission).

- F. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

Submit materials certificate to on-site independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein. Materials shall comply with the gradations specified in Section 02227, Aggregate Material.

PART 3 - EXECUTION

3.01 EXAMINATION

Verify substrate has been inspected, gradients and elevations are correct, and dry.

3.02 CONSTRUCTION

- A. Perform base and subbase course construction in a manner that will drain surface properly at all times and at same time prevent runoff from adjacent areas from draining onto base course or subbase construction.
- B. Compact base material to not less than 95% of maximum density as determined by ASTM D-1557 unless otherwise indicated on the Drawings.
- C. Granular Subbase: Construct to thickness indicated on Drawings apply in lifts or layers not exceeding 8", measured loose.
- D. Granular Base: Construct to thickness indicated on Drawings. Apply in lifts or layers not exceeding 4" measured loose.
- E. All work of this section shall conform to the requirements of Sections 304 of the Maine Department of Transportation Specification for furnishing, placing, and surface tolerance of aggregate base and subbase courses.

3.03 FIELD QUALITY CONTROL

- A. An Independent Testing Laboratory, retained by the Owner, shall perform construction testing of in-place base courses for compliance with requirements for gradation and density. The Contractor shall retain an independent surveyor to verify paving base course tolerances (by rod and level readings on no more than fifty-foot centers) to +0.05' of design elevation that allow for paving thickness as shown in the Drawings. Contractor shall provide instruments and a suitable benchmark and perform all survey. The Contractor may, at his option,

retain his own test laboratory for quality control, production schedules, or for any other reason at no cost to the Owner.

- B. The following tests shall be performed on each type of material used as base and subbase course material:
1. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557.
 2. Mechanical Analysis: AASHTO T-88
 3. Plasticity Index: ASTM D-4318-84
 4. Base and subbase material thickness: Perform one test for each 20,000 square feet in-place base material area.
 5. Base and subbase material compaction: Perform one test in each lift for each 20,000 square feet in-place base material area.
 6. Test each source of base material for compliance with applicable state highway specifications.
- C. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements:
1. Sand-Cone Method: ASTM D1556
 2. Balloon Method: ASTM D2167
 3. Nuclear Method: ASTM D2922, Method B (Direct Transmission).
- D. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. The Owner and Contractor shall be provided with copies of reports within 96 hours of time test was performed. In event that any test performed fails to meet these Specifications, the Owner and Contractor shall be notified immediately by Independent Testing Laboratory. The Owner reserves right to employ a separate testing laboratory and to direct any testing that is deemed by them to be necessary. Contractor shall provide free access to site for testing activities.
- E. Any base or subbase courses which becomes contaminated due to weather, erosion, or other activities, whether or not such contamination is under the control of the Contractor shall be removed and replaced. Said removal and replacement shall be incidental to the work and no additional payment will be made to the Contractor.

END OF SECTION 02230

SECTION 02270 - SOIL STABILIZATION, SLOPE PROTECTION AND EROSION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary and permanent erosion control systems.
- B. Slope Protection Systems.

1.02 RELATED SECTIONS

- A. Section 02000 – City of Portland Planning Board Approval
- B. Section 02100 - Site Preparation
- C. Section 02200 - Earthwork
- D. Section 02900 – Loam, Seeding and Sod
- E. VACANT
- F. Construction Requirements

1.03 ENVIRONMENTAL REQUIREMENTS

- A. The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract in accordance with the Erosion and Sediment Control Report prepared for this project and in accordance with the requirements of the local Site Plan Approval. The Erosion and Sediment Control Report and Site Permits have specific restrictions on seasonal work limits, the amount of area which can be exposed at a given time, the general sequence of construction, and contractor monitoring.
- B. The general contractor will be required to designate, by name, a Registered Professional Engineer or equivalent person responsible for implementation of all erosion control measures as required by local approvals.
 - 1. Assuring and certifying the contractor's construction sequence is in conformance with the specified schedule. In addition, a weekly certification stating compliance, any deviations, and corrective measures shall be filed with the owner by this person. A copy of the certification form is contained the Erosion and Sedimentation Control Report which is appended to this Specification Section.
 - 2. Inspection of the project work site on a weekly basis, with the installation of added erosion control measures in areas which appear vulnerable to erosion.

3. Inspection of all erosion control measures and drainage inlets after any significant rainfall. Accumulated silt/sediment should be removed when the depth of sediment reaches 50 percent of the barrier height. Accumulated silt/sediment should be removed from behind silt fencing when the depth of the sediment reaches 6 inches. A significant rainfall shall be defined as over ½ inch of precipitation in any consecutive 24 hour period.
4. Inspect areas for catch of grass. A minimum catch of 75 percent is required prior to removal of erosion control measures.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Quick growing grasses for temporary seeding (see seed mixes contained in Erosion and Sedimentation Report).
- B. Hay or straw bales.
- C. Fencing for siltation control as specified on the plans.
- D. Curlex blankets by American Excelsior Company or approved equal.
- E. Bale stakes shall be a minimum of 4 feet in length and 1" in width.
- F. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural siltage.
- G. Fence stakes shall be metal stakes a minimum of 8 feet in length.
- H. Stone check dams shall be spaced according to the Erosion Control Detail Plan.
- I. Stone Sediment Barriers or SiltSacks™, or approved equal for inlet protection.
- J. A stabilized construction entrance shall be constructed temporarily.
- K. Riprap for slopes, culvert, storm drain inlet, and outlet aprons.
- L. Reinforced turf.
- M. Wood mulch.
- N. Calcium chloride and water for dust control.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Review site erosion control plan attached to this section of the specifications.
- B. Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Engineer for remedial action.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Provide catalog cuts and information concerning the erosion control products which will be used for construction for review by the Owner.
- B. Provide information concerning the installation of the erosion sedimentation control including anchorage trench provisions and anchorage devices and spacing for review by the Owner.
- C. Place erosion control systems in accordance with the erosion control plan and in accordance with approved installation procedures.
- D. This contract limits the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations. The Owner has the authority to direct the Contractor to provide immediate permanent or temporary pollution control measures. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.
- E. The temporary erosion control systems installed by the Contractor shall be maintained as directed by the Engineer to control siltation at all times during the life of the Contract. The Contractor must respond to any maintenance or additional work ordered by the Engineer within a 48 hour period.
- F. Any additional material work required beyond the extent of the erosion control plan shall be paid for by the Owner except where such measures are required to correct deficiencies caused by the failure of the Contractor to construct the work in accordance with the erosion sediment control plan.
- G. Slopes that erode easily shall be temporarily seeded as the work progresses with a cereal grain of wheat, rye or oats.

END OF SECTION 02270

SECTION 02511 ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide all material and labor for the placement of surface course and binder course on roads, access drives, parking lots, sidewalks, and walkways. Reference Appendix A for Superpavement requirements which, if used, replace this and MDOT Section 401 in their entirety.

1.2 REFERENCES

- A. April 1995 MDOT Standard Specifications, Highways & Bridges, including relevant updates, except as modified herein.
- B. April 1997 MDOT Standard Details, Highways & Bridges.
- C. MS-2 - Mix design methods for asphalt concrete and other hot mix types - The Asphalt Institute (AI).
- D. MS-3 - Asphalt Plant Manual - The Asphalt Institute (AI).
- E. Hot Mix. Asphalt Paving Handbook - US Army Corp of Engineers, UN-13 (CE MP-ET).
- F. MS-19 - Basic Asphalt Emulsion Manual - The Asphaltic Institute (AI).
- G. ASTM D946 - Penetration - Graded Asphalt Cement for use in Pavement Construction.
- H. AASHTO M-226/ASTM D3381 Asphalt Cement
- I. AASHTO M-140/ASTM D997 or AASHTO M-208/ASTM D-2397 Tack Coat
- J. AASHTO M-117/ASTM D242 Mineral Filler
- K. AASHTO T-245/ASTM D1559 Marshall Mix Design
- L. Approved and released for construction plans.

1.3 RELATED SECTIONS

- A. Section 02223 - Excavation, Backfilling and Compacting for Pavement
- B. Section 02330 - Subbase and Base Gravel
- C. Section 02520 - Portland Cement Concrete for Site Improvements
- D. Section 02525 - Curbs and Side Walks
- E. Section 02584 - Pavement Markings

1.4 SUBMITTALS

- A. Design Mix: Before any asphaltic concrete paving is constructed, the Contractor shall submit the proposed actual design mix to the Owner for review and/or approval. Design mix submittal shall follow the format as indicated in the Asphalt Institute Manual MS-2, Marshall Stability Method; and shall include the type/name of the mix, gradation analysis, asphalt cement grade used, Marshall Stability (lbs), flow, effective asphalt content (percent), and direct references to the applicable highway department specifications sections for each material. Design shall be for a mixture listed in the most recent edition of roadway specifications of the state in which the project is to be constructed. In no case shall a mix design over three years old be submitted.
- B. Material Certificates: Submit materials certificate to an independent testing laboratory retained by the Owner. The certificates shall be signed by the material producer and contractor, certifying that materials comply with, or exceed, the requirements herein.
- C. Field density test results, minimum 1 per 100 tons of bituminous pavement placed including sta/offset of test.
- D. Plant inspection reports to verify pavement batch plant and paving equipment meets or exceeds MDOT Specification 401. The inspections shall be conducted by an independent testing firm retained by the Owner.

1.5 JOB CONDITIONS

- A. Weather Limitations:
 - 1. Apply tack coats when ambient temperature is above 40 degrees F, and when temperature has been above 35 degrees F for 12 hours immediately prior to application.
 - 2. Construct asphaltic concrete paving when atmospheric temperature is above 40 degrees F base, 50 degrees F surface.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide asphaltic concrete mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet State Department of Transportation specifications and exhibit satisfactory record on previous installations.

- B. Asphalt Cement: Comply with AASHTO M-226/ASTM D 3381; Table 2 AC-10, AC-20, or AC-30, AR-80, viscosity grade, depending on local mean annual air temperature. (See following chart):

Temperature Condition	Asphalt Grades
Cold, mean annual air temperature < 7° C (45° F)	AC-10 85/100 pen.
Warm, mean annual air temperature between 7° C (45° F) and 24° C (75° F)	AC-20 60/70 pen.
Hot, mean annual air temperature > 24° C (57° F)	AC-30

Final acceptance of the proper grade of A.C. shall be made by the Owner's Engineer.

- C. Tack Coat: Emulsified asphalt; AASHTO M-140/ASTM D 997 or M 208/ASTM D 2397, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one part emulsified asphalt.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M-17/ASTM D242, if recommended by applicable state highway standards.
- E. Asphalt-Aggregate Mixture: Unless otherwise noted on the Drawings, the Design Mix shall have a minimum stability based on a 50-blow Marshall complying with ASTM D 1559 of 1000 lbs. with a flow between 8 and 16. The Design Mix shall be within sieve analysis and bitumen ranges below:

SIEVE ANALYSIS OF MIX

<u>Square Sieve</u>	<u>Total Percent Passing</u>	<u>Percent Tolerance</u>
3/4"	100	
1/2"	80-100%	5%
3/8"	65-93%	4%
#8	40-55%	4%
#50	12-27%	2%
#200	0-10%	0%

Percent bitumen by weight of total mix: 5.0 - 8.5.

Air voids: 3-6%

Percent aggregate voids filled with asphalt cement: 70-82%

Allowable variance of percent bitumen by weight of total mix=0.4

2.2 EQUIPMENT

Maintain all batch plant and paving equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove loose material from compacted base material surface immediately before applying prime coat.
- 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.

3.2 APPLICATIONS

- A. Tack Coat:
 - 1. Apply to contact surfaces of previously constructed asphaltic concrete base courses or Portland cement concrete and surfaces abutting or projecting into asphalt concrete and surfaces abutting or projecting into asphalt concrete pavement.
 - 2. Apply tack coat to asphaltic concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat on the surface of all such bases where asphaltic concrete paving will be constructed.
 - 3. Apply emulsified asphalt tack coat in accordance with APWA Section 2204 and applicable state highway specifications.
 - 4. Apply at minimum rate of 0.05 gallon per square yard of surface.
 - 5. Allow to dry until at proper condition to receive paving.

3.3 ASPHALTIC CONCRETE PLACEMENT

- A. Place asphalt concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:
 - 1. When ambient temperature is between 40 degrees F and 50 degrees F: 285 degrees F.
 - 2. When ambient temperature is between 50 degrees F and 60 degrees F: 280 degrees F.
 - 3. When ambient temperature is higher than 60 degrees F: 275 degrees F.
- B. Whenever possible, all pavement shall be spread by a finishing machine. Inaccessible or irregular areas, pavement may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated coarse aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster than they can be properly spread. Workers shall not stand on the loose mixture while spreading.

- C. Paving Machine Placement: 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.
- D. Joints: 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. Clean contact surfaces and apply tack coat.

3.4 WEATHER AND SEASONAL LIMITATIONS

For weather limitations the State of Maine will be considered to be divided into two paving zones:

- (a) Zone 1: All area north of US Route 2 from Gilead to Brewer and north of Route 9 from Brewer to Calais.
- (b) Zone 2: All area south of Zone 1 including the US Route 2 and Route 9 boundaries.

Bituminous plant mix for use other than traveled way wearing course may be placed in either zone between the dates of April 15th and November 15th, provided that the air temperature as determined by an approved thermometer placed in the shade at the paving location is 35 degrees F or higher and the area to be paved is not frozen. Plant mix to be placed as traveled way wearing course may be placed in Zone 1 between the dates of May 1st and the Saturday following October 1st and in Zone 2 between the dates of April 15th and the Saturday following October 15th provided the air temperature determined above is 50 degrees F or higher.

Any hot bituminous base or binder course that is to be subject to traffic during the winter months shall have its gradation densified or asphalt content (percent of mix) adjusted through a change in the job mix formula as submitted by the Contractor and approved by the Owner.

3.5 ROLLING AND COMPACTION

- A. 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 a workable condition.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. 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.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

- E. 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.
- F. 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.
- G. 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.

3.6 FIELD QUALITY CONTROL

- A. An Independent Testing Laboratory, selected and paid by Owner, shall be retained to perform construction testing of in-place asphaltic concrete courses for compliance with requirements for thickness, density, composition and surface smoothness. Asphaltic surface and asphaltic base/binder courses shall be randomly cored at a minimum rate of one core for every 20,000 square feet of paving. In no event shall less than three cores in light duty areas and three cores in heavy-duty areas shall be obtained. Coring holes shall be immediately filled with full-depth asphalt or with concrete. Asphaltic Concrete pavement samples shall be tested for conformance with the mix design.
- B. Grade Control: Establish and maintain required lines and elevations.
- C. 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 1" overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Owner's; until specified thickness of the course is met or exceeded at no additional expense to the Owner.
- D. 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"
- E. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.
- F. 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.

Rate of testing shall be one core per 20,000 square feet of pavement, with a minimum of 3 cores from heavy-duty areas and 3 cores from standard-duty areas. Cores shall be cut from areas representative of the project.

Areas of insufficient compaction shall be delineated, removed, and replaced in compliance with the specifications at no expense to the Owner.

- G. Pavement Plant Inspection: The paving plant shall be inspected a minimum of one week prior to pavement placement to verify the plant meets the requirements outlined in Section 401. Random inspection and sampling during pavement placement shall be conducted and documented by a testing firm hired and paid for by the Owner.

END OF SECTION

APPENDIX A - SECTION 401 - HOT MIX ASPHALT PAVEMENT

Section 401 of MDOT Standard Specifications and the preceding Asphaltic Concrete section are deleted in their entirety and replaced by the following:

401.01 Description. The Contractor shall furnish and place one or more courses of Superpave Hot Mix Asphalt Pavement (SHMA) on an approved base in accordance with the Contract documents and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans or established.

For the purposes of this Section, the Owner shall be defined as the developer or their assigned agent in charge of construction supervision and inspection.

MATERIALS

401.02 Composition of Mixtures. The Contractor shall compose the Hot Mix Asphalt Pavement with aggregate, Performance Graded Asphalt Binder (PGAB), and mineral filler if required. SHMA shall be designed and tested according to AASHTO TP-4. The Contractor shall size, uniformly grade, and combine the aggregate fractions in proportions that provide a mixture meeting the grading requirements of the Job Mix Formula (JMF). The Contractor may use a maximum of 20 percent reclaimed asphalt pavement.

The Contractor shall submit an MDOT approved JMF for Owner approval. A JMF shall be submitted for testing to a laboratory selected by the Owner for each mixture to be supplied at least 15 calendar days prior to production. The JMF shall establish a single percentage of aggregate passing each required sieve size within the limits shown in Table 1, and shall not cross the restricted zone. The general composition limits given in Table 1 indicate the control points of mixtures permissible under this specification. The JMF shall state the source, gradation, and percentage to be used of each portion of the aggregate, and mineral filler if required. It shall also state the proposed PGAB content, the name and location of the refiner and the supplier for the source of PGAB submitted for approval, and the type of PGAB modification if applicable.

In addition, the Contractor shall provide the following information in the proposed JMF.

- Superpave Stockpile Gradation Summary
- Superpave Design Aggregate Structure Consensus Property Summary
- Superpave Design Aggregate Structure Trial Blend Gradation Plots
- Superpave Trial Blend Results (summary)
- PGAB Specific Gravity and temperature/viscosity charts and Recommended mixing and compaction temperatures from supplier
- Material Safety Data Sheets (MSDS) for PGAB

Table 1: COMPOSITION OF MIXTURES – CONTROL POINTS

SIEVE SIZE	GRADING			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
	PERCENT BY WEIGHT PASSING – COMBINED AGGREGATE			
37.5 mm	100			
25 mm	90-100	100		
19 mm	-90	90-100	100	
12.5 mm	-	-90	90-100	100
9.5 mm	-	-	-90	90-100
4.75 mm	-	-	-	-90
2.36 mm	15-41	23-49	28-58	32-67
1.18 mm	-	-	-	-
0.60 mm	-	-	-	-
0.30 mm	-	-	-	-
0.075 mm	1-7	2-8	2-10	2-10

SIEVE SIZE	RESTRICTED ZONES			
	TYPE 25 mm	TYPE 19 mm	TYPE 12.5 mm	TYPE 9.5 mm
	PERCENT BY WEIGHT PASSING – COMBINED AGGREGATE			
37.5 mm	-	-	-	-
25 mm	-	-	-	-
19 mm	-	-	-	-
12.5 mm	-	-	-	-
9.5 mm	-	-	-	-
4.75 mm	39.5	-	-	-
2.36 mm	26.8-30.8	34.6	39.1	47.2
1.18 mm	18.1-24.1	22.3-28.3	25.6-31.6	31.6-37.6
0.60 mm	13.6-17.6	16.7-20.7	19.1-23.1	23.5-27.5
0.30 mm	11.4	13.7	15.5	18.7
0.075 mm	-	-	-	-

TABLE 2 – SUPERPAVE Volumetric Design Criteria

Estimated Traffic, million 80 kN ESALs	%G @N _{initial}	Voids in the Mineral Aggregate (VMA)					Voids Filled With Binder (VFB)		Fines to Effective Binder Ratio (P _{0.075} /P _{be})	
		9.5 mm	12.5 mm	19.0 mm	25.0 mm	37.5 mm	Min.	Max.	Min.	Max.
		Minimum								
0.3 to <1.0	<90.5	15.0%	14.0%	13.0%	12.0%	11.0%	65	78	0.5	1.2

*For 9.5 mm nominal maximum aggregate size mixtures, the maximum VFB is 76.

As design criteria, Voids @ N_{des} shall be 4.0%, Voids @ N_{max} shall be ≥ 2.0%

401.03 Aggregates. Fine aggregate, that material passing the 2.36 mm sieve, shall not exceed an absorption of 3.0 percent by weight as determined by AASHTO T84. The composite blend, minus any reclaimed asphalt pavement used, shall have a minimum degradation value of 30 as determined by the Washington State Degradation Test of 1967, or a Micro-Deval value of under 18 as determined by the AASHTO Provisional Standard available from the Owner's Central Lab in Bangor. If the Contractor elects to use the Micro-Deval, it shall be indicated in the proposed JMF.

Aggregates shall also meet the following consensus properties. The Owner reserves the right to sample and test the composite aggregate for any of the following properties at any time.

TABLE 3 – SUPERPAVE Aggregate Consensus Properties Criteria

Estimated Traffic, Million 80 kN ESALs	ASTM D 5821 Coarse Aggregate Angularity (Minimum)		AASHTO TP33 Method A Uncompacted Void Content of Fine Aggregate (Minimum)		ASTM D 4791 (8.4) Flat and Elongated Particles (Maximum)	AASHTO T176 Clay Content/ Sand Equivalent (Minimum)
	Depth from Surface					
	<100m m	>100m m	<100m m	>100m m		
0.3 to <1.0	65/60	60/60	40	40	10	45

ASTM D 5821 – "85/80" denotes that 85% of the coarse aggregate has one fractured face and 80% has two fractured faces.

AASHTO TP33 – Criteria are presented as percent air voids in loosely compacted fine aggregate, (U).

ASTM 4791 – Criteria are presented as maximum percent by weight of flat and elongated particles. (5:1 ratio).

401.04 – Vacant

401.05 Temperature Requirements. After the JMF is established, the temperatures of the mixture shall conform to the following tolerances:

In the truck at the mixing plant	± 10° C*
At the Paver	± 10° C*

* If noted in the Quality Control Plan, these may be increased or decreased due to extraordinary considerations, but temperature shall in no case vary by more than 15° C.

The JMF and the mix subsequently produced shall meet the requirements of Tables 2 and 3.

401.06 Performance Graded Asphalt Binder. VACANT.

CONSTRUCTION REQUIREMENTS

401.07 Weather and Seasonal Limitations.

The Contractor may place Hot Mix Asphalt Pavement for use other than a traveled way wearing course, provided that the air temperature as determined by an approved thermometer (placed in the shade at the paving location) is 2° C or higher and the area to be paved is not frozen. The Contractor may place Hot Mix Asphalt Pavement as traveled way wearing course, provided the air temperature determined as above is 10° C or higher.

401.08 Hot Mix Asphalt Plant.

401.081 General Requirements. Mixing plants shall conform to AASHTO M 156. The mixing plant shall include an efficient dust collecting system to prevent loss of fine material. The material collected may be returned to the mixture at a uniform rate and/or be discarded.

401.083 Automation of Batching.

The batch plant shall accurately proportion the various materials in the proper order by weight. The entire batching and mixing cycle shall be continuous and shall not require any manual operations. The batch plant shall use auxiliary interlock circuits to trigger an audible alarm whenever an error exceeding the acceptable tolerance occurs. Along with the alarm, the printer shall print an asterisk on the delivery slip in the same row containing the out-of-tolerance weight. The automatic proportioning system shall be capable of consistently delivering material within the full range of batch sizes.

Tolerances are based on the total batch weight of the Hot Mix Asphalt Pavement. The batch plant shall be able to automatically or manually adjust for all desired batch sizes. The first or last bin drawn shall be the sand bin. Allowable tolerances are as follows:

Each aggregate component	± 2.5 percent from the cumulative target, each bin
Last Bin Drawn	± 1.5 percent
Mineral Filler	± 0.5 percent
Performance Graded Asphalt Binder	± .25 percent, -.15 percent
Zero Return (aggr.)	± 0.5 percent
Zero Return (bit. Material)	± 0.1 percent

All plants shall be equipped with an approved digital recording device.

401.085 Drum Plant Recordation of Proportions. The plant shall utilize an approved recordation system. In the case of a malfunction of this recordation system, the Contractor may continue production for up to two working days while the system is repaired, after which time production shall cease until repairs are completed. The recorder shall simultaneously record the accumulated weights of the dry aggregates, the mineral filler (if added separately) and the Performance Graded Asphalt Binder, all at 5 minute intervals during production and on demand, unless the Owner approves otherwise. The printed record shall include the actual Performance Graded Asphalt Binder content quantity as a percentage of the total mixture weight. The maximum resolution shall be 90 kg of dry aggregate, 9 kg of mineral filler, 9 kg of Performance Graded Asphalt Binder, and 0.1 percent for Performance Graded Asphalt Binder content. The printout shall indicate the amount of moisture programmed into the moisture compensation by total weight. All printed records shall show the day, month, year, and the time to the nearest

minute when the printout was generated. The Contractor shall provide the Owner with a clear and legible copy of the recordings at the end of each day.

401.09 Hauling Equipment. Trucks for hauling Hot Mix Asphalt Pavement shall have tight, clean, smooth metal dump bodies which have been thinly coated with a small amount of lime solution or an approved soap solution or detergent to prevent the mixture from adhering to the bodies.

All truck dump bodies shall have a cover of canvas or other water repellent material capable of heat retention which completely covers the mixture. The cover shall be securely fastened on the loaded truck except when unloading.

All truck bodies shall have an opening on both sides which will accommodate a thermometer stem. The opening shall be located near the midpoint of the body, at least 300 mm above the bed.

401.10 Pavers. Pavers shall be self-contained, self-propelled units with an activated screen (heated if necessary) capable of placing courses of Hot Mix Asphalt Pavement in lane widths on the main line, or shoulder width for shoulders and similar construction.

The Contractor shall operate the paver at speeds which produce a uniform mat. The paver shall have a receiving hopper with sufficient capacity for a uniform spreading operation and a distribution system to place the mixture uniformly, without segregation in front of the screed. The screed assembly shall produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture. Pavers with extendible screeds shall have auger extensions and tunnel extenders as necessary.

401.11 Rollers. Rollers shall be static steel, pneumatic tire, or approved vibrator type. Rollers shall be in good mechanical condition, capable of starting and stopping smoothly, and be free from backlash when reversing direction. Rollers shall be equipped and operated in such a way as to prevent the picking up of hot mixed material by the roller surface. Use of rollers which result in crushing of the aggregate or displacement of the mixture will not be permitted. Any Hot Mix Asphalt Pavement that becomes loose, broken, contaminated, shows an excess or deficiency of Performance Graded Asphalt Binder, or is in any other way defective shall be removed and replaced at no additional cost with fresh Hot Mix Asphalt Pavement which shall be immediately compacted to conform with the adjacent area.

The type of rollers to be used and their relative position in the compaction sequence shall generally be the Contractor's option, provided specification densities are attained and with the following requirements:

- 1) At least one roller shall be pneumatic-tired on bridges and variable depth courses as well as the first lift of pavement over gravel or a reclaimed pavement or other irregular surface.
- 2) Compaction with a vibratory or steel wheel roller shall precede pneumatic-tired rolling, unless otherwise authorized by the Owner.
- 3) Vibratory rollers shall not be operated in the vibratory mode when checking or cracking of the mat occurs, or on bridge decks.
- 4) Any method which results in cracking or checking of the mat will be discontinued, and corrective action taken.

The maximum operating speed for a steel wheel roller shall not exceed the manufacturer's recommendations.

401.111 Surface Tolerances. The Owner will check surface tolerance with a 4.9 m straightedge or string line placed parallel to the centerline of pavement and with a 3 m straightedge or string line placed transverse to the centerline of pavement. The Contractor shall correct variations exceeding 6 mm by removing defective work and replacing it with new material as directed by the Owner. The Contractor shall furnish a 3 m straightedge for the Owner's use.

401.12 Conditioning of Existing Surface. The Contractor shall thoroughly clean the surface upon which Hot Mix Asphalt Pavement is to be placed of all objectionable material. When the surface of the existing base or pavement is irregular, the Contractor shall bring it to uniform grade and cross section.

401.13 Hot Mix Asphalt Material Documentation. The Contractor and the Owner shall agree on the amount of Hot Mix Asphalt Pavement that has been placed each day.

401.14 Preparation of Aggregates. The Contractor shall dry and heat the aggregates for the mixture to the required temperature. The Contractor shall properly adjust flames to avoid physical damage to the aggregate and to avoid depositing soot on the aggregate.

401.15 Mixing. The Contractor shall combine the dried aggregate in the mixer in the amount of each fraction of aggregate required to meet the JMF. The Contractor shall measure the amount of PGAB and introduce it into the mixer in the amount specified by the JMF.

The Contractor shall produce the mixture at the temperature established by the JMF.

The Contractor shall dry the aggregate sufficiently so that the mixture will not flush, foam excessively, or displace excessively under the action of the rollers. The Contractor shall introduce the aggregate into the mixer at a temperature of not more than 14°C above the temperature at which the viscosity of the bituminous material being used is 0.150 Pas.

The Contractor shall store and introduce into the mixer the Performance Graded Asphalt Binder at a uniformly maintained temperature at which the viscosity of the material is between 0.150 Pas and 0.300 Pas. The aggregate shall be completely and uniformly coated with a thorough distribution of the PGAB. The Contractor shall determine the wet mixing time for each plant and for each type of aggregate used.

401.16 Spreading and Finishing. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the Contractor shall spread, rake, and lute the mixture with hand tools to provide the required compacted thickness.

401.17 Compaction. Immediately after the Hot Mix Asphalt Pavement has been spread, struck off, and any surface irregularities adjusted, the Contractor shall thoroughly and uniformly compact the mixture by rolling.

The Contractor shall roll the surface when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving. The Contractor shall prevent adhesion of the mixture to the rollers or vibrating compactors without the use of oil.

The Contractor shall immediately correct any displacement occurring as a result of the reversing of the direction of a roller or from other causes to the satisfaction of the Owner. Any

operation other than placement of variable depth shim course that results in breakdown of the aggregate shall be discontinued.

Along forms, curbs, headers, walls, and other places not accessible to the roller, the Contractor shall thoroughly compact the mixture with mechanical vibrating compactors. The Contractor shall only use hand tamping in areas inaccessible to all other compaction equipment. On depressed areas, the Contractor may use a trench roller or cleated compression strips under a roller to transmit compression to the depressed area.

401.18 Joints. The Contractor shall construct wearing course transverse joints in such a manner that minimum tolerances shown in section 401.111 are met when measured with a straightedge.

The paver shall always maintain a uniform head of material during the joint construction. The bituminous mix shall be free of segregation and meet temperature requirements. Transverse joints of the wearing course shall be straight and neatly trimmed. The Contractor may form a vertical face exposing the full depth of the course by inserting a header, by breaking the bond with the underlying course, or by cutting back with hand tools. The Owner may allow feathered or "lap" joints on lower courses or when matching existing low type pavements.

The Contractor shall apply a coating of emulsified asphalt immediately prior to paving all joints, except those formed by pavers operating in echelon. The Contractor shall use an approved spray apparatus designed for covering a narrow surface. The Owner may approve application by a brush for small surfaces, or in the event of a malfunction of the spray apparatus, but for a period of not more than one working day.

Where pavement under this Contract joins an existing pavement of when the Owner directs, the Contractor shall cut the existing pavement along a smooth line, producing a neat, even, vertical joint. The Owner will not permit broken or raveled edges. The cost of all work necessary for the preparation of joints is incidental to related Contract items.

401.19 Quality Control Method A & B. VACANT.

401.20 Acceptance.

Method C.

TABLE 9: GRADATION, VOLUMETRIC AND PGAB CONTENT VERIFICATION LIMITS

Property	USL and LSL
Percent Passing 4.75 mm [No. 4] and larger sieves	Target + 7
Percent passing 2.36 mm [No. 8] to 1.18 mm [No. 16] sieves	Target + 5
Percent passing 0.60 [No. 30]	Target + 4
Percent passing 0.30 [No. 50] to 0.075 sieve [No. 200]	Target + 3
PGAB Content	Target + 0.5

One sample will be taken from the paver hopper or the truck body per 250 Mg [275 ton] per pay item. The mix will be tested for gradation and PGAB content. If the mix is within tolerances listed in Table 9, the Owner will pay the contract unit price. If the test results for each 250 Mg [275 ton] increment are outside these limits, the following deductions (Table 9b) shall apply. A second consecutive failing test shall result in cessation of production.

TABLE 9b

PGAB Content	-5%
2.36 mm sieve [No. 8]	-2%
0.30 mm sieve [No. 50]	-1%
0.075 mm sieve [No. 200]	-2%
Density	-10%

The Owner shall cut one core per 20,000 square feet of pavement, with a minimum of 3 cores from heavy-duty areas and 3 cores from standard-duty areas, which shall be tested for percent TMD. If the average density of the cores falls below 92.0 percent, the penalty will apply.

END OF SECTION – APPENDIX A

SECTION 02520 - PORTLAND CEMENT CONCRETE FOR SITE IMPROVEMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Site Concrete, exterior slabs, and median barriers.
- B. Precast concrete light pole bases with anchor bolts supplied by the Div. 16 Contractor, precast concrete transformer pads, and chain link fence concrete bases.

1.02 RELATED SECTIONS:

- A. Section 02100 - Site Preparation
- B. Section 02227 - Aggregate Materials
- C. Section 02330 - Subbase and Base Gravel
- D. Section 02525 - Curbs and Sidewalks
- E. Section 02584 - Pavement Markings
- F. Section 03300 - Cast-in-place Concrete.
- G. State Highway Department Standard Specifications
- H. Construction Documents.

1.03 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting
- C. ANSI/ASTM A185- Welded Steel Wire Fabric for Concrete Reinforcement.
- D. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- E. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural construction.
- F. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- G. ASTM A615 - Deformed and Plain Billet - Steel for Concrete Reinforcement.
- H. ASTM C33 - Concrete Aggregates.

- I. ASTM C94 - Ready Mix Concrete.
- J. ASTM C150 - Portland Cement
- K. ASTM C260 - Air-Entraining Admixtures for Concrete.
- L. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- M. ASTM C494 - Chemical Admixtures for Concrete.
- N. FA TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

1.05 PERFORMANCE REQUIREMENTS

- A. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with non-staining type coating that will not discolor or deface surface of concrete.
- B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
- C. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40.
- D. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- E. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.

- F. Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant", Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 45", or Woodmont Products "Chem-Caulk".
- G. Precast concrete light pole bases shall be installed plumb. The exposed portion of the foundation shall be painted with two coats of an acrylic paint. The color shall be reflective yellow.
- H. Transformer Pad: The precast concrete transformer pad shall meet all installation requirements of the electric utility provider and shall be sized to meet the required transformer capacity.

2.02 MIX DESIGN AND TESTING

- A. Concrete mix design and testing shall comply with requirements of applicable Section 03300.
- B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce the following properties:
 - 1. Compressive Strength: 4,000 psi, minimum at 28 days, unless otherwise indicated on the Drawings.
 - 2. Slump Range: 3"-5" for normal concrete at time of placement
 - 3. Air Entrainment: 4% to 6%

PART 3 - EXECUTION

3.01 PREPARATION

- A. Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after the unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.
- B. Surface Preparation: Remove loose material from compacted base material surface immediately before placing concrete.

3.02 INSTALLATION

- A. Form Construction
 - 1. Set forms to required grades and lines, rigidly braced and secured.
 - 2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.

3. Check completed formwork for grade and alignment to following tolerances:

Top of forms not more than 1/8" in 10'-0". Vertical face on longitudinal axis, not more than 1/4" in 10'-0".
 4. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Reinforcement: Locate, place and support reinforcement per Division 3 specifications. For areas to be paved with Portland Cement Concrete, six-inch by six-inch welded wire fabric reinforcement shall be installed per typical detail contained on the Contract Drawings.
- C. Concrete Placement
1. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structure until they are at the required finish elevation and alignment.
 2. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
 3. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint.
- D. Joint Construction: Construct expansion, weakened-plane Control (contraction), and construction joints straight with face perpendicular to concrete surface. Construct transverse joints perpendicular to centerline, unless otherwise detailed.
1. Weakened-Plane Control (Contraction) Joints: Provide joints at a spacing of 40' - 0" o.c. maximum each way. Construct control joints for depth equal to at least 1/4 concrete thickness, as follows:
 - a. Form tooled joints in fresh concrete by grooving top portion with recommended tool and finishing edges with jointer.
 - b. Form sawed joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
 2. Construction Joints: Place concrete joints at end of placements and at locations where placement operations are stopped for period of more than 1/2 hours, except where such placements terminate at expansion joints. Construct joints using standard metal keyway-section forms. No. 5 x 2 1/2'

Tee dowels at 18- to 40-inch center to center spacing shall be installed at all construction joints.

3. Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other fixed objects. Expansion joint spacing of 80 to 120 feet.
- E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If not joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler section together.
- F. Joint Sealants: Exterior pavement joint sealants shall be installed per manufacturer's recommendations.

3.03 COLD WEATHER PLACING

- A. 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 specified herein. All expenses associated with the protective measures, temporary heating, etc. shall be at the expense of the Contractor.

When air temperature has fallen to or is expected to fall below 40 degrees F (4 deg. C) uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 deg. C) and not more than 80 degrees F (27 deg. C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or subgrade containing frozen materials.

Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical agents, unless otherwise accepted in mix design.

3.04 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screening and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 1. Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.

2. Paving: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed.
- D. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in the "water-curing" section of ACI 308-81.

3.05 CLEANING AND ADJUSTING

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

3.06 FIELD QUALITY CONTROL

An independent testing laboratory shall randomly core the pavement at a minimum rate of one core per 20,000 square feet or portion thereof of concrete pavement. In no case shall less than one core be obtained. Core shall be tested for thickness and quality of aggregate distribution.

Core holes shall be patched immediately with Portland cement concrete conforming to paragraph 2.02, and shall be finished to provide a level surface conforming to paragraph 3.04A above.

END OF SECTION 02520

SECTION 02525 - CURB AND SIDEWALKS

PART 1 - GENERAL

1.01 SECTION INCLUDES BUT NOT LIMITED TO

- A. Hot Bituminous Concrete Curb
- B. Hot Bituminous Concrete Sidewalks
- C. Concrete Sidewalk
- D. Granite curb

1.02 RELATED SECTIONS

- A. Section 02100 - Site Preparation
- B. Section 02227 - Aggregate Materials
- C. Section 02505 - Paving Base and Subbase Course
- D. Section 02511 - Asphaltic Concrete Paving
- E. State Highway Department Standard Specifications
- F. Construction Documents.

1.03 REFERENCES

- A. Maine Department of Transportation Specifications, Current Edition

1.04 PERFORMANCE REQUIREMENTS

- A. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.
- B. City of Portland Technical Standards, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Bituminous Curb shall be used where required on the Contract Drawings and shall be installed in accordance with Section 609 of the MDOT specifications. The bituminous concrete curb mix shall include fiberglass resin fibers to provide tensile strength. The fiber and mix shall be approved by the owner's representative prior to placement.

- B. Aggregates subbase gravels and base gravels (if appropriate) for sidewalks shall meet the requirements of Section 02227 of these specifications.
- C. Asphaltic concrete pavement for sidewalks shall meet the requirements of Section 02511 of these specifications.
- D. Granite curb, where required, shall be Type '1' vertical curb meeting the requirements of MDOT Specification Section 609. If granite curb is chosen, granite curb inlets shall be provided at all catch basin inlets. Granite terminal sections shall also be provided at all ramps and end of curb.
- E. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with nonstaining type coating that will not discolor or deface surface of concrete.
- F. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM 185. Furnish in flat sheets, not rolls, unless otherwise acceptable to Owner.
- G. Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- H. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.
- I. Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant", Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 45", or Woodmont Products "Chem-Caulk"

2.2 MIX DESIGN AND TESTING

- A. Concrete mix design and testing shall comply with requirements of applicable Section 03300.

- B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce the following properties:
1. Compressive Strength: 4,000 psi, minimum at 28 days, unless otherwise indicated on the Drawings.
 2. Slump Range: 3"-5" for normal concrete at time of placement
 3. Air Entrainment: 4% to 6%

PART 3 – EXECUTION

3.1 REINFORCED CONCRETE SIDEWALK PREPARATION (WHERE REQUIRED)

- A. Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after the unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.
- B. Surface Preparation: Remove loose material from compacted base material surface immediately before placing concrete.

3.2 INSTALLATION

- A. Form Construction
1. Set forms to required grades and lines, rigidly braced and secured.
 2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.
 3. Check completed formwork for grade and alignment to following tolerances:
Top of forms not more than 1/8" in 10'-0".
Vertical face on longitudinal axis, not more than 1/4" in 10'-0".
 4. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Reinforcement: Locate, place and support reinforcement per Division 3 specifications or as detailed on the Contract Drawings.
- C. Concrete Placement
1. Comply with requirements of Section 03300.
 2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structure until they are at the required finish elevation and alignment.

3. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices.
4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint.

D. Joint Construction

1. Contraction Joints: If joints are specified, the curb or gutter shall be constructed in uniform sections of the length specified on the plans. The joints between sections shall be formed either by steel templates 1/8 inch in thickness, or a length equal to the width of the gutter or curb, and with a depth which will penetrate at least 2 inches below the surface of the curb and gutter; or with 3/4 inch thick preformed expansion joint filler cut to the exact cross section of the curb or gutter; or by sawing to a depth of at least 2 inches while the concrete is between 4 to 24 hours old. If steel templates are used, they shall be left in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.
2. Longitudinal Construction Joints: Concrete curb, concrete gutter, combination concrete curb and gutter, where specified on the plans, shall be tied to concrete pavement with 1/2 inch round, reinforcement bars of the length and spacing shown on the plans.
3. Transverse Expansion Joints: Transverse expansion joint in curb, curb and gutter, gutter or sidewalk shall have the filler cut to the exact cross section of the curb, curb and gutter, gutter or sidewalk. The joints shall be similar to the type of expansion joint used in the adjacent pavement.

E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If not joint sealer, place top of joint filler flush with finished concrete surface. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler section together.

F. Joint Sealants: Exterior pavement joint sealants shall be installed per manufacturer's recommendations.

3.3 COLD WEATHER PLACING

- A. 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 specified herein. All expenses associated with the protective measures, temporary heating, etc. shall be at the expense of the Contractor.

When air temperature has fallen to or is expected to fall below 40° F (4° C) uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50° F (10° C) and not more than 80° F (27° C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or subgrade containing frozen materials.

Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical agents, unless otherwise accepted in mix design.

3.4 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
 1. Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.
 2. Paving: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed.
- D. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in the "water-curing" section of ACI 308-81.

3.5 CLEANING AND ADJUSTING

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

3.6 BITUMINOUS SIDEWALK PREPARATION

- A. Prepare subgrade to receive sidewalk subbase gravel in accordance with Section 02223.
- B. Place and compact subbase and base gravel in accordance with Section 02200, 02223, 02227 of these specifications.
- C. Proof-roll prepared subbase and base material surface to check for unstable areas. The paving work shall begin after the unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the subbase and base material shall be completed prior to the placement of the paving.
- D. Surface Preparation: Remove loose material from compacted base material surface immediately. Compact and shim loose or low areas. In areas to receive curb, clean and sweep binder pavement.

3.7 BITUMINOUS CURB

- A. Bituminous curb shall be installed on the bituminous pavement base course prior to placement of final bituminous pavement wearing course. The curb shall be backfilled with approved materials. This material shall be placed in layers not exceeding 8 inches in depth, loose measure and thoroughly tamped.
- B. Protection of bituminous curb shall be in accordance with MDOT Standard Highway specifications.

3.8 HOT BITUMINOUS CONCRETE

- A. Bituminous concrete pavement for sidewalks shall be placed in two lifts to provide the total thickness specified on the drawings.
- B. Compaction shall be by a paver roller having a minimum total weight of 2,000 lb. with a minimum of 65 lbs. per inch of the drive roll or by satisfactory vibratory equipment.
- C. Placement and quality control shall comply with Section 02511 of these specifications.

3.9 GRANITE CURB (WHERE REQUIRED)

- A. Installation. The curb shall be set on a compacted foundation so that the front top arris line conforms to the lines and grades required. The foundation shall be prepared in advance of setting the curb by grading the proper elevation and shaping to conform as closely as possible to the shape of the bottom of the curbs. The required spacing between shall be assured by the use of an approved curb spacing device to provide an open joint between curbs of at least $\frac{1}{4}$ inch and no greater than $\frac{5}{8}$ inch.
- B. Backfilling. All remaining spaces under the curb shall be filled with approved material and thoroughly hand tamped so the curbs will have a firm uniform bearing on the foundation for the entire length and width. Any remaining excavated areas surrounding the curb shall be filled to the required grade with approved materials. This material shall be placed in layers not exceeding 8 inches in depth, loose measure and thoroughly tamped. Install 6" minimum thickness of lean concrete behind curbing sections at curb joints to minimize curb tipping. Install $\frac{3}{8}$ " minimum non-shrink cement mortar within curb joints in order to minimize intrusion of vegetation.
- C. Protection. The curb shall be protected and kept in good condition. All exposed surfaces smeared or discolored shall be cleaned and restored to a satisfactory condition or the curb removed and replaced.

END OF SECTION 02525

SECTION 02584 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS:

- A. Section 02200 - Earthwork
- B. Section 02505 - Paving Base Course
- C. Section 02511 - Asphaltic Concrete Paving
- D. Section 02520 - Portland Cement Concrete Paving
- E. Construction Drawings

1.02 PROJECT CONDITIONS

Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

Prior to any markings, the Contractor shall meet onsite with the civil engineer to verify all marking placement.

PART 2 - PRODUCTS

2.01 MATERIALS

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.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Sweep and clean surface to eliminate loose material and dust.
- B. Where existing pavement markings are indicated on the drawings to be removed or would interfere with the adhesion of new paint, a motorized device shall be used to remove the markings. The equipment employed shall not damage the existing paving or create a surface hazardous to vehicle or pedestrian traffic. In all areas within public rights-of-way, the method of marking removal shall be approved by governing authority.

3.02 APPLICATION

- A. 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 stripes running parallel, perpendicular, or 45 degrees to centerline as shown on the pavement marking details of the plan set.
- B. The following items are to be painted with the colors noted below:
- Pedestrian Crosswalks: White at the size and spacing indicated on the drawings.
 - Lane Striping where separating traffic in opposite directions: Yellow.
 - Lane Striping where separating traffic in same direction: White.
 - Directional Arrows: White.
 - Handicap Symbols: Non-skid blue ADA symbol of the dimension shown on the drawing or per Local Code and conforming to ADA requirements.
 - Parking Stall Striping: White, unless otherwise noted on plans.
 - Stop Bars: Provide painted stop bars and the word "STOP" where required by plans.
 - Other: As shown on the drawings

END OF SECTION 02584

SECTION 02605 - WATER, SEWER, STORM AND CATCH BASIN STRUCTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Monolithic concrete manholes with masonry transition to lid frame, covers, anchorage and accessories.
- B. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage and accessories.
- C. Masonry manholes sections with masonry transition to lid frame, covers, anchorage and accessories.
- D. Water meter pit (Not Required).
- E. Precast reinforced concrete catch basin sections with tongue and groove joints and masonry riser to cast basin frame, cover, and accessories.
- F. Outlet Control Structure (not required).
- G. Water Quality Units (not required).
- H. Exterior Grease Trap (not required).
- I. Septic Tanks (not required).
- J. Pump Station Structures (not required).

1.02 RELATED REQUIREMENTS

- A. Section 02222 - Excavation, Backfilling, and Compacting for Utilities
- B. Section 02720 - Storm Sewer Systems
- C. Section 02730 - Sanitary Sewer System
- D. Section 03300 - Cast-in-Place Concrete
- E. Local Governing Authority and Code Requirements, including the City of Portland Sewer Use Ordinance.
- F. Construction Drawings

The public utility for sewers for the project is the Portland Public Works Department. All materials, installation, and workmanship will comply with the requirements specified in this section and the requirements of the City of Portland. Where a more stringent standard exists, the more stringent standard shall apply.

All water utility materials and installations shall conform to the Portland Water District standards.

1.03 REFERENCES

- A. ANSI/ASTM C55 - Concrete Building Brick.
- B. ASTM A48 - Gray Iron Castings
- C. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- D. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures
- E. ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
- F. ASTM D1248 - Precast Polyethylene Manholes.
- G. American Concrete Institute (ACI) Standards for Frost Resistance (ACI 318-16-4.5.1).
- H. American Concrete Institute (ACI) Standards for Watertightness (ACI 318-16-4.5.2).
- I. International Masonry Industry All-Weather Council (IMIAC): Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate manhole locations, components to be used, elevations, piping, sizes and elevations of penetrations.
- B. Product Data: Provide manhole covers, component construction, features, configuration, coatings, joint sealants, frost barrier, and dimensions. Provide manhole channel construction data.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE ITEMS

All precast concrete shall meet ACI Standards for frost resistance and watertightness (ACI 318-16-4.5.1 and ACI 318-16-4.5.2).

- A. Precast Manhole Sections: Manhole super-structures shall be precast reinforced concrete of the dimensions indicated on the Plans conforming to ASTM Specification C478. Sections shall be installed with a flexible plastic gasket equal to or better than "Ram-Nek" as manufactured by K. T. Snyder Co., Houston, Texas, or sections may be fabricated to accept Tylox "0" rubber gaskets as manufactured by Hamilton Kent Manufacturing Co., Kent, Ohio. The casting and the outside of the brick work required to bring the rim to grade shall be plastered with at least 3/8" mortar, thoroughly troweled to leave a smooth waterproof exterior surface.

Manhole steps shall be forged aluminum safety type, alloy 6061, temper T6, or reinforced polypropylene plastic. Steps shall be cast or anchored into walls of

precast sections to form a ladder with a distance of 12 inches between steps when aluminum steps are used, cast aluminum with bituminous paint.

The Contractor shall furnish the name of the manufacturer to the Engineer prior to commencing work.

- B. Precast Manhole Bases: Manhole bases shall be precast reinforced concrete of the dimensions indicated on the Plans conforming to ASTM Specification C478. Bases shall be placed on a well compacted layer of crushed stone.

Jointing system for pipe entering or leaving manholes shall be a flexible manhole sleeve cast in the base. A stainless steel pipe clamp shall be used to fix the pipe into the sleeve. All materials shall meet or exceed rubber quality standards of ASTM C-443 and C-361.

For manhole bases, a minimum of 4 inches shall be allowed between pipe invert and inside bottom of base for construction of brick inverts.

Where precast bases are used for drop manholes, a 6-inch concrete slab is to be placed under the base section large enough to receive the concrete encased drop pipes. Provide suitable ties between manhole sections and drop pipe encasements.

Prior to ordering precast manhole bases, all angles between incoming pipes are to be field checked to incorporate possible line changes required in the field layout.

- C. Outlet Control Structures: Provide precast concrete unit, covers, weirs, orifices, and appurtenances as required or shown on the drawings. (Not required.)
- D. Other Precast Items: Reinforced precast sections for other items shall meet the requirements of this Section. Shop drawings and detailed structural computations must be provided to demonstrate that the precast items will withstand an external equivalent fluid pressure of 105 lb/c.f. and an internal equivalent fluid pressure of 65 lb/c.f. The fluid pressure shall be assumed to act from the base elevation of the structure to the proposed finish grade of the structure.
- E. Precast Concrete Grease Trap: The precast concrete grease trap shall meet the requirements of the drawings and Section D of this specification. Shop Drawings are required for the grease trap. (Not required.)
- F. Precast Concrete Water Quality Units: (Not in contract.)

2.02 CASTINGS

- A. The Contractor shall furnish all cast iron frames, grates, and covers conforming to the details shown on the Drawings, or as hereinbefore specified.

- B. Castings shall be at least Class 30 conforming to the ASTM Standard Specifications for Gray Iron Castings, Designation A-48-64.
- C. Before being shipped from the foundry, castings shall be given two coats of coal-tar-pitch varnish, applied in a satisfactory manner so as to make a smooth coating, tough, tenacious and not brittle or brittle with any tendency to scale off.
- D. Sanitary sewer covers shall have the name "Sewer" cast therein. Storm sewer covers shall have the name "Storm" cast therein. Lettering shall be a minimum 3" height, raised lettering.
- E. The manhole castings for storm drains, roadway or traffic areas shall be the equal of the Portland standard non-perforated manhole frame and cover M 24 x 8-S weighing approximately 425 pounds as manufactured by the Etheridge Foundry Company, or Catalog No. LK610 as manufactured by the E. L. LeBaron Foundry Company.

The manhole castings for sanitary sewers vary with height. When the manhole height is over 6'-0", a 22-inch diameter opening is required. When the manhole height is less than 6'-0", a 28-inch diameter opening is required.

1. Standard Frames and Covers:

- a. 22" diameter opening: Neenah Foundry Model R1670 frame and Type C cover with self-sealing application.
- b. 28" diameter opening: Neenah Foundry Model R1754B frame and Type C cover with self-sealing application.

2. Waterproof Locking Frames and Covers:

- a. 22" diameter opening: Neenah Foundry Model R1755-F frame and Type C cover.
- b. 28" diameter opening: Neenah Foundry Model R1755-H frame and Type B cover.

- F. Catch basin castings shall have frames conforming to S 24" x 8 square by Etheridge with a 24" square type M bicycle safe grate or catalog LK 124 (LeBaron) unless otherwise noted on the drawings.

2.03 MORTAR

- A. Mortar used to adjust rims and covers for manholes shall consist of the following materials and proportions by volume: 1 part of Portland cement; 1/4 part lime hydrate; and 3 parts sand.
- B. For precast reinforced concrete manholes, mortar for invert construction shall consist of the following materials and proportions by volume: 1 part Portland

cement and 2 parts sand. Quantity of water in mixture shall be sufficient to produce a stiff, workable mortar, but in no case shall exceed 5-1/2 gallons of water per sack of cement.

2.04 BRICK

Brick for manholes shall meet Standard Specifications for Sewer Brick, AASHTO Designation M-91-42, Grade SA, Size No. 1 wire cut. Any brick rejected by the Engineer as unsuitable shall be immediately removed from the work.

2.05 VENTS

Vents, when required by the Contract Drawings, shall be constructed of galvanized piping of the diameter indicated on the plans with a minimum size of 4" with threaded joints. The top of the vent shall have a minimum of 12 square inches of screened opening to permit air passage, and a cap to prevent extraneous material from entering the vent. The cap shall not interfere with the air passage. Vents shall be connected to appurtenances using a cast in wall pipe.

2.06 SITE CONCRETE

Site concrete shall meet the requirements set forth below:

A. Aggregate: The aggregate shall conform to the Standard Specifications for Concrete Aggregates, ASTM Designation C-33, as revised.

(a) Sand shall be a medium sand with a fineness modules of 2.60 - 2.90.

(b) Coarse aggregate shall not exceed 1-1/2 inches for mass concrete.

B. Cement: All cement shall be a Portland Cement conforming to the requirements of Standard Specifications of the American Society for Testing Materials, Designation C-150, as revised, Type II. An air entraining agent, approved by the Engineer, shall be used.

C. Proportioning Concrete:

Maximum Size Coarse Aggregate (Inches)	Air Content Percent by Volume
1-1/2, 2, or 2-1/2	5 +/- 1
3/4 or 1	6 +/- 1

The strength of the concrete shall be fixed in terms of water-cement ratio in accordance with trial batches of the materials to be used. All concrete placed under this Specification shall be mixed in the ratio not to exceed six (6) U.S. gallons of water per sack of cement, including surface water carried by the aggregate in each case. The Contractor shall determine the approximate

amount of surface water contained in the aggregate, and make proper allowance. Concrete shall have a minimum 28-day strength of 3750 psi. The Contractor shall submit the proposed mix proportions to the Engineer for approval ten (10) days prior to placing concrete. Copies of recent test results for the proposed mix design shall also be submitted.

2.07 REINFORCEMENT

The Contractor shall submit detailed shop drawings for concrete reinforcement in accordance with ACI 318 and ACI 315. The steel shall be deformed Grade 60 bars which conform to ASTM 615, ASTM 616, or ASTM 617. Supports, spaces, and chairs shall permit the steel to be supported in accordance with ACI 318.

2.08 BITUMASTIC COATING

Bitumastic coating, when required, shall consist of two (2) coats of Mobil Corp. Coal Tar Coating or approved equal.

2.09 INSULATION

Insulation, when required by the Drawings, shall be Styrofoam SM or TG as manufactured by the Dow Chemical Company or equal.

Material submitted shall have a K factor of .20 @ 75 degrees by ASTM C518-70, 2-lb. density by ASTM C303-56, compressive strength of 30-lb. by ASTM D1621-64 and a water absorption of less than .05% by ASTM C272-53 and meet Federal Specification HH1524B Type II, Class B.

The Contractor shall coat the insulation material in accordance with the manufacturer's instructions.

2.10 TREATMENT OF INTERIOR SURFACES

All interior surface of cast in place concrete structures shall have a liquid hardener applied. The application shall consist of two coats of VANDEX or approved equal installed in accordance with manufacturer's instructions including requirements for surface preparation. Catalog cuts of the hardener shall be submitted to the Engineer for approval.

2.11 TREATMENT OF EXPOSED SURFACES

All exposed exterior concrete surfaces shall have a "rub finish". Structures and appurtenances shall have an applied coating of Tnemec Series 104 H5 Epoxy applied in 2 coats to achieve a minimum dry film thickness of 18 mils.

2.12 FROST BARRIER FOR SANITARY SEWER MANHOLES

UV Resistant, high grade polyethylene, minimum thickness six (6) mils.

2.13 JOINT SEALANTS

- A. Butyl Rubber Sealant: One-inch diameter strips equal to that manufactured by "Kent Seal".
- B. Butyl Rubber Caulking: Conform to AASHTO M-198 Type B.

PART 3 - EXECUTION

3.01 SETTING OF PRECAST STRUCTURE

- A. General: All appurtenant structures shall be set level on compacted material as specified in Section 2 of these Specifications and as shown on the Plans. Place barrel and top sections in the appropriate height combinations. The excavation shall be dewatered until all anchorage is in place and the backfill has been brought to grade with compacted materials pursuant to Section 02223. Plug all lifting holes inside and out with non-shrink grout.
- B. Manhole Channels: Channels shall be constructed in all sanitary sewer and storm drain manholes in accordance with the details shown on the Plans by a mason whose qualifications meet the approval of the Engineer or a preformed manhole channel: "FIBERLINER" or equal. The sides shall be raised by brick masonry construction from the spring line perpendicular to the height of the crown of the pipe. Where changes in directions are made at manholes, the invert shall be shaped with as great a radius as possible, and to the complete satisfaction of the Engineer. Brick shall be carefully laid to present a smooth surface as indicated on the Plans and to the satisfaction of the Engineer.
- C. Pipe Connections:
 - 1. Stubs in Manholes: Stubs placed as specified and indicated on the Drawings shall be short pieces cut from the bell ends of appropriate pipe and shall have compatible watertight stoppers. Stubs shall be set accurately to the required line and elevation and encased in the structure masonry as indicated on the Drawings.
 - 2. Wall Sleeves and Castings: Wall sleeves and castings as specified and indicated on the Drawings shall be accurately cast to the required location and elevations as indicated on the Drawings.
- D. Steps: Manhole and appurtenant steps shall be cast in the wall and installed in a straight vertical alignment.
- E. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Keep clear of aggregate. Point joints inside and out with butyl caulk.

- F. Frost Barriers: Wrap each manhole to not less than five (5) feet below grade, with a minimum of three layers of six (6) mils each of the polyethylene.
1. Continue excavation and place precast sections down to a minimum of five (5) feet below finish grade if required. Fill below manhole invert with 3000 psi concrete if required.
 2. Clean manhole exterior of all dirt and remove any protrusions.
 3. Apply a six (6) inch wide vertical strip of bituminous waterproofing adhesive from the top of manhole to the frost barrier depth (minimum five (5) feet below grade).
 4. Start poly wrap at adhesive strip and proceed around manhole continuously, overlapping adhesive strip a minimum of 24 inches on the final layer.
 5. Tuck and pleat poly at top in a continuous manner, minimizing size of folds. Extend poly past top of manhole frame and temporarily tuck remainder inside frame, until final backfill and paving.
 6. Paved areas: Cut poly flush with manhole rim after pavement is in place.
 7. Unpaved areas: Pull loose ends of poly together, remove excess air and tie off end with galvanized wire. Bury with manhole below grade.

3.02 ALTERATIONS TO EXISTING MANHOLES

Existing manholes and catch basins to be altered shall be reconstructed as indicated on the Plans or as directed by the Engineer. Adjusting to grade or connecting to an existing pipe stub is not considered an alteration.

Alterations covered include, but are not limited to, adjustments to manhole invert channel caused by new pipe connections or removal of existing pipe connections, and removal and plugging of existing catch basin lead and replacing with a new lead connection conforming to the appropriate section of the Specifications contained herein.

3.03 ADJUSTING EXISTING MANHOLES AND CATCH BASINS

Existing manholes and catch basins to be adjusted to grade shall be reconstructed to the required grade. The existing frames, grates, and covers shall be re-used unless otherwise directed.

The existing structure shall be dismantled to a sufficient depth to allow reconstruction conforming to the standard details.

Adjustment will take place just prior to placing of surface pavement for adjustments of the frame and cover. Adjustments that require dismantling and reconstruction of the super structure shall be accomplished at the time of subgrade preparation. Pavement that is removed for this adjustment shall be cut square, tack coated, and capped with 2" of bituminous concrete. No separate payment will be made for furnishing the bituminous cap.

Each structure that is adjusted shall be cleaned of accumulated silt, debris, or foreign matter prior to final acceptance of the work.

3.04 ABANDONING EXISTING CATCH BASINS AND MANHOLES

Existing catch basins and manholes designated to be abandoned shall be removed to a depth of one (1) foot below the subgrade line, unless otherwise indicated on the Plans or directed by the Engineer. The existing pipes shall be plugged with concrete and brick masonry and the catch basins and manholes shall be filled with heavy gravel satisfactorily compacted in 9-inch lifts. Prior to backfilling, the sump shall be pumped and cleaned of all water and foreign material.

3.05 MANHOLE ADAPTERS

When altering an existing manhole or where a pre manufactured manhole adapter cannot be installed in precast manhole sections, the Contractor shall use a Fernco, or equal, concrete manhole adapter. The adapter shall be designed to provide a positive, watertight seal between the manhole and pipe and shall be mortared in place with Five Star grout or approved equal non-shrink grout.

3.06 SETTING MANHOLE AND CATCH BASIN FRAMES AND GRATES

When altering an existing manhole or where a pre-manufactured manhole adapter cannot be installed in precast manhole adapter cannot be installed in precast manhole sections, the Contractor shall use a Fernco, or equal, concrete manhole adapter. The adapter shall be designed to provide a positive, watertight seal between the manhole and pipe and shall be mortared in place with Five Star grout or approved equal non-shrink grout.

Set to final grade as shown on drawings. Use pavement grade in paved areas, set flush with finish grade in yard areas or as noted on plans. Set manhole frames and covers to final grade only after binder pavement has been installed and after final grading in gravel areas.

3.07 INSTALLATION OF GREASE TRAPS (NOT IN CONTRACT.)

The grease trap shall be installed on a compacted aggregate base as shown on the drawings and backfilled with select backfill.

All piping connections shall meet the requirements of Section 02730 of these specifications.

3.08 INSTALLATION OF WATER QUALITY UNITS (NOT IN CONTRACT)

PART 4 - TESTING

4.01 GENERAL

All sanitary manholes, wetwells, septic tanks, holding tanks, grease traps, pump stations, water quality units and other appurtenant structures shall be tested as to water tightness. All manhole tests must be observed and certified by the Portland Public Works Department. The Contractor is responsible for coordinating the Portland Public Works Department certification. If the initial test fails a retest shall be required. The Contractor has the option of either of the following methods:

- A. Water Test: The groundwater near the manhole or appurtenances shall be lowered below the manhole base. Maintain groundwater at or below this level throughout test. The inlet and outlet of the structure shall be plugged by watertight plugs furnished by the Contractor, and the manhole shall be filled with water to the Top of Core. The water shall remain for sufficient time for the absorption into the concrete pipe to have been substantially completed and then refilled. The amount of water loss from the manhole shall then be determined. The rate shall not exceed the one (1) gallon per vertical foot per 24 hours. The minimum test period shall be 8 hours. Obvious leaks shall be repaired by the Contractor by excavating outside the structure, if required, at no cost to the Owner.
- B. Vacuum: The manholes shall be vacuum tested by a method and apparatus subject to the prior approval of the Engineer. Vacuum testing shall be performed in the following manner:

The manhole shall be fully assembled, including all pipe connections into the structure. The manhole shall be in its final location and shall not have been backfilled prior to the performance of the test.

All lift holes shall be plugged with a non-shrinking mortar, as approved by the Engineer.

The seal between the manhole sections shall be in accordance with ASTM C923.

The Contractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

With the vacuum tester set in place:

- Inflate the compression band to effect a seal between the vacuum base and the structure.
- Connect the vacuum pump to the outlet port with the valve open.
- Draw a vacuum to 10" of Hg. and close the valve.
- The test shall pass if the vacuum remains at 10" Hg. or drops to 9" Hg. in a time greater than one minute. If the manhole fails the initial test, the

VOA-PEAKS ISLAND

**1/2003
DHAI JN2301**

Contractor shall locate the leak and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material.

Any appurtenant structure which shows obvious infiltration, whether tested or not, shall be sealed to eliminate said infiltration.

C. Repairs:

- Determine causes of all leaks and make repairs. Contractor is required to provide all work for repairs.
- Perform repairs using methods and materials approved by the Engineer. Remove and replace or reconstruct manhole if required. Remove and replace any defective sections.

END OF SECTION 02605

SECTION 02660 - WATER DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the water systems. This shall include, but not be limited to the following: pipe and fittings for site water line including domestic water line and fire water line, valves and fire hydrants, set lines, elevations, and grades for water distribution systems work and control system for duration of work including careful maintenance of benchmarks, property corners, monuments, or other reference points. The following protocol applies to these specifications:

1. The construction shall meet the requirements of drawings and specifications of the local water district.
2. If the specifications conflict or are more stringent than the drawings, the specifications given.
3. If water district or water company specifications conflict with drawings or general specifications, the local water district or water company requirements shall govern.

All installations of valves and piping must be observed by the Portland Water District before burial. Disinfection or testing shall require 48 advance notice to the local utility and shall be observed by representatives of the Owner and the local water utility.

Prior to ordering the materials or commencing work, the contractor shall schedule a meeting with the Owner, the Architect, and the Portland Water District to review the project.

1.02 RELATED SECTIONS

- A. Section 02222 - Excavation, Backfilling and Compacting for Utilities.
- B. Section 02227 - Aggregate Materials.
- C. Section 02605 – Water, Sewer, Storm and Catch Basin Structures.
- D. Local Governing Authority and Code Requirements.
- E. All Necessary Construction Permits.
- F. The public utility for water is the Portland Water District. All materials, installation, and workmanship will comply with the requirements specified in this section, the requirements of the Public Utilities Commission and the

Portland Water District (as appropriate). Where a more stringent standard exists, the more stringent standard shall apply. The outline specifications and submittal and general requirements of the respective water districts are appended to this section.

1.03 REFERENCE

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- B. ANSI/ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 Kg) Rammer and 18-in. (457 mm) Drop
- E. ANSI/ASTM D2466 - Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
- F. ANSI/AWS A5.8 - Brazing Filler Metal.
- G. ANSI/AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe Fittings for Water.
- H. ANSI/AWWA C105 - Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquid.
- I. ANSI/AWWA C111 - Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings.
- J. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- K. ANSI/AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.
- L. ANSI/AWWA C502 - Dry Barrel Fire Hydrants.
- M. ANSI/AWWA C504 - Rubber Seated Butterfly Valves.
- N. ANSI/AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS.
- O. ANSI/AWWA C509 - Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems.

- P. ANSI/AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.
- Q. ANSI/AWWA C606 - Grooved and Shouldered Type Joints.
- R. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water.
- S. ASTM B88 - Seamless Copper Water Tube.
- T. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- U. ASTM D2241 - Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- V. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
- W. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- X. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- Y. ASTM D3139 - Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- Z. ASTM D3035 - Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.
- AA. AWWA C901 - Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ½ inch through 3 inch, for water.
- BB. UL 246 - Hydrants for Fire - Protection Service.

1.04 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, hydrants, valves and accessories including ASTM designations, AWWA certifications and UL labels as required.
- B. Manufacturer's Certificate: Certify that products meet or exceed state or local requirements.
- C. Schedule/Service Provisions: Submit schedule for extension of the water main. Include written description of the method of providing temporary

service to the users within the work area and method of notifying District, City and residents.

- D. Submit copies of proposed meeting and meeting minutes from the Preconstruction Conference with the Portland Water District.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of piping mains, valves, connections, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with utility company and/or municipality requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Alignment shall be certified to be within 4" horizontally and 2" vertically of the design grade.

PART 2 - PRODUCTS

2.01 PIPE

- A. Pipe sizes less than 3" that are installed below grade and outside building shall comply with the following:
 - 1. Seamless Copper Tubing: Type "K" roll form to comply with ASTM B88-62. Fittings shall be brass compression manufactured by Ford, Mueller, or McDonald.
- B. Pipe: Sizes 4" and larger shall comply with the following:
 - 1. Ductile Iron Water Pipe: In accordance with ANSI A21.51 (AWWA C151) ductile iron pipe shall be double cement mortar lined in accordance with AWWA C104. Joints shall meet requirements of AWWA C111. Push-on joint pipe to be supplied with gaskets and gasket lubricants. Pipe shall be 62-42-10 strength; 60,000 psi minimum tensile strength; 42,000 psi minimum yield strength, pipe 10" diameter or smaller shall have a Class 52 wall thickness. The bituminous coating used for the sealing of the cement mortar lining shall be of a quality that will not have a deleterious effect on the quality, color, taste or odor of potable water.

- C. Ductile Iron Fittings: Fittings shall be manufactured by Tyler or Griffin and material shall be ASTM A536-72 mini grade 70-50-05, in accordance with AWWA C110. Fittings shall be cement lined (AWWA C104-74). Interior seal coated (AWWA C104-74) and exterior bituminous coated. Mechanical joint with accessories furnished; D.I. glands, gaskets, Cor-Ten T-bolts and nuts; Class 350 pressure rating in accordance with AWWA C110. Thickness shall be equal to ductile iron pipe Class 53 in accordance with AWWA C151. All plain end fittings shall be beveled-edged (60°) to fit slip-joint fitting and shall be long body design.
- D. Retainer Glands and Joint Retainers: Retainer glands shall have a minimum working pressure rating as follows:
- 1) 4" - 350 psi (pounds per square inch)
 - 6" - 350 psi
 - 8" - 250 psi
 - 12" - 200 psi

Retainer glands will be Megalug or Uniflange Series 1400 meeting the working pressures stipulated above.

- E. Bolts and Nuts: General description of properties required.
1. Stainless Steel: Type 316 - contains the addition of molybdenum to the nickel-chromium steels.

Specific Chemical Composition:

a)	Carbon	-	0.08% max.
b)	Manganese-		2.00% max.
c)	Silicone	-	1.00% max.
d)	Phosphorus-		0.04% max.
e)	Sulphur	-	0.03% max.
f)	Chromium	-	16-18.00%
g)	Nickel	-	10-14.00%
h)	Molybdenum-		2-3.00%
i)	SAE No.	-	30316
j)	ASM No.	-	5361A, 5524A, .5573, 5648B, 5690D

2. Cor-Ten Steel: Trade name for cold formed T-head bolts containing alloying elements such as copper, nickel, and chrome.

Specific Chemical Composition:

a)	Carbon	-	0.2% max.
b)	Manganese-		1.25% max.

- c) Sulphur - 0.05% max.
- d) Nickel - 0.25% min.
- e) Copper - 0.20% min.
- f) Combined - 1.25% min.
(Ni,Cu,Cr)

- F. Resilient Sealed Gate Valve: Valve shall meet all provisions of ANSI/AWWA C509-87 specification as latest revised; shall have a smooth unobstructed water way which shall be a minimum of the nominal diameter of the valve. Valve ends to be specified and shall be furnished with Cor-Ten (or equal) bolts and nuts. Valves for the VOA-Peaks Island project shall be Mueller R/W, Metro Seal 250 RS, or Mueller Resilient Wedge Model 2360, American Flow Control 2500.
- G. Valve Boxes: The valve box bottom section shall be slide-type with bell-type base. The valve box top section shall be slide-type. It shall have a top flange, but shall not have a "bead" or bottom flange. The valve box cover shall be a 2" drop-type cover to fit the 7-1/4" opening of the top section. The valve box extension shall be slide-type with a minimum 3" belled bottom. Material shall be cast iron or ductile free from defects. Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness. A minimum thickness of 12" inches of height adjustment shall be provided in the valve box.
- H. Service Box and Rod:
1. Service Box Specification:

Shall be 1.0" (in.) I.D. black iron or steel pipe with top having N.P.I. threads for 1.0" screw-on cover.

Shall be Erie style with 5-6' (ft.) slide-type riser.
 2. Service Box Cover Specifications:

Shall be Quincy type (heavy duty) cover that screws on (1.1 above).

Shall be tapped with a 1" rope thread with a solid brass plug with pentagon operating head.
 3. Service Box Foot Piece Specifications

The standard foot piece shall be heavy-duty (Ford style or equal) cast iron design.

The large, heavy-duty foot piece shall have an arch that will fit over 2" ball-valve curb-stops.

4. Service Rod Specifications

Shall be 24"-30" in length and have a self-aligning design.

Shall be of circular dimension and constructed of 1/2" dia. min. #304 stainless steel.

Shall have a yoke design that is an integral part of the rod.

The curb-stop attachment point shall be a brass cotter pin.

The rod "wrench-flat" shall have a minimum thickness of 1/4" tapered to 1/16" and width of 5/8" or 1/2".

I. Tapping sleeves shall be as approved by the local water company. Options include the following:

Tapping sleeve shall be mechanical joint with recessed outlet flange for tapping valve; conform to AWWA C207, Class D, with rated maximum working pressure of 200 psi. The side rubber gaskets shall be rectangular in cross-section and fit into grooved channels in the casting. These gaskets shall extend the entire length of the sleeve and shall not require cutting or trimming to match MJ end gaskets. Tapping sleeve shall be AB-CD pattern to permit use of plain rubber and duck-tipped gaskets for various O.D. piping sizes.

Mechanical joint with accessories furnished; glands, gaskets, and Cor-Ten T-bolts and nuts or equal. All flange bolts shall be 316 stainless steel or silicone bronze. Interior and exterior to be bituminous coated with a minimum of 4 mils dry film thickness. The sleeve shall be provided with a 3/4" F.I.P.T. test port and brass plug.

The tapping sleeve shall be Romac Industries Inc., 304 Stainless Steel Tapping Sleeves with ductile iron flange. Flange bolts shall be stainless steel or silicon bronze. The sleeve shall be rated for a maximum, working pressure of 200 psi. The interior and exterior shall be bituminous coated with a minimum of 4 millimeters dry film thickness. The sleeve shall be provided with a 3/4" F.I.P.T. test port and plug.

J. Corporation Stop:

1. 3/4" - 1" shall be a ball valve design with a brass ball that is Teflon (or equal) coated. 1-1/2" - 2" shall be ball-corp design with an on-off identification mark on the operating nut
2. The valve shall be supported by 2 seats for water-tight shut-off in either direction.

3. The valve shall have a full port opening.
4. The body of the corporation-stop shall be of heavy-duty design.

K. Specifications for Services:

1. Material

Copper Tubing: ASTM B88, Type K, Seamless, Annealed, 2 Inch Diameter Maximum.

2. Fittings

Brass Compression Manufactured by Ford, Mueller or McDonald.

L. Curb Stops

1. For sizes 3/4" - 2", the valve shall be a brass ball that is Teflon (or equal) coated.
2. The ball shall be supported by seats that are water tight in either direction.
3. The valve shall have a full-port opening.
4. The valve shall open with ¼ turn (90°) with a check or stop.
5. The valve shall not have a drain.
6. The valve stem shall have 2 "o" rings and a bronze ring lock that holds the stem solidly in the valve body.
7. The valve body shall be a heavy duty design.

M. Hydrant: All hydrants shall be "break away" type. The hydrants shall meet the requirements of the Portland Water District.

Wrap barrel with 3 layers of polyethylene. Paint per District requirement. One repair kit shall be supplied (minimum) or one repair kit for every 3 hydrants. All hydrants shall be "Non drainable" from the manufacturer. The hydrant shall have an epoxy coated base, and open left. The nozzles shall have National Standard Threads. Operating nut shall be 1-15/16".

All material used in the production of fire hydrants for ordinary service shall conform to the specifications designated for each material listed in AWWA Standard C502.

- N. Joint Restraint: Place thrust blocking consisting of 2,500 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, hydrants, valves or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs./sq. ft. when water main pressure is 100 psi.

MINIMUM THRUST BLOCKING BEARING AREAS

<u>Pipe Diameter</u>	<u>Tees Sq. Ft.</u>	<u>90 Deg. Bend Sq. Ft.</u>	<u>45 Deg. Bend Sq. Ft.</u>	<u>22 Deg. Bend Sq. Ft.</u>
4"	1.0	1.0	1.0	1.0
6"	1.5	2.0	1.0	1.0
8"	2.5	3.5	1.8	1.0
10"	4.0	5.5	2.8	1.5
12"	6.0	8.0	4.0	2.0
14"	8.0	11.0	5.5	3.0
16"	10.0	14.2	7.0	4.0

- O. Rigid Insulation: Installation, when required by the Drawings, shall be Styrofoam SM or TG as manufactured by the Dow Chemical Company or equal.

Materials submitted shall have a K factor of .20 @ 75 degrees by ASTM C518-70, 2-lb. density by ASTM C303-56, compressive strength of 30-lb. by ASTM D1621-64 and a water absorption of less than .05 meet Federal Specifications HH1524B Type II, Class B.

- P. Temporary Water Service: Provide temporary water service as necessary during the site work and building construction. Use materials as approved by the Portland Water District as appropriate.

PART 3 - EXECUTION

3.01 WATER DISTRIBUTION SYSTEM

- A. Building Service Lines: Reconnect all building services between the main and curb stop.
- B. Regrading: Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.
- C. Pipe Laying, General
 - 1. Do not lay pipe on unstable material, in wet trench, or when trench or weather conditions are unsuitable.
 - 2. Support pipe laid in fill area at each joint, by brick or concrete piers carried down to solid undisturbed earth.

3. Do not lay pipe in same trench with other pipes or utilities.
4. Hold pipe securely in place while joint is being made.
5. At least one foot six inches shall separate water lines vertically from other pipes or underground structures.
6. Where water pipes cross sanitary sewers or are laid parallel and adjacent to them, bottom of water pipe shall be separated by not less than one foot six inches above top of sewer and ten feet horizontally.
7. Do not work over, walk on, pipes in trenches until covered by layers of earth well tamped in place to a depth of 12 inches over pipe.
8. Full length of each section of pipe shall rest solidly upon pipe bed with recesses excavated to accommodate bells or joints. Do not lay pipes on wood blocking.
9. Install water lines to avoid storm and provide the specified clearing to sanitary sewer lines.
10. Clean interior of pipe thoroughly of all foreign matter before installation. Keep pipes clean during laying operations by means of plugs or other methods. When work is not in progress, securely close open ends of pipe and fittings to prevent water, earth, or other substances from entering.
11. Tees, plugs, caps, bends and hydrants on pipe installed underground shall be anchored. Pipe clamps and tie rods, or concrete thrust blocks may be used. Type of pipe and soil conditions determine methods. Anchor water mains as specified in NFPA No. 24.
12. Close pipe openings with caps or plugs during installation. Tightly cover and protect equipment against dirt, water and chemical, or mechanical injury. At completion of all work thoroughly clean exposed materials and equipment.

D. Laying Ductile Iron Pipe

1. Installing Pipe: Lay pipe in accordance with AWWA C600.
2. Joints:
 - a. Mechanical: AWWA C111. Provide sufficient quantities of bolts, nuts, glands and gaskets for each socket opening on pipe and fittings.

- b. Push-On: Apply thin film of lubricant to gasket and place in proper position in contour of bell. Insert beveled end of joining pipe and make contact with gasket. Force beveled end of pipe to bottom of bell without displacing gasket. Do not caulk. Only lubricant furnished by manufacturer of pipe shall be used.
- c. Flanges: AWWA C115. Install only in concrete pits. Must be watertight and set not less than six inches from walls to floor.

E. Setting of Valves:

1. Install valves as indicated on the Drawings and support on concrete pads with valve stem vertical and plumb. For the Skowhegan Middle School, hydrant tees shall be used. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body.
2. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
3. Clean valves and curb stops interior before installation.

F. Setting of Fire Hydrants

1. Install fire hydrant assemblies if applicable as indicated on Drawings in vertical and plumb position with steamer nozzle pointed toward building unless otherwise directed by local authorities. Hydrant tees shall be used (with directly adjacent valving). Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil or concrete blocking. Place minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.
2. Clean interior of hydrants of all foreign matter before installation.
3. Set center of each hydrant not less than two (2) feet nor more than six (6) feet back of edge of road or face of curb. Set barrel flange not more than two (2) inches above finished grade and eighteen (18) inches between center of steamer nozzle and finished grade.

G. Pipe Sleeves: Vacant.

3.02 DISINFECTION

- A. Notify the Water District and obtain their concurrence at least 48 hours prior to disinfection of the water system.

- B. Disinfect distribution system with chlorine before acceptance for domestic operation in accordance with the following procedures:
1. The only acceptable method of disinfection shall be the continuous Feed Method of chlorine.
 2. The rates of introduction of the chlorine and water shall be so proportioned that the chlorine concentration in the water is maintained at a minimum of 50 mg/l available chlorine.
 3. During the application of the chlorine, valves shall be operated in such a manner that the treatment dosage shall not flow back into the line supplying the water. The operation of the valves shall be done under Water District supervision.
 4. The chlorinated water shall be retained in the main for at least 24 hours. At the end of the 24-hour period, the treated water shall contain no less than 25 mg/l available chlorine.
 5. At the end of the retention period, the chlorinated water shall be flushed from the main until the chlorine in the water leaving the main is no higher than the normal residual in the system, or less than 1 mg/l.
 6. All bacteriological tests shall be collected in sample bottles and shall be tested at a State certified laboratory. All costs for disinfection of the main as well as bacteriological costs shall be borne by the Contractor.

3.03 TESTING OF WATER DISTRIBUTION SYSTEM

- A. Notify the Water District at least 48 hours prior to testing the water system.
- B. Test water distribution system pipe sizes installed below grade and outside building in accordance with following procedures:
1. Before pressure testing the water main, air shall be completely expelled from the pipe. If permanent air valves are not located at all high points, corporation stops shall be installed at all high points so that the air can be expelled as the pipe is being filled. After completion of the test, the corporation stops shall either be removed or left in place at the discretion of the Water District.
 2. If fire hydrants are installed on the new water main, the test shall be conducted against a closed hydrant valve.
 3. The test pressure shall be 1.5 times the static pressure at the lowest point of elevation of the line and shall not be less than 150 psi.

4. The test shall not exceed the pipe or thrust restraint design pressures, nor exceed twice the rated pressure of the valves or hydrants and shall not exceed the rated pressure of the valves, if resilient - sealed butterfly valves are used.
5. Water, only, shall be used to bring the main to the required test pressure. The type of pump shall be approved by the local water district.
6. The test shall be of at least two hours in duration. A leakage test shall be conducted immediately after the pressure test.
7. After the pressure test period, water shall be pumped into the main to bring the pressure back up to the initial test pressure. No pipe installation shall be accepted if the leakage is greater than that listed in Table 1 attached to this Section.

If any pipe installation shows a leakage greater than that specified in Table 1, the contractor at his own expense shall locate and repair the leak until it is within the specified allowance.

The pressure and leakage tests shall be conducted under the Water District's observation.

END OF SECTION 02660

Table 1

Allowable Leakage for Mechanical-Joint or Push-On Joint Pipe in 18-ft. Nominal Lengths*

Avg. Test Pressure (psi)	Pipe Size - inches															
	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
	Allowable Leakage per 1,000 ft-gph															
250	0.48	0.71	0.95	1.42	1.90	2.38	2.85	3.33	3.80	4.28	4.75	5.70	7.13	8.55	9.98	11.40
225	0.45	0.68	0.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50	5.40	6.76	8.11	9.46	10.81
200	0.42	0.64	0.85	1.27	1.70	2.12	2.55	2.97	3.40	3.82	4.25	5.10	6.37	7.61	8.92	10.19
175	0.40	0.60	0.79	1.19	1.59	1.99	2.38	2.78	3.18	3.58	3.97	4.77	5.96	7.15	8.34	9.54
150	0.37	0.55	0.74	1.10	1.47	1.84	2.20	2.58	2.94	3.31	3.68	4.41	5.52	6.62	7.72	8.83
140	0.36	0.53	0.71	1.07	1.42	1.78	2.13	2.49	2.84	3.20	3.55	4.26	5.33	6.40	7.46	8.53
130	0.35	0.51	0.69	1.03	1.37	1.71	2.06	2.40	2.74	3.08	3.42	4.11	5.14	6.16	7.19	8.22
120	0.33	0.49	0.66	0.99	1.32	1.64	1.98	2.30	2.63	2.96	3.29	3.95	4.93	5.92	6.91	7.89
110	0.31	0.47	0.63	0.94	1.26	1.58	1.89	2.21	2.52	2.83	3.15	3.78	4.72	5.67	6.61	7.56
100	0.30	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.40	6.31	7.21
90	0.28	0.43	0.57	0.86	1.14	1.42	1.71	1.99	2.28	2.56	2.85	3.42	4.27	5.13	5.98	6.84
80	0.27	0.40	0.54	0.80	1.08	1.34	1.61	1.88	2.15	2.42	2.69	3.22	4.03	4.84	5.64	6.45
70	0.25	0.38	0.50	0.75	1.00	1.26	1.51	1.76	2.01	2.26	2.51	3.01	3.77	4.52	5.28	6.03
60	0.23	0.35	0.46	0.70	0.93	1.16	1.39	1.63	1.86	2.09	2.32	2.79	3.49	4.19	4.89	5.58
50	0.21	0.32	0.42	0.64	0.85	1.06	1.28	1.49	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.10
40	0.19	0.28	0.38	0.57	0.76	0.95	1.14	1.33	1.52	1.71	1.90	2.28	2.85	3.42	3.99	4.56

* The allowable leakage for a pipeline is calculated by multiplying the leakage per hour per 1,000 feet at the average test pressure and for the diameter of pipe tested as obtained from the above table by the duration of the test in hours and the total length of the line being tested divided by 1,000. If the line under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

SECTION 02720 - STORM SEWER SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Site storm sewerage drainage piping, fittings, and accessories, and bedding.
- B. Connection or providing stubs of building storm water drainage system.
- C. Catch basins, paved area drainage, site surface drainage, and stormwater detention facilities.

1.02 RELATED SECTIONS

- A. Section 02222 - Excavation, Backfilling and Compacting for Utilities.
- B. Section 02270 - Slope Protection and Erosion Control
- C. Section 02605 - Sewer and Catch Basin Structures.
- D. Section 02730 - Sanitary Sewer Systems.
- E. Section 03300 - Cast-in-Place Concrete: Concrete type for catch basin, cleanout or head wall base pad construction.
- F. Local governing authority and code requirements.
- G. All necessary construction permits.
- H. Construction drawings.

1.03 REFERENCE

- A. AASHTO M294 and M252 - Corrugated Polyethylene pipe smooth interior.
- B. AASHTO M36 - Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.
- C. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- D. ANSI/ASTM A74 - Cast Iron Soil Pipe and Fittings.
- E. ANSI/ASTM C12 - Practice for Installing Vitrified Clay Pipe Lines.
- F. ANSI/ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.

- G. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- H. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- I. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- J. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 Kg) Rammer and 18-in. (457 mm) Drop
- K. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- L. ASTM C700 - Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated.
- M. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- N. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.04 DEFINITIONS

Bedding: Fill placed under, beside and directly beside pipe to midpoint of pipe, prior to subsequent backfill operations.

Special Backfill: Fill placed above bedding beside and over pipe prior to other backfill operations.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of pipes and mains, connections, catch basins, cleanouts and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 COORDINATION

- A. Coordinate the work with termination of storm connections outside building and trenching.
- B. The exact location of roof drain leaders shall be determined from the Architectural Plans or as shown on the drawings. The number and location of the roof drains may be different than shown in the site drawings. Verify roof drain lead locations with the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS AND ACCESSORIES

Provide any one of the following materials subject to any restrictions noted in this subsection or on plans including the requirement for a minimum Manning's "n" value of .0010. The contractor shall provide catalog cuts to the Owner and indicate the proposed materials to be used prior to ordering materials. The approval of the Owner must be obtained prior to ordering materials.

- A. Reinforced Concrete Pipe: Comply with requirements of ASTM C 76, Class IV unless another class type is indicated on Drawings, installed with flexible plastic (Bitumen) gaskets at all joints. Gaskets shall comply with AASHTO M-198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations. Reinforced concrete pipe is only permitted where shown on the contract drawings since the Manning's "n" is higher than 0.010.
- B. 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. PVC shall not be used for any drainage pipe which will be permanently exposed to sunlight.
- C. Corrugated Polyethylene Pipe (CPP), Smooth Interior: Shall conform with AASHTO Designations M294 and M252. Pipe must be installed in accordance with manufacturer's installation guidelines for culvert and other heavy duty drainage applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. (ADS) N-12 and HANCOR, INC. (HiQ smooth interior). CPP pipe shall not be used for any drainage pipe which will be permanently exposed to sunlight.
- D. Polyvinyl Chloride (PVC) Large Diameter Closed Profile Gravity Sewer Pipe, UNL-B-9: Pipe and fittings shall be installed in accordance with pipe manufacturer's installation guidelines. Acceptable manufacturer: CARLON (Vylon HC). PVC pipe shall not be used for any drainage pipe which will be permanently exposed to sunlight.
- E. Storm drain inlets, outlets, and culverts to include: (Not in contract).
- Rip rapped aprons.
 - Concrete flared inlets/outlets for pipes 24" or larger in diameter.
 - Field cut 45° mitered inlets and outlets for pipes smaller than 24" diameter.
 - Bar racks for pipes 24" diameter or larger.
- F. Manholes and Catch Basins Outlet Control Structures, Stilling, and Water Quality Unit's, where applicable, (Refer to Section 02605).

2.02 UNDERDRAIN SYSTEM

- A. Polyvinyl Chloride (PVC) Pipe: The perforated underdrain pipe with ring-tite joints and fittings shall comply with the requirements of ASTM F 758. Holes shall be 120 degrees double row, 1/4-inch diameter at 3 1/4 inch spacing. Underdrain pipe with a filter fabric sleeve shall not be acceptable. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM F 75B classification. Acceptable manufacturers shall be Johns-Manville "Ring-tite" Polyvinyl chloride.
- B. Filter fabric: Filter fabric shall be used around all underdrains as specified in Section 02222.

2.03 INLETS AND CATCH BASINS

- A. Lid and frame per details shown on plans.
- B. Catch basin and inlet structures shall be in accordance with Section 02605.
- C. The location of catch basins shall be accurately located by a registered land surveyor. Catch basins shall be located as follows:
1. Edge of frame 6" off face of curb where shown near sloped granite or bituminous concrete curblines.
 2. The center of aisle or parking modules when shown on plans.
 3. In other cases, verify with Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

Verify that trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on civil engineering drawings.

3.02 INSTALLATION - STORM DRAINS

- A. Installation shall begin downgradient and proceed upstream. The pipe shall be accurately laid to the line and grades to the satisfaction of the Engineer. The line and grade may be adjusted by the Engineer from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore.

Firmly support the pipe and fittings on bedding material as shown on the drawings or as specified by these specifications. Do not permanently support the pipe or fittings on saddles, blocking stones or any other material that 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 hand-shaped bed 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. Do not drive the pipe down to grade by striking it with a shovel, backhoe, or other unyielding object. After the pipe is set to line and grade, place and compact bedding material to hold the pipe alignment. Complete bedding.

The Owner or his representative reserves the right to check the elevations and alignment on any pipe for conformance with proposed line and grade. Installed grades shall be within the tolerance of plus or minus 0.02 feet from theoretical computed grades. Alignment shall be within a tolerance of plus or minus 0.04 feet. Pipe grade shall be defined as the invert elevation of the pipe. Pipe not meeting the grade tolerance or of poor alignment shall be adjusted by the Contractor.

- B. No pipe laying will be allowed to begin at any point other than a manhole or other appurtenance without the expressed consent of the Engineer. The interior of each length of pipe will be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had sufficient fine material placed and tamped about it to secure it firmly in place to prevent any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily, or for any reason whatsoever, the end of the pipe shall be carefully protected against dirt, water, or other extraneous material. Bedding shall be as shown on the Plans.
- C. The pipe shall be cut as necessary for appurtenances. In general, the pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.
- D. Clean interior of all pipe thoroughly before installation. When work is not in progress, open ends of pipe shall be closed securely, in a manner approved by the Engineer, to prevent entrance of trench water, dirt, or other substances.
- E. All joints shall be made in a dry trench in accordance with the manufacturer's recommendations. Take all necessary steps to prevent flotation of the pipe in the trench.
- F. A minimum of two (2) pipe lengths or pipe stubs shall be used between any two (2) appurtenances.
- G. When connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline service. Provide facilities for dewatering and for disposal of water removed from dewatering lines and excavations without damage to adjacent properties.

204

3.03 INSTALLATION-UNDERDRAIN SYSTEM

- A. Pipe Laying: Underdrain system pipe laying shall comply with the requirements of pipe laying described above under "Installation - Storm Drains."
- B. The underdrain pipe shall be installed with holes facing up unless otherwise noted on the plans.
- C. Filter fabric shall be used around all underdrains. The filter fabric shall completely encapsulate the piping and a bedding and backfill of 6" of 3/4 inch crushed stone. The use of fabric sleeves for underdrains without stone shall not be permitted.

END OF SECTION 02720

SECTION 02730 - SANITARY SEWER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

Furnish labor, materials, services, equipment, and other necessary items required for accompanying the construction of the sanitary sewer systems. This shall include, but not be limited to, the following:

Sanitary sewer drainage piping, fitting and accessories, cleanouts, and bedding.

Set lines, elevations, and grades for sanitary sewer system work and control system for duration of work, including careful maintenance of benchmarks, property corners, monuments, or other reference points.

Consult this specification for any changes, which become necessary as a result of encountering unforeseen changed conditions in the field.

1.02 RELATED SECTIONS

- A. Section 02222 - Excavation, Backfilling, and Compacting for Utilities.
- B. Section 02605 – Water, Sewer, Storm, and Catch Basin Structures.
- C. Construction Drawings.
- D. Local governing authority and code requirements.
- E. All necessary construction permits.

The public utility for the sewer is the City of Portland. All materials, installation, and workmanship will comply with the requirements specified in this section, and the requirements of the City of Portland. Part II of the Maine State Plumbing Code shall govern the sewer system serving the project. Where a more stringent standard exists, the more stringent standard shall apply.

1.03 REFERENCE

- A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ANSI/ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- C. ASTM D2321 – Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe, latest revision.
- D. ASTM D2412 – External Loading Properties.
- E. ASTM A746 - Ductile Iron Gravity Sewer Pipe.
- F. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

- G. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- I. ANSI A21.4 - Cement-Mortar Lining for Water.
- J. ANSI A21.11 (AWWA C111) – Rubber Gasket Joints.
- K. ANSI A21.50 (AWWA C150) – Ductile Iron Pipe Thickness.
- L. ANSI A21.15 (AWWA C115) – Threaded, Flanged Pipe.
- M. ANSI A21.20 (AWWA C110) – Cast and Ductile Iron Fittings.
- N. ANSI 1316.1 and ANSI A21.10 (AWWA C110) – Pipe Flanges and Fittings.

1.04 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.05 SUBMITTALS

- A. Product Data: Provide catalog materials indicating pipe, pipe accessories, and fittings.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.
- C. Manufacturer's Certificate: Certify that products meet or exceed ASTM designations and these specifications.

1.06 COORDINATION

- A. Coordinate the work with connection to municipal sewer utility service, the building sewer, and other utility trenching.

PART 2 - PRODUCTS

2.01 SEWER PIPE MATERIALS

- A. Polyvinyl Chloride Sanitary Sewer acceptable for all gravity lines except:
 - Where the horizontal separation to a water main is less than 10 feet;
 - When the vertical separation is less than 18";
 - Where sheeting is used;
 - Where peat or soft clay is encountered.

1. Pipe and fittings (8-inch to 15-inch diameter) 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. Nominal laying length shall be 12 ½ or 20 feet.
 2. Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant. Gaskets shall comply with ASTM F477 and D3212.
 3. Corrugated Polyvinyl Chloride sewer pipe and fittings shall comply with ASTM F 949. Pipe must be marked with manufacturer's name, pipe size, cell classification and ASTM F 949. Pipe must be marked with manufacturer's name, pipe size, cell classification and ASTM F 949 Classification. Pipe must be installed per the manufacturer's installation requirements. Acceptable manufacturer: CONTECH, INC. "A-2000" PVC sewer pipe or Owner-approved equivalent.
- B. Ductile Iron Sanitary Sewer: Pipe and fittings shall comply with requirements of ductile iron pipe described under "Section 02660, Water Distribution Systems."
- C. Polyvinyl Chloride Pressure Sewer:
1. Pipe and fittings shall comply with ASTM D 2241, rated SDR 18 or ASTM D1784 and shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 2241 or D1784 classification.
 2. Joints shall be integral gasketed joints formed on a continuous pipe length, utilizing elastomeric seal such as "Ring Tite" as manufactured by Johns Manville Company and comply with ASTM D3131.
- D. Manholes (Refer to Section 02605).

2.02 CLEANOUTS

- A. Lid and Frame: Heavy-duty cast iron construction, manufactured by Neenah. Lid Design: (Refer to Section 02605).
- B. Shaft Construction: Cast iron shaft of internal diameter as specified on plans with 2,500 psi concrete collar for cleanouts located in paved areas.
- C. Base Pad: Cast-in-place concrete, 2,500 psi leveled top surface to receive cast iron shaft sections, sleeved to receive sanitary sewer pipe sections.

2.03 PIPE AND VALVING ASSOCIATED WITH STRUCTURES

- A. All pipe and valving shall be cast/ductile iron with 125 lb ANSI standard flanges.
- B. All pipe to be cement lined.
- C. Air and vacuum valve shall be as manufactured by Golden Anderson.

- D. Paint any piping inside special appurtenances with epoxy paint in accordance with 10 State Standards and/or TR-16 manual "Guides for the Design of Wastewater Treatment Works."

2.04 PIPE INSULATION

Two-inch HI-60 insulation as manufactured by Dow Chemical or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION - GRAVITY AND PRESSURE SEWERS

- A. Pipe Laying: Gravity and pressure sewer pipe laying shall comply with the requirements of pipe laying described under "Storm Sewer System" Section 02720 and for PVC pipe ASTM D2321, Standard Practice for Underground Installation of Flexible Sewer Pipe, latest revision.
- B. All service leads shall have a temporary cap placed to permit testing as outlined in Part 4 of this specification.
- C. All service leads shall have cleanouts installed in accordance with Part 1 of the State Plumbing Code and the details contained in the plan set.

3.02 INSTALLATION

- A. Pipe insulation shall be 4'-0" minimum width and centered longitudinally along the pipe.
- B. Use where required by plans, as directed by the Owner, and any time the final pipe cover is less than 5 feet.
- C. Install 6 inches above the pipe unless otherwise directed. Use 6-inch select backfill above and below the pipe.

PART 4 - FIELD QUALITY CONTROL

4.01 TESTING OF SANITARY SEWER SYSTEM (GRAVITY MAIN)

- A. Testing of a section of sewer between manholes shall be performed using the below stated equipment according to stated procedures and under the supervision of the Owner's representative.
 - 1. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

2. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
3. All air used shall pass through a single control panel.
4. Three (3) individual hoses shall be used for the following connections:
 - a. From control panel to pneumatic plugs for inflation.
 - b. From control panel to sealed line for introducing the low-pressure air.
 - c. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

Procedures: All pneumatic plugs shall be seal tested before being used in the actual test installation. One (1) length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against the pressure without bracing and without movement of the plugs out of the pipe.

After a manhole-to-manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

Diameter (Inches)	Minutes to Decrease from 3.5 - 2.5 psig Pressure
4	2.0
6	3.0
8	4.0
10	5.0
12	6.0
15	7.5
18	9.0
21	10.5

- B. In areas where ground water is known to exist, the Contractor shall install a one-half (1/2) inch diameter capped pipe nipple, approximately ten (10) inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the

performance of the Line Acceptance Test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple.

The hose shall be held vertically, and a measurement of the height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same.)

- C. If installation fails to meet the above requirements for the air test, the Contractor shall correct the pipeline until an acceptable test is achieved.
- D. The Contractor shall provide as required the proper plugs, weirs, and other equipment required to perform all tests. Testing of each section of sewer installed shall include the portions of service connections that are to be installed under the Contract.
- E. Where ground water is confirmed to be high, the Engineer at his/her option may elect to accept infiltration measurements in lieu of air testing.
- F. These tests shall be conducted at all times in the presence of the Engineer. Should a line that has previously been tested indicate any water infiltration, or otherwise appear suspect to the Engineer, the Contractor shall conduct confirmation air tests on the line at no additional costs.

4.02 DEFLECTION TESTING

- A. Deflection tests shall be performed on all flexible pipes. The test shall be conducted after the final backfill has been in place at least 30 days.
- B. No pipe shall exceed a deflection of 5 percent.
- C. If the deflection test is to be run using a right ball or mandrel, it shall have a diameter equal to 95 percent of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

4.03 TESTING OF SANITARY SEWER FORCE MAIN SYSTEM

Leakage in pressure mains shall not exceed the limits shown on Table 1, appended to this section, when tested by water pressure at 100 psi. The Contractor shall furnish all necessary equipment and personnel for making such tests. Should the pipe fail to meet the leakage requirements, it shall be removed and repaired by the Contractor. All testing shall be done in the presence of the Owner's representative.

END OF SECTION 02730

Table 1

Allowable Leakage for Mechanical-Joint or Push-On Joint Pipe in 18-ft. Nominal Lengths*

Avg. Test Pressure (psi)	Pipe Size - inches															
	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
	Allowable Leakage per 1,000 ft-gph															
250	0.48	0.71	0.95	1.42	1.90	2.38	2.85	3.33	3.80	4.28	4.75	5.70	7.13	8.55	9.98	11.40
225	0.45	0.68	0.90	1.35	1.80	2.25	2.70	3.15	3.60	4.05	4.50	5.40	6.76	8.11	9.46	10.81
200	0.42	0.64	0.85	1.27	1.70	2.12	2.55	2.97	3.40	3.82	4.25	5.10	6.37	7.61	8.92	10.19
175	0.40	0.60	0.79	1.19	1.59	1.99	2.38	2.78	3.18	3.58	3.97	4.77	5.96	7.15	8.34	9.54
150	0.37	0.55	0.74	1.10	1.47	1.84	2.20	2.58	2.94	3.31	3.68	4.41	5.52	6.62	7.72	8.83
140	0.36	0.53	0.71	1.07	1.42	1.78	2.13	2.49	2.84	3.20	3.55	4.26	5.33	6.40	7.46	8.53
130	0.35	0.51	0.69	1.03	1.37	1.71	2.06	2.40	2.74	3.08	3.42	4.11	5.14	6.16	7.19	8.22
120	0.33	0.49	0.66	0.99	1.32	1.64	1.98	2.30	2.63	2.96	3.29	3.95	4.93	5.92	6.91	7.89
110	0.31	0.47	0.63	0.94	1.26	1.58	1.89	2.21	2.52	2.83	3.15	3.78	4.72	5.67	6.61	7.56
100	0.30	0.45	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00	3.60	4.50	5.40	6.31	7.21
90	0.28	0.43	0.57	0.86	1.14	1.42	1.71	1.99	2.28	2.56	2.85	3.42	4.27	5.13	5.98	6.84
80	0.27	0.40	0.54	0.80	1.08	1.34	1.61	1.88	2.15	2.42	2.69	3.22	4.03	4.84	5.64	6.45
70	0.25	0.38	0.50	0.75	1.00	1.26	1.51	1.76	2.01	2.26	2.51	3.01	3.77	4.52	5.28	6.03
60	0.23	0.35	0.46	0.70	0.93	1.16	1.39	1.63	1.86	2.09	2.32	2.79	3.49	4.19	4.89	5.58
50	0.21	0.32	0.42	0.64	0.85	1.06	1.28	1.49	1.70	1.91	2.12	2.55	3.19	3.82	4.46	5.10
40	0.19	0.28	0.38	0.57	0.76	0.95	1.14	1.33	1.52	1.71	1.90	2.28	2.85	3.42	3.99	4.56

* The allowable leakage for a pipeline is calculated by multiplying the leakage per hour per 1,000 feet at the average test pressure and for the diameter of pipe tested as obtained from the above table by the duration of the test in hours and the total length of the line being tested divided by 1,000. If the line under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

212

SECTION 02831 - SITEWORK FENCING AND GATES

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide galvanized coated chain link fences and gate units controlled by single source including erection accessories, fittings, and fastenings as indicated on Drawings.
- B. Provide high wire mesh fence including erection accessories, fittings and fastenings of the height indicated on the Drawings.

1.02 RELATED SECTIONS

- A. Construction Drawings.
- B. Manufacturer's technical data and installation requirements.

1.03 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 A121 – Zinc-Coated (Galvanized) Steel Barbed Wire.
- F. ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- G. ASTM A392 – Zinc-Coated Steel Chain-Link Fence Fabric.
- H. ASTM A428 – Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- I. ASTM A491 – Aluminum-Coated Steel Chain Link Fence Fabric.
- J. ASTM C569 – Steel, Carbon (0.15) Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- K. ASTM C585 – Aluminum Coated Steel Barbed Wire.
- L. ASTM C94 – Ready Mixed Concrete.
- M. ASTM F573 – Residential Zinc-Coated Steel Chain Link Fence Fabric.
- N. ASTM F668 – Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.

- O. Chain Link Fence Manufacturers Institute (CLFMI) – Product Manual.
- P. FS FF-F-191 – Fencing Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories).

1.04 SUBMITTALS

- A. Contractor shall submit catalog cut sheets of all fencing products proposed for use.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. 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

2.02 MATERIALS

- A. Fabric
 - 1. No. 9 ga. (0.148" \pm 0.005") finished size galvanized steel wires, 2" mesh, with both top and bottom salvages twisted and knuckled finish.
 - 2. Furnish one-piece fabric widths for fencing.
- B. End, Corner, and Pull Posts: Schedule 40 Galvanized steel, minimum sizes and weights as follows:
 - 1. Up to 4'-0" Fabric Height: 2.375" OD pipe, 3.65 lbs./lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs./lin. ft.
 - 2. Over 4'-0" Fabric Height: 2.875" OD pipe, 5.79 lbs./lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs./lin. ft.
- C. Line Posts: Schedule 40 Galvanized steel, minimum sizes and weights as follows:
 - 1. Up to 4'-0" Fabric Height: 1.90" OD steel pipe, 2.70 lbs./lin. ft., or 1.875" x 1.625" C-sections, 2.28 lbs./lin. ft.
 - 2. 4'-0" to 8'-0" Fabric Height: 2.375" OD steel pipe, 3.65 lbs./lin. ft., or 2.25" x 1.875" H-sections 2.64 lbs./lin. ft.

3. Over 8'-0" Fabric Height: 2.875" OD steel pipe, 5.79 lbs./lin. ft. or 2.25" x 1.875" H-sections, 3.26 lbs./lin. ft.
- D. Gate Posts: Schedule 40 Galvanized steel posts for supporting single gate leaf, or one leaf of double gate installation, for nominal gate widths as follows:
 1. Up to 4'-0": 3.5" x 3.5" roll-formed section, 2.85 lbs./lin. ft., or 2.875" OD pipe, 5.79 lbs./lin. ft.
 2. Over 4'-0" to 13'-0": 4.000" OD pipe, 9.11 lbs./lin. ft.
- E. Top Rail: Rails: 1.66" OD pipe, 2.27 lbs./ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs./Ft.; Schedule 40 galvanized steel, manufacturer's longest lengths.
- F. Couplings: Expansion type, approximately 6" long, for each joint.
- G. Attaching Devices: Provide means for attaching top rail securely to each gate corner, pull and end post.
- H. Sleeves: Schedule 40 Galvanized steel not less than 6" long and with inside diameter not less than 1/2" 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.
- I. Tension Wire: 7 gage galvanized steel, coated coil spring wire, located at bottom of fabric.
- J. Wire Ties: 9 ga. galvanized steel.
- K. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts 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.
- L. Post Tops: Galvanized steel, weathertight closure cap for each tubular post. Furnish caps with openings to permit passage of top rail.
- M. Stretcher Bars: Galvanized steel, one piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretch bar for each gate and end post, and two for each corner and pull post.
- N. Stretch Bar Bands: Manufacturer's standard.
- O. Gate Cross-bracing: 3/8" diameter galvanized steel adjustable length truss rods.
- P. Portland Cement: ASTM C150.

- Q. Aggregates: ASTM C33.
- R. Water: Clean.
- S. Non-shrink non-Metallic Grout: Premixed, factory-packaged, noncorrosive nonstaining, nongaseous, exterior grout complying with CE CRD-C621.
- T. Swinging Gate Hardware
1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180 degree gate opening. Provide 1-1/2" pair of hinges for each leaf over 6'-0" nominal height.
 2. Latch: Forked type of plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
- U. Double Gates Hardware: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors set in concrete, to engage center drop rod or plunger bar. Include locking device and padlock eye as integral part of latch, using one padlock for locking both gate leaves.
- V. Sliding Gate Hardware: Provide manufacturer's standard heavy-duty track, ball-bearing hanger sheaves, overhead framing and support, guides, stays, bracing, and accessories as required.
- W. Solid Slats: All solid slats for chain link fencing shall be aluminum and match the color of the chain link mesh vinyl coating. Provide only where required by Contract Drawings.
- X. Wire Mesh Fence: Provide galvanized field fencing with 9 ga. Top and bottom wire, 9 ga. Filler wires and stay wires at 12" o.c.

PART 3 – EXECUTION

3.01 GATE FABRICATION

- A. Fabricate swing gate perimeter frames of 1.90" or 2.375" OD pipe, Schedule 40 galvanized steel as specified on the drawings. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum of 8'-0" apart.

- B. Assemble gate frames by welding or special fittings and rivets, for rigid connections. Install same fabric as for fence with stretcher bars at vertical edges. Install diagonal cross-bracing on gates as required to ensure rigid frame without sag or twist. Bars may be used at top and bottom edges. Attach stretchers to gate frame at 15" o.c. maximum.
- C. Attach hardware to provide security against removal or breakage.

3.02 FINISH

- A. Fabric Finish: galvanized coated,
- B. Framing: Galvanized steel, ASTM A120 or A123, with not less than 1.8 oz. zinc/sq. ft. of surface.
- C. Hardware and Accessories: Galvanized, ASTM A153 with zinc weights in accordance with Table I.

3.03 CONCRETE MIXING

Mix materials to obtain concrete with minimum 28-day compressive strength of 2,500 psi; 1" maximum size aggregate, maximum 3" slump, and 2-4% entrained air.

3.04 INSTALLATION

- A. Comply with recommended procedures and instructions of fencing manufacturer. Provide secure, aligned installation with line posts spaced at 10'-0" o.c. maximum.
- B. Grade Set Posts: Drill or hand excavate using post hole digger in firm undisturbed or compacted soil.
- C. 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.
- D. Center and align posts in holes 3" above bottom of excavation.
- E. Place concrete around 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.
- F. 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 nonshrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.
- G. Top Rails: Run rail continuously, bending to form radius for curved runs. Provide expansion couplings as recommended by manufacturer.

- H. 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.
- I. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.
- J. 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.
- K. 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.
- L. 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.
- M. Tie Wires
 - 1. 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.
 - 2. 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.
 - 3. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- N. 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.
- O. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubrication.

END OF SECTION 02831

SECTION 02846 – SIGNAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide traffic control signs complying with U.S. Department of Transportation, Federal Highway Administration's Manual "Uniform Traffic Control Devices", local codes, and as specified. See Drawings for type, location, and quantity of signs required.

1.02 RELATED REQUIREMENTS

- A. Construction Drawings.
- B. Manufacturer's Mounting Instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Signs to be equivalent to those manufactured by SA-SO, Inc., Grand Prairie, TX.
- B. Provide information for all signs, proposed mounting heights, mounting hardware, and posts to be submitted to the Owner for review and approval prior to installation.

2.02 SIGNS

To be painted with reflective baked-enamel finish with following colors:

- A. "STOP" Signs: (R1-1) 24"x24", Octagon, reflectorized copy and border.
- B. "SPEED LIMIT" Signs: (R2-1) 18"x24", black legend on white background.
- C. "HANDICAPPED SYMBOL" Signs: (R7-Series) 18"x24", white legend on blue background.
- D. "NO PARKING, FIRE LANE" Signs: (R7-Series) 12"x18", red letters on white background.
- E. "KEEP RIGHT" signs: (R4-7a) 18"x24", black letters and symbol on white background.
- F. "DO NOT ENTER" Signs: (R5-1) Highway Dept. standard red and white sign except 24"x24" size.
- G. Miscellaneous Signs: Per Uniform Traffic Control Device Manual Recommendations.

2.03 POSTS

Channel galvanized posts with appropriate non-corrosive sign-mounting hardware for each sign.

PART 3 - EXECUTION

Stop signs shall be erected on a 6'-6" cedar post painted white with a 6'-0" overall mounting height. All other signs not on grassed areas or protected by barrier curb shall be installed inside a 4" concrete-filled pipe bollard. Pipe bollard must extend 3' above finish grade. Set posts vertical and plumb with bottom of sign at 5' above finish grade. Mount signs in accordance with manufacturer's instructions. Check mounting height, replace any posts which are not installed plumb.

All existing signs that are within the limits of work shall be temporarily removed, stored and reset upon the completion of work. Damaged signs shall be replaced by the Contractor at no expense to the owner. The Contractor shall coordinate sign locations with the owner or their representative prior to re-installation.

END OF SECTION 02846

SECTION 02900 - LOAM, SEED

PART 1 - GENERAL

1.01 - QUALITY OF WORK AND MATERIALS

The Contractor shall furnish all materials and perform all work in accordance with these specifications, drawings, and instructions provided by the Owner's representative hereafter also referred to as the Owner. The work shall include everything shown on the drawings and required by the specifications and everything to which in the judgment of the Owner is incidental to what is shown on the drawings or required by the specifications. All work completed and materials furnished and installed shall be of the best quality and shall be in strict accordance with the intention of the drawings, specifications and samples. The Contractor shall cooperate with the Owner so that no error or discrepancy in the drawings or specifications shall cause defective or inappropriate materials to be used or poor workmanship to be allowed and so that the work may proceed in the most efficient and effective manner.

1.02 - WEATHER CONDITIONS

Work must be carried out only during weather conditions favorable to grass establishment construction. The suitability of such weather conditions shall be determined by the Owner.

1.03 - PROTECTION

- A. Before commencing work, all trees and shrubs that are to be saved must be protected from damage by the placement of fencing flagged for visibility or some other suitable protective procedure approved by the Owner. No work may begin until this requirement is fulfilled.
- B. In order to avoid damage to roots, bark or lower branches, no truck or other equipment shall be driven or parked within the drip line of any trees, unless the tree over spreads a paved way.
- C. The Contractor shall use any and all precautionary measures when performing work around trees, walks, pavements, utilities, and any other features either existing or previously installed under this contract.
- D. The Contractor shall adjust depth of earthwork and loaming when working immediately adjacent to any of the aforementioned features in order to prevent disturbing tree roots, undermining walks and pavements, and damage in general to any existing or newly incorporated item.

- E. Where excavating, fill, or grading is required within the branch spread of trees that are to remain, the work shall be performed as follows:
1. TRENCHING: When trenching occurs around trees to remain, the tree roots shall not be cut but the trench shall be tunneled under or around the roots by careful hand digging and without injury to the roots.
 2. RAISING GRADES: When the existing grade at tree is below the new finished grade, and fill not exceeding 16 inches (16") is required, clean, washed gravel graded from one to two inches (1" - 2") in size shall be placed directly around the tree trunk. The gravel shall extend out from trunk on all sides a minimum of 18 inches (18") and finish approximately two inches (2") above the finish grade at tree. Install gravel before any earth fill is placed. New earth fill shall not be left in contact with the trunks of any trees requiring fill. Where fill exceeding 16 inches (16") is required, a dry laid tree well shall be constructed around the trunk of the tree. The tree well shall extend out from the trunk on all sides a minimum of three feet (3') and to three inches (3") above finish grade. Coarse grade rock shall be placed directly around the tree well extending out to the drip line of the tree. Clean, washed gravel graded from one to two inches (1" - 2") in size shall be placed directly over the coarse rock to a depth of three inches (3"). Approved backfill material shall be placed directly over the washed gravel to desired finished grade.
 3. LOWERING GRADES: Existing trees in areas where the new finished grade is to be lowered shall have regrading work done by hand to elevation as indicated. Roots as required shall be cut cleanly three inches (3") below finished grade and scars covered with tree paint.
 4. Trees marked for preservation that are located more than six inches (6") above proposed grades shall stand on broad rounded mounds and be graded smoothly into the lower level. Trees located more than 16 inches (16") above proposed grades shall have a dry laid stone wall, or other retaining structure as detailed on the plans, constructed a minimum of five feet (5') from the trunk. Exposed or broken roots shall be cut clean and covered with topsoil.

1.04 - SAMPLES

- A. It is the responsibility of the Contractor, before ordering or purchasing materials, to provide samples of those materials to the Owner for approval, as specified below:
1. TOPSOIL COVER
 - a. Loam (General Seeding Areas) – representative samples shall be taken from several locations with test results showing the requirements of Part 2, Material.
 2. COMPOSTED SOIL ADMIXTURE: VACANT.

1.05 - GUARANTEE

- A. The condition of all new grassed surfaces is the responsibility of the Contractor and shall be approved by the Owner.
- B. Until final approval, any replacement of grassed surfaces that may be necessary shall be at the expense of the Contractor.
- C. All lawns shall be guaranteed for one (1) full growing season from the date of completion of the maintenance provisions. All areas where a full catch of grass has not been obtained shall be reseeded or resodded as appropriate.
- D. In addition to other standard provisions, the Contractor's bid amount shall also provide for the following:
 - 1. Maintenance necessary during Establishment Period.
 - 2. The Contractor shall also be responsible for any damages caused by his operations and shall dispose of all rubbish and excess soil as directed.

1.06 - MAINTENANCE OPERATIONS BEFORE APPROVAL

- A. Grassed areas damaged during the process of the work shall be the responsibility of the Contractor, who shall restore the disturbed areas to a condition satisfactory to the Owner. This may include filling to grade, fertilizing, seeding or sodding as appropriate, and mulching.

1.07 - FINAL APPROVAL

The Owner shall have the final approval for acceptance of the landscaping.

1.08 - RELATED REQUIREMENTS

- A. Construction Drawings.
- B. An Erosion Control Program has been prepared for this project that is appended to specifications Section 02270. Strict adherence to the provisions of the Erosion Control Program as well as the requirements of this section will be required.

PART 2 - MATERIALS:

2.01 - SEED

- A. Seed mixture shall be fresh, clean, new crop seed. Drawing L-4 shows where various seed types are required. 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 bearing the dealer's guaranteed analysis. If seed is mixed by the dealer, the Seeding Contractor shall furnish to the Owner the dealer's guaranteed statement of the composition of the mixture and the percentage of purity and germination of each variety.

B. Seed shall be purchased from a recognized distributor and shall be composed of the following varieties mixed in the proportions indicated. Seed shall test to minimum percentages of 95% for purity and 85% for germination.

C. Permanent Seed Mix

The permanent feed mixture shall be spread at a rate of 2.3 pounds per 1,000 square feet in each direction (4.6 pounds per 1,000 square feet total) consisting of the following seed mixture:

40%	SR 3000 Fineleaf Fescue
30%	A-34 Kentucky Bluegrass
20%	Pennant Perennial Ryegrass
10%	GARAN Kentucky Bluegrass

D. Temporary Seed Mix

The temporary seed mixture shall be spread at a rate of 2.6 pounds per 1000 square feet in each direction (5.2 pounds per 1,000 square feet total) of Winter Rye if spread in the fall or 1.8 pounds per 1000 square feet in each direction (3.6 pounds per 1,000 square feet total) of Oats if spread in the spring.

2.02 - TOPSOIL

A. General: Topsoil has been (or will be) stockpiled for re-use in landscape work. If quantity of stockpiles topsoil is insufficient, provide additional topsoil as required to complete landscape work.

B. Topsoil Material: Fertile, friable, natural topsoil of loaming character, without admixture of subsoil material obtained from a well-chained arable site, free from all clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign material greater than 1" in every dimension, with acidity range of between pH 5.0 and 7.0 and shall not contain less than 6% organic matter by weight as determined by loss on ignition of moisture-free samples as dried at 65 degrees Celsius.

1. Use only topsoil, whether stockpiled on site or imported, which is representative of topsoil test report.
2. Obtain topsoil only from local sources or from areas having similar soil characteristics to that found at the project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches; do not obtain from bogs or marshes.
3. Use only material from sources identified to and approved by Architect and listed on the topsoil soils test report.

2.03 - COMPOSTED SOIL ADMIXTURE

Organic composted soil admixture shall be permitted as an additive if it meets all Maine Department of Environmental Protection guidelines under Chapter 567, Section C and must be approved for commercial landscaping. Compost shall be weed seed free and consist of approximately equal portions of municipal bio-solids, short paper fiber, wood ash, and sawdust and be the product of 15 days of thermophilic aerobic decomposition followed by 90 days of curing. Compost will be adequately stabilized, pathogen free with acceptable odor. The material shall pass through a 3/8" mesh screen, be friable and free of stones, sticks, and all objectionable debris. Compost source is subject to the review of the Engineer.

Typical Product Parameters:

TKN Nitrogen	2.0%
Organic-N	1.44%
Carbon/Nitrogen Ratio	20 to 1
Total Phosphorous	2.20%
Total Potassium	.34%
Organic Matter	79%
Conductivity	6.2 mmhos/cm
pH	7.0
Screen Size	< 3/8" available
Density	+/- 800-1200 lbs/cy

Admixture shall be Earth Life Compost from BFI Organics, Falmouth, Maine.

2.04 - LOAM ADDITIVES

- A. Commercial Fertilizer: Shall be a complete fertilizer and shall be a standard product complying with the State and United States fertilizer laws. Fertilizer shall be delivered to the site in the original unopened containers which shall bear the manufacturer's name and guaranteed statement of analysis. At least 40 percent by weight of the nitrogen content of the fertilizer shall be derived from organic materials.
- B. Superphosphate: Shall be finely ground phosphate rock as commonly used for agricultural purposes and shall contain not less than 18 percent available phosphoric acid.
- C. Ground Limestone: Shall be dolomitic limestone and contain not less than 85 percent of total carbonates and magnesium and shall be ground to such fineness that 50 percent will pass a 100 mesh sieve and 90 percent will pass through a 20 mesh sieve. Coarser material will be accepted provided the specified rates of application are increased proportionately on the basis of quantities passing the 100 mesh sieve.
- D. Water: shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life. Hose and all other watering equipment required for the work shall be furnished by the Contractor.

2.05 - MULCH

- A. Asphalt Spray Mulch: Shall be an emulsified asphalt, Type HFMS-1.
- B. Hay Mulch: Shall conform to the MDOT mulching standards Section 619.
- C. Cellulose Fiber Mulch: Shall conform to the MDOT mulching standards Section 619.

2.06 - SOD

- A. Sod shall be a species recommended by an experienced local A.N.A. – Certified nursery. Sod to be strongly rooted, weed-disease and pest free and uniform in thickness.
- B. All slopes greater than 3:1 shall be pegged to hold sod in place.

2.07 - EROSION CONTROL BLANKET/FABRIC NETTING

- A. Contractor shall provide and install where indicated on civil drawings "Curlex" blankets: by American Excelsior Company; or approved equal.
- B. The area to be covered shall be prepared, fertilized, and seeded before blanket is applied. When blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. In ditches the blanket shall be applied in the direction of the flow of water, butted snugly at ends and side and stapled. On slopes, the blankets shall be applied either horizontally or vertically to the slope. Ends and sides shall be butted snugly and stapled. Staple to manufacturer's recommendations.

PART 3 – EXECUTION

3.01 - PREPARATION OF SUBGRADE

- A. After the work has been completed, do whatever grading is necessary to bring the subgrade to a true, smooth slope parallel and except where otherwise indicated, four (4) inches below grade for all areas to receive loam. Other subgrades shall be as indicated.
- B. Immediately before placing the loam, barrow or otherwise loosen the surface of the subgrade to a depth of two (2) inches. The subgrade shall be inspected and approved by the Owner before placing the loam.

3.02 - PLACING LOAM

- A. Place and spread loam over approved areas to a depth sufficiently greater than the depth required for seed areas so that after natural settlement and light rolling, the complete work will conform to the lines, grades and elevations indicated and shall assure proper drainage in an uninterrupted pattern free of hollows and pockets. Supply additional loam as needed to the specified depths under the Contract without additional costs to the Owner.
- B. After loam has been spread, prepare it carefully by scarifying or harrowing and taking. Remove all stiff clods, lumps, brush, roots, stumps, litter and other foreign material and stones over one inch in diameter and dispose of all directed by the Owner. Loamed areas shall also be free of smaller stones in excessive quantities as determined by the Owner. Roll the entire surface with a hand roller weighing approximately one hundred pounds per foot of width. During the rolling, fill all depressions caused by settlement with additional loam and then regrade and roll until the surface presents a smooth, even and uniform finish and is up to the required grade.

3.03 - BLENDING AND PLACING OF COMPOSTED ENHANCED LOAM MIXTURE - VACANT

3.04 - APPLICATION OF LOAM ADDITIVES

- A. Applying Fertilizers: Apply commercial fertilizer and work thoroughly into the loam in two applications. The first application shall be within one week before the seeding, at the rate of 35 pounds per thousand square feet, mixed into the seed bed. The second application shall be as determined by the test results.
- B. Applying Superphosphate: Incorporate superphosphate into the loam with the first application of commercial fertilizer at the rate of 20 pounds per thousand square feet or at the rate determined from the test results.
- C. Applying Ground Limestone: After the loam has been spread and graded, and, if recommended as a result of the soil analysis, apply ground limestone at the minimum rate of 60 to 80 pounds per one thousand square feet or at the rate recommended by the testing laboratory.

3.05 - SEEDING SEASON

- A. The dates for seeding shall be as follows:
 - a. Spring: April 15 to June 1
 - b. Fall: August 1 to September 15
- B. Seeding at any time other than within the above season shall be allowed only when ordered by the Owner or when the Contractor submits a written request for permission to do so and permission is granted.

3.06 - SOWING OF SEED AND MULCHING

- A. Seeding: Seeding shall consist of soil preparation, seeding, raking, rolling, weeding, watering and otherwise providing all labor and materials necessary to secure the establishment of acceptable turf.
- B. Sowing of Seed: Immediately before any seed is sown, the ground shall be scarified, harrowed and raked until the surface is smooth, friable, and of uniformly fine texture. No seeding shall be done during the windy weather. So seed in two directions at right angles to each other. Sow the seed evenly with approved seeding device in the proportions and at the rate per unit of area theretofore specified. Cover seed with a thin layer of loam by light raking or other approved method, roll in both directions with a hand roller weighting approximately one hundred pounds per foot of width, and water with a fine spray. Erect warning signs and barriers to protect seeded areas. Spray a film of the specified asphalt mulch over all seed areas at a rate of 0.15 to 0.30 gallon per square yard using approved application procedures. Care shall be taken to maintain the proper application rate with no puddling or excessive accumulation of asphalt thereby slowing seed germination. The Contractor will also be responsible for clearing or repairing all areas adjacent to the mulching operation and which have been sprayed or otherwise coated with the asphalt. Apply hay mulch at the MDOT specified rate of 1 to 2 tons per acre on all ditches and all slopes of 3:1 or greater. Apply cellulose fiber mulch at the MDOT specified rate of not less than 60 pounds per 1000 square feet unit of area.
- C. Hydraulic Spray Method: The hydraulic spray of sowing seed shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated area at the required rates. If the Owner finds the application uneven or otherwise unsatisfactory, he may require the hydraulic spray method be abandoned and the balance of the work done as specified above in paragraph 3.05.B.

3.07 - OMITTED

3.08 - WATERING

- A. Water newly seeded areas daily or as necessary to maintain moisture to a minimum depth of 5 inches with a fine spray to supplement natural rainfall to the equivalent of 1-inch to 4-inch depth.
- B. Suitable water for planting and maintenance of seeded areas will be provided by the Contractor. The Contractor shall furnish all necessary watering equipment.

3.09 - RESTORATION AND CLEAN-UP

- A. Excess and water material shall be removed daily. When turfing in an area has been completed, the area shall be cleaned of all debris and excess material. Where existing turf areas have been damaged during turfing operations, the Contractor shall restore the area to their original condition at his expense. Other paving shall be cleaned when work in adjacent areas is completed.

PART 4 – TURF ESTABLISHMENT PERIOD

4.01 - GENERAL

- A. The turf establishment period will be in effect until the turf has been mowed once.
- B. A stand of turf is defined as 100 grass plants per square foot.
- C. The Contractor shall be responsible for the establishment and proper care of a stand of turf over the entire seeded area.

4.02 - MAINTENANCE DURING THE ESTABLISHMENT PERIOD

- A. The Contractor shall provide the following maintenance where applicable: mowing, removal of excess clippings, eradicating weeds, watering, fertilizing, overseeding and any other operations necessary to promote the growth of grass.
- B. The seeded area shall be mowed to a height of 3 inches whenever the average height of the grass becomes 6 inches.

PART 5 – FINAL ACCEPTANCE

5.01 – GENERAL

Final inspection and acceptance will be at the end of the turf establishment period. Acceptance will be based upon a satisfactory stand of turf as defined in the paragraph, "Turf Establishment Period." Prior to final acceptance and after the mowing, the Contractor shall apply 20 pounds per 1,000 square feet of a slow release nitrogen fertilizer. Formula for this application shall be 10N-3P-6K.

5.02 - REPLACEMENT

Areas larger than 25 square inches that do not have a stand of turf must be replanted. Rejected areas of turf shall be replanted within acceptable planting dates as directed by the Owner.

5.03 Furnish all and complete instructions for maintenance of the seeded areas to the Owner at the time of acceptance.

5.04 The Owner's inspection shall determine whether maintenance shall continue in any part.

5.05 After all necessary corrective work has been completed, and maintenance instructions have been received by the Owner, the Owner will certify in writing the acceptance of the turf. The Contractor's responsibility for maintenance of turf shall cease on receipt of acceptance.

END OF SECTION 02900

SECTION 02950 - TREES, PLANTS, AND GROUND COVERS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all materials and equipment, and do all work required to complete the planting, as indicated on the Drawings and as specified.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
 - 1. Section 02100, SITE PREPARATION; Clearing and grubbing and stripping of topsoil.
 - 2. Section 02200, EARTHWORK; Establishment of subgrade elevations and excavation and backfill.
 - 3. Section 02900, LOAM, SEEDING AND SOD; Seeding and sodding.

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American National Standards Institute, Inc. (ANSI):
 - Z60.1 American Standard for Nursery Stock (Sponsor: American Association of Nurserymen, Inc.)
 - 2. American Society for Testing and Materials (ASTM):
 - C 136 Sieve Analysis of Fine and Coarse Aggregates
 - E 11 Wire-Cloth Sieves for Testing Purposes
 - 3. American Wood Preservers' Association (AWPA):
 - C2 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment By Pressure Processes
 - 4. "Hortus Third", A Concise Dictionary of Plants Cultivated in the United States and Canada, Cornell University, L.H. Bailey Hortorium, Macmillan Publishing Co., New York, NY.

1.04 SUBMITTALS

A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Sample Size or Quantity</u>
Mulch	1 ft. ³
Planting soil	1 ft. ³
Topsoil from on-site sources	1 ft. ³
Topsoil from off-site sources	1 ft. ³
Tree wrap	36 in. length
Each plant species	Actual representative sample, or picture with scale; include information on sources

B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials:

- Aluminum sulfate
- Antidessicant
- Fertilizer
- Fungicide
- Insecticide
- Compost
- Tree wrap

C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:

- Compost
- Commercial fertilizer
- Limestone

D. Test Reports: Test reports from an approved testing agency indicating compliance with the specifications shall be submitted for topsoil, peat moss, planting soil mixture, and any other materials designated by the Engineer/Landscape Architect.

1.05 OWNER'S INSPECTION AND TESTING

A. Work will be subject to inspection at all times by the Engineer/Landscape Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 01410, TESTING LABORATORY SERVICES to analyze and test materials used in the construction of the work. Where directed by the Engineer/Landscape Architect, the testing laboratory will make material analyses and will report to the Engineer/Landscape Architect whether materials conform to the requirements of this specification.

232

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Engineer/Landscape Architect, shall provide such auxiliary personnel and services needed to accomplish the testing work.
3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

1.06 CONTRACTOR'S INSPECTION AND TESTING

- A. Testing, analyses, and inspection required by the Contractor for his own information or guidance shall be at his own expense.
- B. The Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Engineer/Landscape Architect, to perform the following tests and analyses:

<u>Material</u>	<u>Tests and Analysis Required</u>
-----------------	------------------------------------

Topsoil	Mechanical analysis of soil indicating the percent passing by weight of the following sieve sizes: 1 in., 1/2 in., No. 4, No. 10, No. 100, and No. 200. Determination of pH, organic content, and nutrient content. Recommendations shall be made by the testing agency as to the type and quantity of soil additives required to bring nutrient content and pH to satisfactory levels for planting.
---------	--

Compost	Determination of moisture absorption capacity, organic matter content, and pH.
---------	--

1. Materials shall not be used in construction until test results have been reviewed by the Engineer/Landscape Architect.
2. All costs associated with testing shall be at Contractor's expense.

1.07 SOURCE QUALITY CONTROL

- A. Identification of plant names shall be as listed in "Hortus Third".
- B. Selection of Plant Materials: Submit to the Engineer/Landscape Architect the names and locations of nurseries proposed as sources of acceptable plant material. Inspect all nursery materials to determine that the materials meet the requirements of this section. Proposed materials shall be flagged at the

nurseries by the Contractor prior to viewing by the Engineer/Landscape Architect.

1. Schedule with the Engineer/Landscape Architect a time for viewing plant material at the nursery. Trips to nurseries shall be efficiently arranged to allow Engineer/Landscape Architect to maximize his viewing time. A minimum of six weeks shall be allowed for this viewing prior to time that plants are to be dug.
2. Engineer/Landscape Architect may choose to attach his seal to each plant, or representative samples.
3. Where requested by the Engineer/Landscape Architect, photographs of plant material or representative samples of plants shall be submitted.
4. Viewing and/or sealing of plant materials by the Engineer/Landscape Architect at the nursery does not preclude the Engineer/Landscape Architect's right to reject material at the site of planting.

1.08 UNAVAILABILITY OF PLANT MATERIALS

- A. Before changes or substitutions can be made due to unavailability of plant material, submit satisfactory evidence that he has advertised for a one-month period in a trade journal such as the "Landscape Materials Information Service", with no response, or has undertaken other methods of locating plant material acceptable to the Engineer/Landscape Architect.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Digging Plant Material: Plants shall not be dug at the nursery or approved source until the Contractor is ready to transport them from their original locations to the site of the work or acceptable storage location.
- B. Transportation of Plant Material: Plants transported to the project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury to the plants. Closed vehicles shall be adequately ventilated to prevent overheating of the plants.
 1. Plants shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the plants are in transit, being handled, or are in temporary storage.
 2. The roots of bareroot stock shall be protected from drying out with wet straw or other suitable material while in transit.
 3. Unless otherwise authorized by the Engineer/Landscape Architect, notify the Engineer/Landscape Architect at least two working days in advance of the anticipated delivery date of any plant material. A legible copy of the bill

of lading, showing the quantities, kinds, and sizes of materials included for each shipment shall be furnished to the Engineer/Landscape Architect.

- C. Storage: Unless specific authorization is obtained from the Engineer/Landscape Architect, plants shall not remain on the site of work longer than three days prior to being planted.
1. Plants that are not planted immediately shall be protected as follows:
 - a. Earth balls shall be kept moist and their solidity carefully preserved.
 - b. Plants shall not be allowed to dry out or freeze.
 2. Bareroot plants may remain on the site of the work only 24 hours before being planted or placed in storage. During this 24-hour period, injury and desiccation of plants on-site shall be prevented.
 - a. Roots of plants in storage shall first be puddled in a paste solution of prepared planting soil and then watered.
 - b. Plants shall then be protected and kept moist by "heeling-in" the roots or by placing the plant in a cool moist storage building. The "heeling-in" procedure shall require the plants to be separated and the roots heeled in a suitable moist soil. If plants are stored in a building, the roots shall be covered with a suitable moist mulch.
 3. Both the duration and method of storage of plant materials shall be subject to the approval of the Engineer/Landscape Architect.
- D. Handling of Plant Materials: Exercise care in handling plant materials to avoid damage or stress.

1.10 REJECTION OF MATERIALS

- A. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
- B. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, balls of earth broken or loosened, or areas of bark be torn, the Engineer/Landscape Architect will reject the injured plant.
- C. When a plant has been rejected, remove it from the area of the work and replace it with one of the required size and quality.

1.11 PLANTING SEASON

- A. Spring Planting: Spring planting may commence as soon as the ground has thawed at the nursery and at the site of planting, and weather conditions make

it practicable to work both at the nursery and at the site. The planting period shall be April 1 to October 15.

- B. Regardless of the dates specified above, planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.
- C. Planting season may be extended only with the written permission of the Engineer/Landscape Architect.

1.12 ACCEPTANCE

- A. The Engineer/Landscape Architect will inspect all work for Substantial Completion upon written notice of completion. The request shall be received at least ten calendar days before the anticipated date of inspection.
- B. Acceptance of plant material by the Engineer/Landscape Architect will be for general conformance to specified size, character, and quality, and shall not diminish responsibility for full conformance to the Contract Documents.
- C. Upon completion and reinspection of all repairs or renewals necessary in the judgment of the Engineer/Landscape Architect, the Engineer/Landscape Architect will recommend to the Owner that acceptance of the work of this Section be given.
- D. Acceptance in Part
 - 1. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so, and when permission is given to the Contractor in writing to complete the work in parts.
 - 2. Acceptance and use of such areas by the Owner shall not waive any other provisions of this Contract.

1.13 MAINTENANCE

- A. Plant material shall be maintained until the completion of guarantee period and Final Acceptance of work, as described in Part 3 of this Section.
- B. Following Acceptance, maintenance of plant material shall become the Owner's responsibility. Provide instructions and service as follows.
 - 1. Provide Owner with typewritten recommended maintenance program at time of Substantial Completion.
 - 2. Make as many periodic inspections as necessary during the guarantee period, at no additional cost to the Owner, to inspect the condition of all plant materials. Submit written report of each inspection to the

Engineer/Landscape Architect outlining corrective measures required to keep the guarantee valid.

1.14 GUARANTEE

- A. Plants shall be guaranteed for a period of one year after the date of Acceptance by the Owner and Engineer/Landscape Architect.
 - 1. When the work is accepted in parts, the guarantee periods shall extend from each of the partial acceptances to the terminal date of the last guarantee period. Thus, all guarantee periods terminate at one time.
- B. Plants shall be healthy, free of pests and disease, and in flourishing condition at the end of the guarantee period. Plants shall be free of dead and dying branches and branch tips, and shall bear foliage of normal density, size, and color.
- C. Replace dead plants and all plants not in a vigorous, thriving condition, as determined by the Engineer/Landscape Architect during and at the end of the guarantee period, without cost to the Owner, as soon as weather conditions permit and within the specified planting period.
 - 1. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this Specification.
 - 2. Make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Owner.
 - 3. The guarantee of all replacement plants shall extend for an additional one-year period from the date of their acceptance after replacement. In the event that a replacement plant is not acceptable during or at the end of the said extended guarantee period, the Owner may elect one more replacement or credit for each item.
- D. At the end of the guarantee period, and no less than five days prior to final inspection, staking and guying materials, and tree wrap and ties shall be removed from the site.

1.15 FINAL INSPECTION AND FINAL ACCEPTANCE

- A. At the end of the guarantee period, the Engineer/Landscape Architect will, upon written notice of end of guarantee period inspect the work for Final Acceptance. Request shall be received at least ten calendar days before the anticipated date for Final Inspection.
- B. Upon completion and reinspection of full repairs or replacements necessary in the judgment of the Engineer/Landscape Architect at that time, the

Engineer/Landscape Architect will recommend to the Owner that Final Acceptance of the Work of this Section be given.

PART 2 PRODUCTS

2.01 PLANTS

- A. Except as otherwise specified, size and grade of plant materials shall conform to ANSI Z60.1. In no case shall ball size be less than 11 in. in diameter for each inch of caliper.
- B. Plants shall have outstanding form; symmetrical, heavily branched with an even branch distribution, densely foliated and/or budded, and a strong, straight, distinct leader where this is characteristic of species. Plants shall possess a normal balance between height and spread. The Engineer/Landscape Architect will be the final arbiter of acceptability of plant form.
- C. Plants shall be healthy and vigorous, free of disease, insect pests and their eggs, and larvae.
- D. Plants shall have a well-developed fibrous root system.
- E. Plants shall be free of physical damage such as scrapes, broken or split branches, scars, bark abrasions, sunscalds, fresh limb cuts, disfiguring knots, or other defects. These defects shall not interrupt more than 25% of the circumference of the plant cambium.
- F. Plants shall meet the sizes indicated on the Plant List. Plants larger or smaller than specified may be used only if accepted by the Engineer/Landscape Architect.
- G. Where a size or caliper range is stated, at least 50% of the material shall be closer in size to the top of the range stated.
- H. Plants shall not be pruned before delivery.
- I. Plants indicated as "B&B" shall be balled and burlapped.
 - 1. Unless otherwise permitted by the Engineer/Landscape Architect, plants shall be nursery grown.
 - 2. Plants shall be grown for at least two years under climatic conditions similar to those in the locality of the Project.
 - 3. Nursery grown plants shall be freshly dug. No heeled in plants or plants from cold storage will be accepted, unless otherwise permitted by the Engineer/Landscape Architect.

- J. Container grown plants shall be well rooted and established in the container in which they are growing. They shall have grown in the container for a sufficient length of time for the root system to hold the planting medium when taken from the container, but not long enough to become root bound. Container grown plants exceeding the sizes indicated in ANSI Z60.1 shall have containers which are not less than 75% of the ball sizes for comparable B&B plant material. Each container plant shall be inspected and root pruned as needed.

1. Canes or Trunk(s) and Branches:

- a. Very well formed and sturdy.
- b. Branching plentiful and uniformly distributed to form a well-balanced plant.
- c. Scars shall be free of rot and not exceed 1/4 the diameter of the wood beneath in greatest dimension unless completely healed (except pruning scars).
- d. Pruning scars clean cut leaving little or no protrusion from the trunk or branch.
- e. Graft union completely healed.
- f. No mechanical or pest damage.
- g. No extreme succulence.

2. Foliage:

- a. Densely supplied with healthy, vigorous leaves of normal size, shape, color, and texture (except shrubs moved bare-root or deciduous shrubs when dormant).
- b. No holes, cavities, or depressed areas caused by broken or dead branches or insufficient foliage.
- c. No chlorosis.
- d. Pest or mechanical damage barely perceptible with no more than 5% of total foliage affected.
- e. No frost or cold damage discernible.

3. Root System:

- a. Sturdily established in container.
- b. Shall not be excessively rootbound except plants deliberately grown rootbound to produce a dwarf plant.
- c. No large roots growing out of container.
- d. Noxious weeds in container.

- K. Bareroot stock, where specified or approved by Engineer/Landscape Architect, shall meet the standards of ANSI Z60.1 and shall conform to the following:
 - 1. Root System. The root system of bareroot stock shall be sufficient to insure plant growth.
 - 2. Bareroot Trees. Bareroot trees shall have a heavy fibrous root system that has been developed by proper cultural treatment, transplanting, and root pruning. The spread of the root system shall be 12 times greater than the trunk diameter plus an additional 6 in.
 - 3. Bareroot Shrubs. Bareroot shrubs shall have a well-developed fibrous root system, with a minimum spread conforming to the following:

<u>Plant Height, ft.</u>	<u>Minimum Spread of Roots, in.</u>
1.5 to 2	10
2 to 3	11
3 to 4	14
4 to 5	16
5 to 6	18
6 to 8	20

2.02 TOPSOIL

- A. Topsoil shall be obtained from a previously established stockpile on the site, to the extent that suitable material is available. Additional topsoil required shall be obtained from off-site sources.
- B. Topsoil, whether stripped from site or supplied from off-site, shall be a sandy loam as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

<u>Textural Class</u>	<u>% of Total Weight</u>	<u>Average %</u>
Sand (0.05-2.0 mm dia. range)	45 to 75	60
Silt (0.002-0.05 mm dia. range)	15 to 35	25
Clay (less than 0.002 mm dia. range)	5 to 25	15

- 1. 95% of topsoil shall pass a 2.0 mm sieve.
- 2. Topsoil shall be free of stones 1 in. in longest dimension, earth clods, plant parts, and debris.
- 3. Organic matter content shall be 4 to 12% of total dry weight.

2.03 COMPOST

- A. Compost shall be highly organic dark brown to black containing 6-10% organic matter tested on a dry weight basis with pH between 6.0 – 8.0, free of plants, their roots, debris; other extraneous matter >1 in. diameter and shall be uncontaminated by foreign matter, or substances harmful to plant growth. Do not use soil for planting while in a frozen or muddy condition.

2.04 PLANTING SOIL

- A. Planting soil shall be a mixture of 3 parts topsoil and 1 part compost, by volume.
- B. Planting soil shall have pH value range of 5.5 to 7.0
 - 1. If planting soil mixture does not fall within the required pH range, limestone or aluminum sulfate shall be added to bring the pH within the specified limit.

2.05 LIMESTONE

- A. Ground limestone shall be an agricultural limestone containing a minimum of 85% total carbonates, by weight. Ground limestone shall be graded within the following limits:

<u>Sieve Size%</u>	<u>Passing by Weight</u>
No. 10	100
No. 20	90
No. 100	60

2.06 WATER

- A. Water shall be suitable for irrigation and shall be free from ingredients harmful to plant life.

2.07 ALUMINUM SULFATE

- A. Aluminum sulfate shall be unadulterated and shall be delivered in containers with the name of the material and manufacturer and net weight of contents.

2.08 COMMERCIAL FERTILIZER

- A. Fertilizer content shall conform to the following:

<u>Constituent</u>	<u>% Present by Weight</u>
Nitrogen (N)	10
Phosphorus (P)	10
Potassium (K)	10

1. 50% of nitrogen shall be derived from natural organic source of ureaform.
 2. Available phosphorus shall be derived from superphosphate, bone meal, or tankage.
 3. Potassium shall be derived from muriate of potash containing 60% potash.
- B. Fertilizer shall be delivered in manufacturer's standard container printed with manufacturer's name, material weight, and guaranteed analysis.
- C. Fertilizers with N-P-K analysis other than that stated above may be used provided that the application rate per square foot of nitrogen, phosphorus, and potassium is equal to that specified.
- D. Controlled-release fertilizer shall be equal to the following:

<u>Product</u>	<u>Manufacturer</u>
Agriform 20-10-5	Sierra Chemical Co.
Planting Tablets	Milpitas, CA 95035
EZY-Grow Fertilizer Packet	EZY-Grow - Landscape Specialties

- E. Slow release fertilizer for seasonal plantings shall be Osmocote slow release 14-14-14 analysis.

2.09 MULCH

- A. Mulch shall be a 100% fine-shredded pine bark, of uniform size and free from rot, leaves, twigs, debris, stones, or any material harmful to plant growth. Bark shall have been shredded and stockpiled no less than two months and no more than two years before use.

2.10 GUYING AND STAKING MATERIALS

- A. Wood Stakes: For trees under 10 ft. in height, straight, sound, rough sawn lumber not less than 2 x 2 in., if square, or 2-1/2 in. diameter, if round. Wire for staking shall be 12 gauge steel.
- B. Wire for Guying: Galvanized steel 1 x 19 preformed 3/16 in. diameter.
- C. Turnbuckles: Galvanized steel fitted with eyebolts.
- D. Deadman: Sound, rough sawn lumber 2 x 4 in., or other material approved by the Engineer/Landscape Architect.
- E. Hose: High quality braided rubber hose, 3/4 in. diameter and suitable length, black in color.

2.11 WRAPPING MATERIAL

- A. Tree wrapping material shall be equal to the following:
 1. Osnaburg Cloth, 4-7/8 in. wide, unbleached, pinked on both edges, manufactured by The Carnegie Textile Co., 1734 Ivanhoe Road, P.O. Box 10276, Cleveland, OH 44110.
 2. Standard manufactured tree wrapping paper, brown in color with crinkled surface.

<u>Tree Caliper</u>	<u>Twine Type</u>
3 in. or less	2-ply
Greater than 3 in.	3-ply

2.12 ANTIDESICCANT

- A. Antidesiccant shall be an emulsion specifically manufactured for plant protection which provides a protective film over plant surfaces which is permeable enough to permit transpiration. Antidesiccant shall be delivered in manufacturer's sealed containers and shall contain manufacturer's printed instructions for use.
- B. Antidesiccant shall be equal to the following:

<u>Product</u>	<u>Manufacturer</u>
Wilt-Pruf	Wilt-Pruf Products, Inc. P.O. Box 469 Essex, CT 06426

2.13 FUNGICIDE

- A. Fungicide shall be zinc ethylene bisdithiocarbonate (Zineb), or equal.

PART 3 EXECUTION

3.01 EXAMINATION OF SUBGRADE

- A. Examine subgrade and rough grading before planting. Alert Engineer/Landscape Architect to unacceptable rough grading or subgrade.

3.02 DRAINAGE OF SOILS

- A. Test drainage of five plant beds and pits chosen by the Engineer/Landscape Architect shall be done by filling with water twice in succession. The time at which water is put into the pit or bed for a second filling shall be noted.

Engineer/Landscape Architect shall then be notified of the time it takes for pit or bed to drain completely. Planting operations shall not proceed until Engineer/Landscape Architect has reviewed test drainage results.

- B. Notify the Engineer/Landscape Architect in writing of all soil or drainage conditions that he considers detrimental to growth of plant material. Submit proposal and cost estimate for correction of the conditions for Engineer/Landscape Architect's approval before starting work.

3.03 LAYOUT OF PLANTING AREAS

- A. Individual plant locations and outlines of shrub and ground cover areas to be planted shall be staked by the Contractor in ample time to allow inspection by the Engineer/Landscape Architect.
- B. Digging shall not begin until locations are approved by the Engineer/Landscape Architect.
- C. Location of trees shall be staked using color coded stakes. A different stake color shall be used for each tree species.

3.04 PREPARATION OF SUBGRADE

- A. Subgrade of planting areas shall be loosened or scarified to a minimum depth of 3 in. prior to spreading planting soil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 in., sticks, and other extraneous material.

3.05 PLANT PIT EXCAVATION

- A. Planting pits for trees and shrubs shall be excavated to the depth and dimension indicated on the Drawings.
- B. Excavation shall not begin until locations are approved by the Engineer/Landscape Architect.

3.06 FILTER FABRIC

- A. Filter fabric shall be installed where indicated on the Drawings. Unless otherwise indicated on the Drawings, filter fabric shall be overlapped 6 in. along all edges.

3.07 SPREADING OF PLANTING SOIL

- A. Planting soil shall be spread and placed to required depths.
- B. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

3.08 PLANTING

- A. Walls of plant pits shall be dug so that they are vertical and scarified.
- B. Plants shall be set as indicated on Drawings. Plants shall have same relationship to finished grade as in the nursery.
- C. Plants shall be turned to the desired orientation when required by Engineer/Landscape Architect.
- D. Containerized plants shall be removed from container taking care not to damage roots. The side of the root ball shall be scarified to prevent root-bound condition and plant positioned in planting pit.
- E. Planting shall be positioned in center of planting pit, set plumb, and rigidly braced in position until all planting soil has been tamped solidly around the ball.
- F. Pits shall be backfilled with planting soil. Soil shall be worked carefully into voids and pockets, tamping lightly every 6 in.
 - 1. When pit is two-thirds full, plants shall be watered thoroughly, and water left to soak in before proceeding.
 - 2. At this time, ropes or strings on top of ball shall be cut and shall be pulled back. Burlap or cloth wrapping shall be left intact around ball except that portions of wrap that are exposed at top of ball shall be turned under and buried. Non-biodegradable ball wrapping and support wire shall be totally removed from ball and planting pit.
 - 3. Remove nursery plant identification tags.
- G. Backfilling and tamping shall then be finished and a saucer formed around plant pits as indicated on the Drawings.
- H. Saucer shall be filled with water and water left to soak in. Saucer shall then be filled with water again.
- I. Following planting of aquatic plant material, 3 in. layer of gravel shall be spread to stabilize soil beneath.

3.09 BULBS AND FLOWERING PLANTS

- A. Prepare flowering plant planting bed by application of fertilizers and pH-altering amendments and thoroughly rototilling into the top 12 in. prior to planting bulbs and flowering plants.

3.10 APPLICATION OF FERTILIZER

- A. Fertilizer shall be applied when planting pits are backfilled two-thirds full. Fertilizer application shall be of the type, rate, and timing recommended by the testing agency for each plant type.
- B. Slow-release fertilizer
 - 1. Fertilization schedule for trees and shrubs using slow release 4 oz. packet system shall be per manufacturers recommendations.
 - 2. Fertilizer packets shall be placed 6 to 8 in. deep below top of planting soil around root balls of plants. Packets shall be spaced evenly depending on the number of packets required.

3.11 FUNGICIDE SPRAYING

- A. Immediately after planting, all trunks of deciduous trees shall be sprayed with fungicide, applied as directed by chemical manufacturer.

3.12 WRAPPING

- A. Trunks of deciduous trees shall be spiral wrapped above the first set of branches. Wrap shall be applied from base up and securely tied.

3.13 STAKING AND GUYING

- A. Each tree shall be staked or guyed immediately following planting. Plants shall stand plumb after staking or guying.
- B. Duckbill Tree Support Systems shall be installed in strict conformance with manufacturer's published installation instructions.
- C. Duckbill Root Ball Fixing Systems shall be installed in strict conformance with manufacturer's published installation instructions.

3.14 MULCHING

- A. Mulch shall be applied as follows (entire area listed shall be mulched):

<u>Plant Type</u>	<u>Mulch Area</u>	<u>Mulch Depth, in.</u>
Tree	Saucer	3
Shrub	Saucer or Bed	3
Ground Cover	Bed	3

3.15 PRUNING

- A. Each tree and shrub shall be pruned to preserve the natural character of the plant. Pruning shall be done after delivery of plants and after plants have been inspected and approved by the Engineer/Landscape Architect. Pruning procedures shall be reviewed with Engineer/Landscape Architect before proceeding.
- B. Pruning shall be done with clean, sharp tools. Cuts shall be made flush, leaving no stubs. No tree paint shall be used.
- C. Dead wood, suckers, and broken and badly bruised branches shall be removed.

3.16 MAINTENANCE OF PLANTING

- A. Maintenance shall begin immediately after each plant is planted and shall continue until Final Acceptance. The Contractor shall provide water for irrigation if none is available on site.
- B. Maintenance shall consist of pruning, watering, cultivating, weeding, mulching, removal of dead material, repairing and replacing of tree stakes, tightening and repairing of guys, repairing and replacing of damaged tree wrap material, resetting plants to proper grades and upright position, and furnishing and applying such sprays as are necessary to keep plantings free of insects and disease, and in a healthy growing condition.
- C. Planting areas shall be kept free of weeds, grass, and other undesired vegetative growth.
- D. Note: Extend maintenance beyond Substantial or Final Acceptance of Project if necessary to meet above requirements. Engineer/Landscape Architect may withhold funds from Substantial and Final Completion payments as necessary to assure proper performance of maintenance operations.

END OF SECTION 02950

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SCOPE

- A. The work of this Section consists of all plain and reinforced concrete work as shown on the Drawings and as specified herein, and includes, but is not limited to the following:
1. Furnishing, placing, curing and finishing of all plain and reinforced concrete work for the building and site.
 2. Furnishing, erection and removal of formwork and shoring.
 3. Furnishing and placing of reinforcing steel and related accessories.
 4. Furnishing and installation of vapor barrier.
 5. Furnishing and installation of perimeter insulation.
 6. Furnishing and installation of joint fillers.
 7. Setting of anchor bolts.
 8. Coordination with all other trades for location of all pipe sleeves, duct openings, keys, chases, electrical boxes and conduits, anchors, inserts, fastenings and other devices required by other trades.
 9. Hardening and sealing of exposed concrete floors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The related work shall be performed under the following Sections:
1. Section 02200 EXCAVATING, BACKFILLING AND COMPACTING.

1.03 REFERENCES (LATEST EDITIONS)

- A. ASTM listed standards by the American Society for Testing and Materials.
- B. ACI listed standards by the American Concrete Institute.
- C. In case of conflict between the References and the Project Specification, the Project Specification shall govern. In the case of conflict between References, the more stringent shall govern.

- D. When compliance with any such References is specified herein for materials or a manufactured or fabricated product, the Contractor, if requested, shall furnish an affidavit from the manufacturer or fabricator certifying that the materials or product delivered to the job meets the requirements specified. However, such certification shall not relieve the Contractor from the responsibility of complying with any added requirements specified herein.

1.04 SUBMITTALS

- A. Submit Complete Shop Drawings and Data, in accordance with the provisions of Section 01300 - SUBMITTALS.
- B. Provide Submittals for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.
- C. Provide concrete Mix Data as specified in Paragraph 2.02B.
- D. Provide manufacturer's Data for other products.
- E. Fabrication of any material or performing of any work prior to the final approval of the Submittals will be entirely at the risk of the Contractor.
- F. The Contractor is responsible for furnishing and installing materials called for in Contract Documents, even though these materials may have been omitted from approved Submittals.
- G. Reproduction of structural plans, sections and details shall not be used for Shop Drawings.

1.05 QUALITY ASSURANCE

- A. All materials, measuring, mixing, transportation, placing and curing shall be subject to inspection by the Architect or by the testing agency. However, such inspection, wherever conducted, shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract requirements, nor shall inspector's acceptance of material or workmanship prevent later rejection of same by the Owner or Architect if defects are discovered.

- B. A qualified testing agency for testing and inspection will be selected by the Owner and shall be paid directly by the Owner.
- C. The Contractor shall retain the services of a qualified testing agency, approved by the Architect, to test aggregate and to prepare or review mix designs for each strength of concrete specified, and shall submit mix designs and test results to the Architect for approval. The costs of all such preliminary services shall be borne by the Contractor.
- D. Advise the testing agency of intent to place concrete by notification at least 24 hours prior to the time of placement.
- E. Concrete will be sampled and tested for quality control as follows:
 - 1. Sampling fresh concrete: ASTM C 172
 - 2. Compression test specimens: ASTM C 31
 - 3. Slump: ASTM C 143
 - 4. Air content: ASTM C 231
 - 5. Compressive strength: ASTM C 39
- F. Cooperate with the testing agency's work and provide help as required for taking and storing samples. Provide storage facilities for concrete cylinders at the site. Facilities must protect cylinders from affects of low or high temperatures in cold or hot weather, respectively.
- G. Compression tests shall consist of four (4) cylinders for each test made, cured and tested by the laboratory during the progress of the job. At least one (1) test shall be made for each strength of concrete up to 50 cubic yards pour, and at least one (1) test per strength for each 50 cubic yards thereafter, unless otherwise directed by the Architect. Concrete for each set of cylinders shall be from one (1) sample representative of the entire batch. All cylinders shall be standard 6" X 12".
- H. When tests of control specimens fall below required strength, the Architect may require core specimens taken from concrete in question and tested in accordance with ASTM C 42. If these specimens do not meet strength requirements, Architect will have right to require additional curing, load tests, strengthening

or removal and replacement of those parts of structure which are unacceptable, and in addition, removal of such sound portions of structure as necessary to ensure safety, appearance, and durability of the structure. Additional testing, load tests, strengthening or removal and replacement of parts of structure shall be at the Contractor's expense.

- I. Accept as final, results of tests made by the qualified professional testing organization engaged by the Owner.
- J. Testing required because of changes requested by the Contractor in materials, sources of materials or mix proportions, and extra testing of concrete or materials because of failure to meet the Specification requirements is to be paid by the Contractor.

1.06 NOTIFICATION OF RELATED TRADES

- A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvres, etc. when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.
- B. Leave openings in walls for pipes, ducts, etc. for mechanical and electrical work, as shown on Drawings or required by layout of mechanical systems.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement
 - 1. Portland Cement - ASTM C 150, Type II.
- B. Natural Aggregate
 - 1. Coarse Aggregate: Shall be hard, durable, uncoated crushed stone or gravel conforming to ASTM C 33. Coarse aggregate shall pass through 3/4" sieve except 3/8" at toppings less than 3" thick.
 - 2. Fine Aggregate: Shall be sand, clean, hard, durable, uncoated grains, free from silt, loam and clay, to meet ASTM C 33.

C. Water

1. Water shall be potable, from the local municipal supply.

D. Admixtures

1. Water-reducing Agent shall conform to ASTM C 494, Type A. Water-reducing agent shall be compatible with air-entraining agent.
2. Air-entraining agent shall conform to ASTM C 260.
3. Calcium Chloride or admixtures containing more than 0.1% Chloride ions are not permitted.

E. Concrete Reinforcement

1. Reinforcing steel shall conform to ASTM A 615 deformed bars, Grade 60.
2. Welded wire fabric shall conform to ASTM A 185 in flat sheets.
3. Bar supports, metal accessories and other devices necessary for proper assembly of concrete reinforcing shall be of standardized factory-made wire bar supports. Wire for tying shall be ASTM A 82, 18 gauge black annealed wire.

F. Formwork

1. Forms for concrete surfaces shall be made of wood, metal or other material subject to approval of the Architect.
2. Form release agent shall be of a non-staining type, specifically manufactured for concrete forms.
3. Form Ties shall be factory-fabricated, removable or snap back of approved design. Wire shall be at least 1-1/2" back from exterior surfaces and 1" from interior surfaces.

G. Surface Conditioners

1. Floor Sealer shall conform to ASTM C 309 Type I and shall be compatible with adhesives used for floor coverings and with floor or deck coatings.
2. Floor Hardener shall conform to "Surfhard" by

Euclid Chemical Company, Inc., "Hornolith" by W.R. Grace Company, "Saniseal 50" by Master Builders Company or equal approved by the Architect.

H. Other Materials:

1. Joint filler where used with caulking or sealants, shall be cork type, non-extruding, self-expanding filler strips conforming to ASTM D 1752, III. Where no sealant or caulking is required, strips may be non-extruding bituminous type in accordance with ASTM D 1751.
2. Flexible epoxy joint sealant shall be Sikadur 51 NS/SL by Sika Corporation, or approved equal.
3. Vapor Barrier shall be .006" polyethylene film.
4. Perimeter insulation shall be extruded polystyrene foam "Styrofoam Brand Tongue and Groove" by Dow Chemical, or equal approved by Architect. Molded bead polystyrene is not permitted.
5. Waterproof Kraft Paper shall be in accordance with ASTM C 171.
6. Non-Shrink Grout: Shall be "Masterfloor 713" by Master Builders, "Sono Grout" by Sonneborn Contech, Inc. "Five Star Grout" by U.S. Grout Corporation or equal approved by the Architect.
7. Polypropylene Fibers - Slabs-On-Grade: Fibrillated, graded length, polypropylene fibers shall be Fibermesh MD or equivalent. Fibers shall be added at the plant in accordance with the manufacturer's recommendations.

2.02 CONCRETE MIXES

A. Strength, cement and water requirements:

Design Compr. <u>Strength, f'c</u>	Min. Cement Factor <u>Sacks/yd³</u>	lbs/yd ³	Max. Water Cement Ratio <u>Gal/sack Gal by wt.</u>
3000	5.5	517	6.50 .60
4000	6.5	611	5.50 .50

B. All concrete shall be proportioned in accordance with ACI Standard 211.1, "Recommended Practice for Selecting

Proportion for Normal and Heavyweight Concrete" and comply with the requirements of ACI 301 "Specifications for Structural Concrete" Chapter 3, Method 1 (trial batches) or 2 (field experience).

- C. Air-entraining and water-reducing agents shall be used in all concrete, in strict accordance with the manufacturer's printed instructions. Total air entrained in freshly mixed concrete shall be 5.0% plus or minus 1.0% of volume of concrete with required strengths maintained.
- D. Water-Cement Ratio - This is a total water in mix at time of placement, including free water of aggregates and liquid admixtures.
- E. Slump of concrete: 3 inches
- F. Premix admixtures in solution form and dispense as recommended by the manufacturer. Include the water in the solution in the design water content of the mixtures.

PART 3 EXECUTION

3.01 STORAGE

- A. All materials shall be stored to prevent damage from the elements and other causes.
- B. Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Any materials which have deteriorated, or which have been damaged, shall not be used for concrete.
- C. Store reinforcement steel on wood skids to protect it from earth and damage from trucking or other construction operations. Reinforcement shall be free from loose mill scale, rust, release agent, concrete splatter and other extraneous coatings at the time it is embedded in the concrete.
- D. All forms shall be stored in neat manner and orderly fashion, protected from the weather and abuse.
- E. Materials which are judged not acceptable for this project shall not be stored on the site, but shall be immediately removed from the site.

3.02 FORMING

- A. Acceptable tolerances shall be as specified in ACI 347 "Recommended Practice for Concrete Formwork".
- B. Forms shall be constructed to conform to shapes, lines, and dimensions shown, plumb and straight, and shall be maintained sufficiently rigid to prevent deformation under load. Forms shall be sufficiently tight to prevent the leakage of grout. Securely brace and shore forms to prevent displacement and to safely support the construction loads.
- C. Treat forms with a form release agent applied according to the manufacturer's instructions, by roller, brush or spray to produce a uniform thin film without bubbles or streaks. Apply the release agent in two coats for the first use of the form and in one coat for each additional use.

3.03 MIXING PROCESS

- A. Ready-mixed concrete shall be mixed and transported in accordance with "Specification for Ready-Mixed Concrete" ASTM C 94, Alt. #3 and ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".

3.04 REINFORCING

- A. Reinforcing shall be securely tied and supported to maintain proper spacing and cover during placing operations. Take particular care to bend tie wire ends away from exposed faces of beams, slabs, and columns. In no case shall ends of tie wires project towards or touch formwork.

3.05 EMBEDDED ITEMS

- A. Coordinate the installation of all embedded items required by other trades. Such items normally are to be in place prior to the placing of reinforcing steel.

3.06 JOINTS

- A. Provide construction joints as shown on the Drawings, but in any case limit the maximum dimensions for placement of concrete in any one placement as follows:
 - 1. Walls: 60 feet
 - 2. Slabs-on-grade: 90 feet

- B. Construction joints shall be formed with keyed bulkheads. Reinforcement shall continue through the joint, and additional reinforcement shall be placed as indicated on the Drawings.
- C. Provide control joints as shown on the Drawings, but in any case limit the maximum dimensions between joints as follows:
 - 1. Slabs-on-grade: 30 feet
- D. Control joints shall be formed by saw cut, or as approved by Architect. Reinforcement shall continue through the joint.

3.07 PLACING

- A. Notify Architect at least 24 hours prior to each placement.
- B. Do not place concrete until soil bearing material, reinforcing steel, inserts, sleeves and other work to be built into the concrete have been inspected and approved by the Architect and all trades concerned.
- C. In hot weather, all concreting shall be done in accordance with ACI 305, "Recommended Practice for Hot Weather Concreting".
 - 1. When temperature rises above 70 degrees F, all surfaces of concrete shall be protected against rapid drying.
 - 2. Concrete delivered to the forms shall have a temperature of not over 90 degrees F.
 - 3. The temperature of the forms shall not be over 90 degrees F.
 - 4. Use ice as part of mixing water in massive concrete elements.
- D. In cold weather, all concreting shall be done in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting".
 - 1. When the average daily temperature falls below 40 degrees F, all surfaces of concrete shall be maintained at a temperature of at least 50 degrees F and not over 90 degrees F for seven (7) days.
 - 2. Concrete delivered to the forms shall have a

temperature of at least 60 degrees F and not over 90 degrees F.

3. The temperature of the forms including gravel base, shall be at least 40 degrees F.
 4. The Contractor shall maintain a record of temperature of the concrete at the most exposed surfaces of each placement at the beginning and at the end of each day of the curing period, which shall be available to the Architect.
- E. Conveying - Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is retained.
- F. Depositing - Delivery and placement of concrete shall be programmed so that the time lapse between batching and placement shall not exceed 1-1/2 hours. Concrete shall not be allowed a free fall of over 4 feet. Concrete shall be deposited as nearly as practicable in its final position, to avoid segregation due to rehandling or flowing.
- G. Concrete shall be deposited continuously, in horizontal layers of such thickness (not deeper than 18 inches) that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Placing shall be carried out at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited.
- H. Concrete shall be consolidated with the aid of mechanical vibrators in conformance with ACI "Recommended Practice for Consolidation of Concrete" to produce a dense, homogeneous mass without voids or pockets. Vibrators should be placed in concrete rapidly so as to penetrate approximately 3 to 4 inches into the previous lift, to blend the two layers. Vibrating techniques must assure that when the course aggregate reaches the form, it stops and the matrix fills the voids.

3.08 FINISHING OF CONCRETE SURFACES

- A. The intent of this Specification is to secure for the job, materials and workmanship of such quality that only nominal finishing will be required to produce

concrete surfaces equal to the best obtainable with the concrete and forming materials specified. Surfaces which reveal, upon removal of forms, imperfections of such magnitude as to seriously impair the appearance of the structure, in the opinion of the Architect, shall be deemed cause for rejection, and concrete members containing such imperfections shall be entirely removed and replaced without damage to adjacent materials or extra expense to the Owner. Lesser imperfections of concrete surfaces shall be patched and finished in accordance with the following procedures:

- B. Exposed vertical surfaces: Immediately after removal of forms, chip off all fins and other projections and patch all voids, honeycombs and air pockets exceeding 3/4" in any dimension. In areas where concentrations of small voids occur, patch a sufficient number of the voids to produce a uniform appearance across the entire panel. Smooth out projections and fins with wet carborundum stones or power grinders to extent directed by Architect. Pull tie rods and finish surface.
- C. Concealed Vertical Surfaces: At surfaces to receive waterproofing membranes or dampproofing coatings, chip off fins and other projections and trowel patch all voids, honeycombs and air pockets exceeding 1/2" in any dimension. Pull tie-rods and patch voids formed by tie-rod cones flush with adjacent surfaces. At other concealed surfaces, patching, if any, shall be as directed by the Architect and shall, in general, be only such as is required to assure or protect the structural integrity of concrete or reinforcing.

3.09 FLOOR AND OTHER FLATWORK FINISHES

- A. Concrete for finish floor slabs shall be poured as dry as practicable within allowable slump range. Except when otherwise indicated or specified, concrete finish floor slabs shall be monolithically finished at required elevation by screeding, floating, and troweling to provide smooth, even, non-porous finish, free of trowel marks. Do not begin finish troweling until concrete has hardened sufficiently to prevent excess fines from working to the surface. After troweling is complete and slabs have set sufficiently to ring the trowel, the surfaces of all slabs exposed in the finished work shall be given a second steel troweling to a burnished finish.

- B. Concrete for floor slabs shall be poured to the proper elevations adding concrete to compensate for form and shoring deflections. Slab thickness indicated on drawings is a minimum.
- C. Finish surface shall not vary more than 1/4" when measured by a 10'-0" straight edge, except at sub-slabs to receive resilient flooring which shall not vary more than 1/8" when measured by a 10'-0" straight edge. Leveling of the slab by the Contractor to this tolerance for resilient flooring will be allowed by the use of latex type underlayment as approved by the Architect.
- D. Exterior platforms, walks, etc. shall be given rough broom finish.
- E. No dry cement or mixture of sand and cement shall be applied to surface of any concrete slab to absorb moisture.
- F. Protect floors from damage until completion of job.

3.10 CURING AND PROTECTION

- A. Protect newly placed concrete against low and high temperature effects and against rapid loss of moisture. Cure all concrete for at least seven days at a temperature of at least 50 degrees F by curing methods approved by the Architect.
- B. Vertical or near vertical surfaces may be cured by maintaining wood forms continuously wet during curing period, by wrapping with continuous .006" polyethylene with taped joints or as approved by the Architect.
- C. Floor surfaces, after hardening sufficiently to prevent damage, and normally within several hours after final troweling, or finishing shall be treated with floor sealer in accordance with manufacturer's recommendations or as approved by the Architect. Sealer shall be compatible with finish floor material or coating. Reinforced waterproof kraft paper with taped lapped seams shall be used at areas to receive material incompatible with sealer.

3.11 FORM REMOVAL

- A. Forms shall be removed without damage to concrete. The contractor shall be responsible for the safety of the construction during and after form removal. No act of

the Architect shall relieve him of this responsibility.

- B. Protect corners from damage after form removal by boxing, corner boards or other means approved by the Architect.
- C. Formwork for pilasters, walls, and other parts not supporting the weight of concrete may be removed as soon as the concrete has reached 30% of its specified 28-day strength, but not before 2 days, provided it is properly cured and protected.
- D. Bracing for foundation walls retaining earth shall remain in place until upper level floor slab has achieved its 28-day strength.

3.12 VAPOR BARRIER

- A. Apply vapor barrier under all interior slabs-on-grade after insuring that gravel sub base is level and well compacted.
- B. Lap all joints to a minimum width of 12 inches. Trim vapor barrier to fit neatly around column bases.
- C. Do not damage the vapor barrier at any time; repair any accidental punctures with a patch of the same material extending a minimum of 12 inches in all directions.

3.13 PERIMETER INSULATION

- A. Apply perimeter insulation in continuous four (4) foot height to inside surface of foundation walls. Insulation shall be 2" thick, set in trowel coat of approved mastic. Lay up insulation, applying mastic to all sides of edges in accordance with manufacturer's instructions.
- B. One-half inch thick insulation shown installed between concrete floor slabs and concrete foundation walls shall be of same material as specified for perimeter insulation.

3.14 CUTTING OF HOLES

- A. Cut holes required by other trades in any cast-in-place concrete which did not receive sleeves. Use a core drilling process or sawing process which produces clean sharp edges and the minimum hole size which accommodates the piping, conduit, or equipment requiring the opening.

- B. Obtain approval of Architect before cutting any holes for any trades.

3.15 FLOOR HARDENING

- A. All interior concrete floors remaining exposed in the finished work shall be treated with a chemical hardener in a three-coat application, not sooner than 28 days after pouring of slab, in accordance with manufacturer's specifications.

3.16 NON-SHRINK GROUT

- A. Grout solid all column leveling plates and beam bearing plates in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Loose Steel Lintels.
 - 2. Miscellaneous Framing and Supports.
 - 3. Columns with base plates, cap plates, connections.
 - 4. Steel Pipe Railings.
 - 5. Metal Stairs. NOT USED
- B. Related Sections:
 - 1. 03300, Cast-In-Place Concrete.
 - 2. 04200, Unit Masonry.
 - 3. 06100, Rough Carpentry
 - 4. 09900, Painting.

1.02 QUALITY ASSURANCE

- A. Design Criteria:
 - 1. Treads and Platforms - Steel Stairs: Capable of withstanding uniform load of 100 psf or concentrated load of 300 lbf located to produce maximum stress conditions.
 - 2. Handrails and Toprails:
 - a. Capable of withstanding following loads applied as indicated when tested per ASTM E935.
 - b. Concentrated Loads: 200 lbf applied at any point in any direction.
 - c. Uniform Load: 50 lbf per linear ft. applied simultaneously in both vertical and horizontal directions.
 - d. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 3. Guards:
 - a. Intermediate rails, balusters and panel fillers capable of withstanding uniform load of 25 lbf per sq. ft. of gross area of guard, including any open areas, of which they are part.
 - b. Above load need not be assumed to be acting concurrently with uniform horizontal loads on toprails of railing assembly in determining stress on guard supporting members.
- B. Shop Assembly:
 - 1. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.
 - 2. Disassemble units only as necessary for shipping and handling limitations.
 - 3. Clearly mark units for reassembly and coordinated installation.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.
- B. Shop Drawings:
 - 1. Submit shop drawings for fabrication and erection of miscellaneous metal fabrications.
 - 2. Include plans, elevations and details of sections and connections.
 - 3. Show anchorage and accessory items.
 - 4. Provide templates for anchor and bolt installation by others.
 - 5. Where materials or fabrications are indicated to comply with certain requirements for design loadings include structural computations, material properties and other information needed for structural analysis.
 - 6. Provide shop drawings signed and sealed by registered Professional Engineer licensed in State of New Hampshire.
- C. Samples: Submit 2 sets of representative samples of materials and finished products as may be requested by Architect.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ferrous Metals:
 - 1. Metal Surfaces - General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - 2. Steel Plates, Shapes and Bars: ASTM A36.
 - 3. Steel Tubing: Cold-formed, ASTM A500; Grade B or hot-rolled, ASTM A501.
 - 4. Structural Steel Sheet: Hot-rolled, ASTM A570 or cold-rolled ASTM A611, Class 1; of grade required for design loading.
 - 5. Galvanized Structural Steel Sheet:
 - a. ASTM A446, of grade required for design loading.
 - b. Coating Designation: As indicated, or if not indicated, G90.
 - 6. Steel Pipe:
 - a. ASTM A53; Type and grade, if applicable, as selected by fabricator and as required for design loading.
 - b. Black finish unless galvanizing is indicated.
 - c. Standard weight, Schedule 40, unless otherwise indicated.
 - 7. Brackets, Flanges and Anchors: Cast or formed

- metal of same type material and finish as supported rails, unless otherwise indicated.
8. Concrete Inserts:
 - a. Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27.
 - b. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
 - B. Grout:
 1. Non-Shrink Non-Metallic Grout:
 - a. Premixed, factory packaged, nonstaining, non-corrosive, nongaseous grout complying with CE CRD-C621.
 - b. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.
 - C. Fasteners:
 1. General:
 - a. Provide hot-dipped galvanized fasteners for exterior use or where built into exterior walls.
 - b. Select fasteners for type, grade, and class required.
 2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
 3. Lag Bolts: Square head type, FS-FF-B-561.
 4. Machine Screws: Cadmium plated steel, FS-FF-S-92.
 5. Wood Screws: Flat head carbon steel, FS-FF-S-111.
 6. Plain Washers: Round, carbon steel, FS-FF-W-92.
 7. Masonry Anchorage Devices: Expansion shields, FS-FF-S-325.
 8. Toggle Bolts: Tumble-wing type, FS-FF-B-588, type, class, and style as required.
 9. Lock Washers: Helical spring type carbon steel, FS-FF-W-84.
 - D. Finish Coatings:
 1. Galvanized Coating - No Field Applied Finish:
 - a. Provide hot-dipped galvanized coating consisting of zinc with addition of min. 0.5 percent nickel for improved appearance and weather-resistance.
 - b. Coating Thickness: Min. 3.4 mils per ASTM A123 and as required by applicable standards for other items.
 - c. Steel Products: Comply with ASTM A123.
 - d. Steel Hardware: Comply with ASTM A153.
 - e. Assembled Steel Products: Comply with ASTM A123.
 2. Galvanized and Primed Coating - Field Applied Finish:
 - a. Provide hot-dipped galvanized coating consisting of zinc with addition of min. 0.5 percent nickel for improved appearance and weather-resistance.
 - b. Coating Thickness: ASTM A123, and as required

- by applicable standards for other items.
 - c. Steel Products: Comply with ASTM A123.
 - d. Steel Hardware: Comply with ASTM A153.
 - e. Assembled Steel Products: Comply with ASTM A123.
 - f. Apply two-component epoxy universal primer by galvanizer within 6 to 12 hours after application of galvanized coating and force cure dry in oven capable of reaching 130 to 150 deg. F to max. 3.0 mil DFT.
3. Shop Primer - Ferrous Metal:
 - a. Manufacturer's or Fabricator's standard, fast-curing, lead-free, universal primer; selected for good resistance to normal atmospheric corrosion, for compatibility with finish paint systems indicated and for capability to provide a sound foundation for field-applied top-coats despite prolonged exposure.
 - b. Comply with performance requirements of FS-TT-P-645.
 4. Galvanizing Repair Paint:
 - a. Touch up field welds and galvanized coating damages using 95 percent organic zinc-rich paint applied to min. 6 mil DFT.
 - b. Comply with ASTM A780.
- E. Concrete Fill:
1. Concrete Materials and Properties:
 - a. Comply with requirements of Section 03300, Cast-In-Place Concrete, for normal weight, ready-mix concrete
 - b. Compressive Strength: 2500 psi at 28 days.
 - c. Mixture: Min. 440 lbs. per sq. ft. cement and max. 0.65 W/C ratio unless higher strengths indicated.

2.02 FABRICATION

- A. General:
1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended.
 2. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.
 3. Use type of materials indicated or specified for various components of work.
 4. Exposed Work:
 - a. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
 - b. Ease exposed edges to radius of approximately 1/32 in. unless otherwise indicated.
 - c. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

5. Welding:
 - a. Weld corners and seams continuously, complying with AWS recommendations.
 - b. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
 6. Exposed Connections:
 - a. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.
 - b. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.
 7. Anchorage:
 - a. Provide for anchorage of type indicated, coordinated with supporting structure.
 - b. Fabricate and space anchoring devices to provide adequate support for intended use.
 8. Surfaces to Receive Hardware: Cut, reinforce, drill and tap miscellaneous metal work as indicated.
 9. Exposure to Weather: Fabricate joints which will be exposed to weather in manner to exclude water or provide weep holes where water may accumulate.
- B. Loose Steel Lintels:
1. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown.
 2. Weld adjoining members together to form single unit where indicated.
 3. Provide min. 8 in. bearing at each side of openings, unless otherwise indicated.
 4. Finish: Paint with primer and paint
see Section 09900 - Painting
- C. Miscellaneous Framing and Supports:
1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete work.
 2. Fabricate miscellaneous units to sizes, shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing.
 3. Except as otherwise indicated, fabricate from structural steel shapes, plates and steel bars of welded construction using mitered joints for field connection.
 4. Cut, drill and tap units to receive hardware and similar items.
 5. Equip units with integrally welded anchors for casting into concrete or building into masonry.
 6. Furnish inserts if units must be installed after concrete is placed.
 7. Except as otherwise indicated, anchors 24 in. o.c. and provide anchor units min. 1-1/4 in. x 1/4 in. x 8 in. steel straps.

8. Finish: Galvanized coating - no field applied finish, except as otherwise indicated.

D. Steel Pipe Railings and Handrails:

1. Fabricate steel pipe railings and handrails to design, dimensions, and details indicated.
2. Provide railings and handrails members formed of pipe of sizes and wall thickness indicated, min. required to support design loading.
3. Interconnect railing and handrail members by butt welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
4. Tee and Cross Intersections: Provide coped joints.
5. Bends: Interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, of radiuses indicated.
6. Elbow Bends: Provide mitered joints.
7. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required.
8. Maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
9. Provide wall returns at ends of wall mounted handrails, except where otherwise indicated.
10. Close exposed ends of pipe by welding 3/16 in. thick steel plate in place or by use of prefabricated fittings.
11. Brackets, Flanges, Fittings, and Anchors:
 - a. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work.
 - b. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.
12. Finish: Paint with primer and paint.

See Section 09900 -Painting

E. Steel Framed Stairs: NOT USED

1. General:
 - a. Construct stairs to conform to sizes and arrangements indicated.
 - b. Join pieces together by welding unless otherwise indicated.
 - c. Provide complete stair assemblies including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components necessary for support of stairs and platforms and as required to anchor and contain stairs on supporting structure.
2. Stair Framing:
 - a. Fabricate stringers of structural steel channels, or plates, or combination as indicated.
 - b. Provide closures for exposed ends of stringers.
 - c. Construct platforms of structural steel channel



- headers and miscellaneous framing members as indicated.
- d. Bolt or weld headers to stringers and newels and framing members to stringers and headers.
 - e. Fabricate and join so that bolts, if used, do not appear on finish surfaces.
 - f. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.
3. Metal Pan Risers, Subtreads:
- a. Shape metal pans for risers and subtreads to conform to configuration shown.
 - b. Provide thicknesses of structural steel sheet for metal pans indicated but not less than that required to support total design loading.
 - c. Form metal pans of hot-rolled or cold-rolled carbon steel sheet, unless otherwise indicated.
 - d. Directly weld risers and subtreads to stringers, locate welds on side of metal pans to be concealed by concrete fill.
 - e. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars.
 - f. Weld brackets to strings and attach metal pans to brackets by welding, riveting or bolting.
 - g. At Contractor's option, provide prefilled treads consisting of prepoured concrete fill, with non-slip aggregate finish in welded sheet metal pan designed and fabricated for attachment to installed stringers using manufacturer's standard connection detail.
4. Subplatforms:
- a. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading.
 - b. Attach subplatform to platform framing members with welds.
5. Stair Railings and Handrails:
- a. Comply with applicable requirements specified elsewhere in this section for steel pipe railings and handrails, and as follows:
 - b. Fabricate newels of steel tubing and provide newel caps of gray iron castings, as shown.
 - c. Railings may be bent at corners, rail returns and wall returns, instead of using prefabricated fittings.
 - d. Connect railing posts to stair framing by direct welding, unless otherwise indicated.
6. Finish: Galvanized and primed coating - field applied finish on exposed surfaces and edges.

F. Prefabricated Building Columns:

1. Type: Prefabricated building columns consist of assemblies composed of loadbearing steel structural member protected by manufacturer's standard insulating concrete fireproofing encased in outer non-

- loadbearing steel shell.
- 2. Fire Performance Characteristics:
 - a. Provide prefabricated building columns which bear UL Classification Marking for fire resistance.
 - b. Fire Resistance Rating: As indicated on Drawings.
- 3. Column Configuration:
 - a. Provide columns of sizes and shapes indicated.
 - b. Fabricate connections to comply with details shown or required to suit type of structure indicated.
- 4. Concrete Fill: Manufacturer's standard structural concrete filling for pipe and tubular sections, with min. 4200 psi compressive strength, machine-mixed and mechanically-vibrated during placement to produce concrete core free of voids.
- 5. Manufacturer: Bridgeport Column Co. Inc, Firetrol Corp, George A. Dean Inc, Lally Column Co. Inc, Tubular Products Inc.

PART 3 EXECUTION

3.01 PREPARATION

A. Field Measurements:

- 1. Take field measurements before preparation of shop drawings and fabrication, where possible.
- 2. Do not delay job progress.
- 3. Allow for trimming and fitting where taking field measurements before fabrication might delay Work.

B. Coordination:

- 1. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction.
- 2. Coordinate delivery of such items to project site.

3.02 INSTALLATION

A. General:

1. Fastening to In-Place Construction:

- a. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction.
- b. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws and other connectors as required.

- 2. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding Work.

- B. Steel Pipe Railings and Handrails:
 - 1. Adjust railing before anchoring to ensure matching alignment at abutting joints.
 - 2. Space posts at spacing indicated, or if not indicated, as required by design loadings.
 - 3. Plumb posts in each direction.
 - 4. Rail Ends:
 - a. Anchor into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
 - b. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
 - 5. Wall Mounted Handrails:
 - a. Secure handrails to wall with wall brackets and end fittings.
 - b. Provide bracket with min. 1-1/2 in. clearance from inside face of handrail and finished wall surface.
 - c. Locate brackets as indicated, or if not indicated, at spacing required for design loading.

3.03 ADJUSTING AND CLEANING

- A. Touch-Up Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
 - 2. Apply by brush or spray to provide min. 2.0 mil DFT.
- B. Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

- END OF SECTION -

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wood Framing.
 - 2. Wood Grounds, Nailers, and Blocking.
 - 3. Wood Furring.
 - 4. Sheathing.
 - 5. Treated Wood.
 - 6. Air Infiltration Barrier.
 - 7. Sub-Floor.
 - 8. Underlayment.
 - 9. Rough Stair Framing.

- B. Related Sections:
 - 1. 05500, Metal Fabrications.
 - 2. 06192, Prefabricated Wood Trusses.
 - 3. 06400, Architectural Woodwork.
 - 4. 09250, Gypsum Board.

1.02 SUBMITTALS

- A. Wood Treatment Data:
 - 1. Submit chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
 - 2. Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and conformance with applicable standards.
 - 3. Water-Borne Treatment: Include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Keep rough carpentry Work dry during delivery, storage, and installation.

- B. Provide for air circulation in stack of wood materials.

PART 2 PRODUCTS

2.01 MATERIALS

certified by American Lumber Standards Committee's (ALSC) Board of Review.

2. Inspection Agencies: Inspection agencies and abbreviations used to reference with lumber grades and species include:
 - a. NLGA, National Lumber Grades Authority.
 - b. SPIB, Southern Pine Inspection Bureau.
3. Grade Stamps:
 - a. Factory-mark each piece of lumber with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 - b. Exposed Lumber: Apply grade stamps to ends or back of each piece, or omit grade stamps entirely and issue certificate of grade compliance from inspection agency instead of grade stamp.
4. Sizing and Moisture Content:
 - a. Nominal sizes are indicated, except as shown by detail dimensions.
 - b. Provide actual sizes as required by PS 20, for moisture content specified for each use.
 - c. Dressed Lumber: S4S, unless otherwise indicated.
 - d. Lumber: Max. 15 percent moisture content at time of dressing and shipment for max. 2 in. nominal thickness, unless otherwise indicated.
5. Species: Any species listed meeting specified grade and rules.
 - a. SPF (Spruce-Pine-Fir) graded under NLGA rules.
 - b. Southern Pine graded under SPIB rules.
 - c. Hem-Fir graded under WWPA rules.

B. Dimension Lumber:

1. Light Framing:
 - a. Stud or Standards grade lumber for stud framing 2 to 4 in. thick, 2 to 6 in. wide, 10 ft. and shorter.
 - b. Standard grade for other light framing, 2 to 4 in. thick, 2 to 4 in. wide, any species.
2. Structural Light Framing: 2 to 4 in. thick, 2 to 4 in. wide, Select Structural Grade, No. 1, No. 2, or No. 3 grade.
3. Structural Framing: 2 to 4 in. thick, 5 in. and wider, shall be SPF (Spruce-Pine-Fir) No. 2 or better, including joists, rafters, beams, studs, posts and plates.
4. Exposed Framing Lumber:
 - a. Definition: Exposed framing refers to dimension

lumber not concealed by other work and indicated to receive stained or natural finish.

- b. Grading: Hand-select material at factory from lumber of species and grade indicated for compliance with Appearance Grade requirements of ALSC National Grading Rule; issue inspection certificate of inspection agency for selected material.
- c. Same species and grade as indicated for structural framing.

C. Miscellaneous Lumber:

- 1. Provide wood for support or attachment of other work including cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- 2. Provide lumber of sizes indicated, worked into shapes shown.
- 3. Moisture content: Max. 19 percent for lumber items not specified to receive preservative treatment.
- 4. Grade: Standard Grade light framing size lumber of any species or board size lumber as required. No. 3 Common or Standard grade boards per WCLIB or WWPAA rules or No. 3 boards per SPIB rules.

D. Construction Panels:

- 1. Construction Panel Standards: Comply with PS 1, U.S. Product Standard for Construction and Industrial Plywood for plywood panels and, for products not manufactured under PS 1 provisions, with APA Performance Standard and Policies for Structural Use Panels, Form No. E445.
- 2. Trademark: Factory-mark each construction panel with APA trademark evidencing compliance with grade requirements.
- 3. Concealed APA Performance-Rated Panels: Where construction panels will be used for following concealed types of applications, provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure-durability classification, edge detail (where applicable), and thickness.
- 4. Roof Sheathing: APA RATED SHEATHING, exterior with span rating to suit rafter spacing.
- 5. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA CD PLUGGED INT with exterior glue, in thickness indicated or, if not otherwise indicated, min. 1/2 in.
- 6. Subflooring: APA RATED SHEATHING, exterior, with span rating to suit rafter spacing indicated.
- 7. Wall Sheathing: APA RATED SHEATHING, exterior with span rating to suit stud spacing.
- 8. Plywood Underlayment for Resilient Flooring:
 - a. Underlayment under 19/32 in. in indicated thickness, plywood panels with fully sanded face.

- b. Grade Designation: APA UNDERLAYMENT INT, exterior glue.
 - c. Underlayment over lumber floors with boards up to 4 in. wide, plywood of species Group 1.
9. Plywood Underlayment for Carpet: Plywood panels in thickness indicated, APA UNDERLAYMENT INT, exterior glue.

E. Miscellaneous Materials:

- 1. Fasteners and Anchorages:
 - a. Provide size, type, material, and finish and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers, and anchoring devices.
 - b. Provide metal hangers and framing anchors of size and type recommended by the manufacturer for each use including recommended nails.
 - c. Where rough carpentry work is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners and anchorages with hot-dip zinc, ASTM A153.
- 2. Building Paper: ASTM D226, Type I; asphalt saturated felt, nonperforated; 15 lb. type.
- 3. Air Infiltration Barrier:
 - a. Provide 6.1 mil thick fabric composed of very fine, high density polyethylene fibers.
 - b. Vapor Transmission Rate: 51.30 grams per 100 sq. in. in 24 hours.
 - c. Weight: 8.81 lbs. per 1000 sq. ft.
 - d. Bursting Strength: 105 psi tear resistance of 32.5 lbs. for length, 24.8 lbs. for width.
 - e. Air Porosity: 7.6 seconds; water resistance of 99.3 cm of water head.
 - f. Product: Dupont Co. Model Tyvek, or equal.
- 4. Sill Sealer Gaskets:
 - a. Glass fiber resilient insulation fabricated in strip form for use as sill sealer.
 - b. 1 in. nominal thickness compressible to 1/32 in.
 - c. Select from manufacturer's standard widths to suit width of sill members indicated.

2.02 FABRICATION

A. Preservative Treatment:

- 1. Where lumber or plywood is specified to be treated, comply with applicable requirements of AWWA C2 - Lumber and C9 - Plywood and AWPB standards listed.
- 2. Mark each treated item with AWPB Quality Mark Requirements.
- 3. Pressure-treat above-ground items with waterborne preservatives to comply with AWPB LP2.
- 4. After treatment, kiln-dry lumber and plywood to maximum moisture content, respectively, of 19 and 15 percent.
- 5. Treat indicated items and following:

- a. Wood cants, nailers, curbs, blocking, striping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
- b. Wood sills, sleepers, blocking, furring, striping, and similar concealed members in contact with masonry or concrete.
- c. Wood Framing Members: Max. 18 in. above grade.
- 6. Pressure-treat following with waterborne preservatives for ground contact use complying with AWPB LP22:
 - a. Wood members in contact with ground.
 - b. Wood members in contact with fresh water.
- 7. Complete fabrication of treated items before treatment, where possible.
- 8. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPB M4.
- 9. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates, adjoining construction, and conditions under which Work is to be installed.
- B. Do not proceed with Work where unsatisfactory conditions exist.
- C. Where rough carpentry is fitted to other Work, obtain measurements of other Work, verify dimensions shown on shop drawing details.
- D. Apply heavy brush coat of same chemical treatment material to surfaces exposed by sawing, cutting, or drilling.

3.02 ERECTION

- A. General:
 - 1. Discard units of material with defects which might impair quality of Work, and units which are too small to use in fabricating Work with minimum joints or optimum joint arrangement.
 - 2. Set carpentry Work to required levels and lines, members plumb and true to line, cut and fitted.
 - 3. Securely attach carpentry Work to substrate by anchoring and fastening as shown and as required by recognized standards.
 - 4. Countersink nail heads on exposed carpentry Work and fill holes.
 - 5. Use common wire nails, except as otherwise indicated.
 - 6. Use finishing nails for finish Work.
 - 7. Select fasteners of size that will not penetrate

- members where opposite side will be exposed to view or will receive finish materials.
8. Make tight connections between members.
 9. Install fasteners without splitting of wood; pre-drill as required.
- B. Wood Grounds, Nailers, Blocking, and Sleepers:
1. Provide wherever shown and where required for screeding or attachment of other Work.
 2. Form to shapes as shown and cut as required for true line and level of Work to be attached.
 3. Coordinate location with other Work involved.
 4. Attach to substrates as required to support applied loading.
 5. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.
 6. Build into masonry during installation of masonry Work.
 7. Where possible, anchor to formwork before concrete placement.
 8. Provide permanent grounds of dressed, preservative treated, key-beveled lumber min. 1-1/2 in. wide and of thickness required to bring face of ground to exact thickness of finish material involved.
 9. Remove temporary grounds when no longer required.
- C. Construction Panels:
1. General: Comply with applicable recommendations contained in Form No. E 30D, APA Design/Construction Guide Residential & Commercial, for types of construction panels and applications indicated.
 2. Fastening Methods:
 - a. Sheathing: Nail or staple to framing.
 - b. Plywood Backing Panels: Nail to supports.
- D. Stud Framing:
1. General:
 - a. Provide stud framing where shown.
 - b. Use 2 in. x 4 in. wood studs 16 in. o.c. with 4 in. face perpendicular to direction of wall or partition.
 - c. Provide single bottom plate and doubletop plates 2 in. thick by width of studs; except single top plate non-loadbearing partitions.
 - d. Nail or anchor plates to supporting construction.
 - e. Construct corners and intersections, min. 3 studs.
 - f. Provide miscellaneous blocking and framing as shown and as required for support of facing materials, fixtures, specialty items and trim.
 - g. Provide continuous horizontal blocking row at midheight of single-story partitions over 8 ft. high and at midpoint of multistory partitions, using 2 in. thick members of same width as wall or partitions.
 2. Openings:

- a. Frame openings with multiple studs and headers.
- b. Provide nailed header members of thickness equal to width of studs.
- c. Set headers on edge and support on jamb studs.
- d. Non-Bearing Partitions: Provide double jamb studs and headers min. 4 in. deep for openings max. 36 in. wide and min. 6 in. deep for wider openings.
- e. Load-Bearing Partitions: Provide double jamb studs for openings max. 72 in. wide, and triple jamb studs for wider openings.
- f. Provide headers of depth shown or, if not shown, provide as recommended by NFPA Manual for House Framing.

E. Floor Joist Framing:

1. General:

- a. Provide framing on sizes and spacings shown.
 - b. Attach to wood bearing members by toe nailing or metal connector.
 - c. Frame to wood supporting members with wood ledgers as shown or, if not shown, with metal connectors.
 - d. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmer where span of header exceeds 48 in.
 - e. Do not notch in middle third of joists.
 - f. Limit notches to 1/6 depth of joist, 1/3 at ends.
 - g. Do not bore holes larger than 1/3 depth of joist or locate closer than 2 in. from top or bottom.
 - h. Provide solid blocking 2 in. thick by depth of joist at ends of joists unless nailed to header or brand member.
- 2. Lap members framing from opposite sides of beams, girders or partitions min. 4 in. or securely tie opposing members together.
 - 3. Provide solid blocking 2 in. thick by depth of joist over supports.
 - 4. Anchor members paralleling masonry with 1/4 in. x 1-1/4 in. metal strap anchors max. 96 in. o.c.
 - 5. Extend anchors min. 4 in. into masonry, turn up 4 in. and extend over and fasten to 3 joists.
 - 6. Under jamb studs at openings, provide solid blocking between joists.
 - 7. Under non-loadbearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 8. Provide triple-joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures, unless otherwise indicated.
9. Bridging:
- a. Provide bridging between joists where nominal depth-to-thickness ratio exceeds 4, at intervals of 96 in.
 - b. Use bevel cut 1 in. x 4 in. or 2 in. x 3 in.

wood bracing, double-crossed and nailed both ends to joists, or use solid wood bridging 2 in. thick by depth of joist, end nailed to joist.

F. Rafter and Ceiling Joist Framing:

1. Ceiling Joists:

- a. Provide member size and spacing shown, and as previously specified for floor joist framing.
- b. Face nail to ends of parallel rafters.
- c. Where principal ceiling joists are at right angles to rafters, frame as indicated with additional short joists from wall plate to first joist; nail to ends of rafters and to top plate and nail to long joists or anchor with framing anchors or metal straps.
- d. Provide 1 in. x 8 in. or 2 in. x 4 in. stringers 48 in. o.c. crosswise over principal ceiling joists.

2. Rafters:

- a. Provide member size and spacing shown.
- b. Notch to fit exterior wall plates and toe nail or use special metal framing anchors.
- c. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers.
- d. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.

3. Valleys:

- a. Provide valley rafter of size shown or, if not shown, provide rafter twice as thick as regular rafters and 2 in. deeper.
- b. Bevel ends of jack rafters for full bearing against valley rafter.

4. Hips:

- a. Provide hip rafters of size shown or, if not shown, provide of same thickness as regular rafters and 2 in. deeper.
- b. Bevel ends of jack rafters for full bearing against hip rafters.

G. Rough Stair Framing:

1. Provide stair framing members of size, space, and configuration indicated or, if not otherwise indicated, to comply with following requirements.
2. Stringer Size: Min. 2 in. x 12 in.
3. Notch stringers to receive treads, risers, and supports; leave min. 3-1/2 in. of effective depth.
4. Stringer Spacing: Min. 3 stringers for each 36 in. clear width of stair.
5. Fabricate stair framing to following variations between treads and risers for each flight of stairs.
 - a. Adjacent Treads and Risers: 3/16 in.
 - b. Between Largest and Smallest Treads and Risers: 3/8 in.

3.03 ADJUSTING AND CLEANING

- A. Maintain premises in neat, safe, and orderly condition during execution of Work.
- B. Maintain free of accumulations of sawdust, cut ends, and debris.

3.04 Advantech

- A. Advantech 3/4" and 5/8" T & G sheathing in lieu of plywood is an acceptable product.

END OF SECTION 06100

SECTION 06190
PREFABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SCOPE

A. The work of this Section consists of all wood roof and floor truss work as shown on the Drawings and as specified herein, and includes, but is not limited to the following:

1. Design, fabrication and erection of prefabricated wood roof and floor trusses.
2. All temporary and permanent bracing of wood roof and floor trusses.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. The related work shall be performed under the following Sections:

1. Section 06100 ROUGH CARPENTRY.

1.03 REFERENCES (LATEST EDITIONS)

A. National Forest Products Association (NFPA):

"National Design Specification for Wood Construction" (including supplement, "Design Values for Wood Construction").

B. Truss Plate Institute (TPI):

"Design Specification for Metal Plate Connected Wood Trusses"

"Recommended Code of Standard Practice for the Metal Plate Connected Wood Truss Industry"

"Bracing Wood Trusses: Commentary and Recommendation"

"Quality Control Manual"

C. ASTM listed standards by the American Society for Testing and Materials.

D. In case of conflict between the References and the Project Specification, the Project Specification the more stringent shall govern.

- E. When compliance with any such References is specified herein for materials or a manufactured or fabricated product, the Contractor, if requested, shall furnish an affidavit from the manufacturer or fabricator certifying that the materials or product delivered to the job meets the requirements specified. However, such certification shall not relieve the Contractor from the responsibility of Complying with any added requirements specified herein.

1.04 SUBMITTALS

- A. Submit complete Shop Drawings in accordance with the provisions of Section 01300 - SUBMITTALS.
- B. Submit Shop Drawings of trusses showing truss configuration and span, size, species and grade of all wood members; location of all splices; and details of all joints including number, size and type of all connector plates. Shop Drawings shall also show locations of all required compression web bracing or other member bracing.
- C. Submit design calculations. Printout from a digital computer program showing all loads, spans, member forces, deflections and reactions shall satisfy this requirement. Calculations shall bear the stamp of a Professional Engineer, registered in the State of ~~Maine.~~
- D. Submit, at the Architect's request, records of tests of metal connector plates, conducted in accordance with ASTM D 1716, E 489, E 767 and Appendix C of TPI "Design Specification for Metal Plate Connected Wood Trusses." Tests shall be for each type of plate used, and shall be adequate in number and type to determine the safe capacity of the plates in the grades and species of wood to be used. Test records shall be certified by an independent testing agency acceptable to the Architect.
- E. Reproduction of structural plans, sections and details shall not be used for Shop Drawings.

1.05 QUALITY ASSURANCE

- A. All materials and workmanship under this Section shall be subject to inspection in the mill, shop or field by the Architect, or by qualified inspectors selected by the Architect and paid directly by the Owner. All trusses shall be visually inspected.

- B. However, such inspection, wherever conducted, shall not relieve Truss Fabricator of his responsibility to provide his own inspection, testing and quality control and to furnish materials and workmanship in accordance with Contract requirements, nor shall inspector's acceptance of materials or workmanship prevent later rejection of same by Owner or Architect if defects are discovered.
- C. The Truss Fabricator shall give proper notice to inspection agencies designated by the Architect and shall allow access and full facilities as required for this inspection.

PART 2 PRODUCTS

2.01 TRUSSES

- A. Trusses shall be metal plate connected wood trusses as defined by the Truss Plate Institute, or as approved by the Architect.

2.02 WOOD MATERIALS

- A. Species and grades of wood to be used in trusses shall be determined by the Truss Fabricator, subject to the restrictions and requirements stated elsewhere in this Section, and subject to requirements of the appropriate referenced specifications.
- B. All lumber used for trusses shall be identified with a grade mark of the appropriate grading authority as determined by the NFPA "National Design Specification for Wood Construction."
- C. No warped, bowed, split or otherwise structurally defective members shall be used.
- D. Lumber used for bracing shall comply with the requirements of Section 06100 ROUGH CARPENTRY.

2.03 METAL PLATE CONNECTORS

- A. Connector plates shall be toothed plates of 18 gauge minimum sheet steel, galvanized to conform to ASTM A 446 Grade A, Class G 90.

- B. Capacities of plate connectors in wood joints shall be determined in accordance with TPI "Design Specification for Metal Plate Connected Wood Trusses."
- C. Tests of connector plates shall be conducted for all species and grades of lumber to be used in truss fabrication.

2.04 FABRICATION

- A. All trusses shall be fabricated by a member of the Truss Plate Institute.

PART 3 EXECUTION

3.01 DESIGN AND FABRICATION

- A. Trusses shall be designed by the Truss Fabricator to safely carry the specified design loads over the spans shown on the Drawings without exceeding the allowable stresses in members or connections as stipulated in the appropriate referenced specification and without exceeding the deflections shown on the drawings.
- B. Truss design loads shall be as stated on the Drawings, but shall not be less than TPI recommended minimum design loads (TPI "Design Specification for Metal Plate Connected Wood Trusses", Appendix A).
- C. Generally, trusses shall be fabricated with configurations and sizes of members shown on the Drawings, of an appropriate species and grade of wood, such that the allowable stresses are not exceeded. The Architect may, at his discretion, approve other sizes or configurations. Sizes of members not specified on the Drawings shall be determined by the truss fabricator, but shall not be less than nominal 2 x 4.
- D. Stresses in members and forces in connections shall be determined for design purposes by a rational analysis, in accordance with accepted engineering practice. The analysis shall include the effects of stresses due to local eccentricities in the joints, unless connections are detailed such that such eccentricities do not exist.
- E. In general, analysis shall assume all compression and bending members to be unbraced unless special bracing is detailed or unless continuous bracing can reasonably be inferred from the Drawings, in accordance with accepted

engineering practice. Location and types of all bracing required by analysis or assumed in design shall be indicated on the Shop Drawings.

- F. Trusses shall be fabricated only from approved Shop Drawings. Sizes, configurations, connector plates and other materials shall be exactly as shown on approved Shop Drawings.
- G. Members meeting at a joint shall be accurately cut and fit to bear wood to wood. Connector plates shall be undamaged, and shall be well embedded and accurately aligned so as not to introduce eccentricities into the joint, unless such eccentricities are accounted for in the analysis and design.
- H. Splices shall be located only where indicated on approved Shop Drawings.

3.02 STORAGE

- A. Store all trusses in the yard or the field so as to limit lateral bending of members and prevent damage to joints. Banding of trusses with metal strapping is recommended.

3.03 ERECTION AND BRACING

- A. Erect all trusses plumb, straight and true, and located accurately in place as shown of the Drawings. Install such temporary bracing as required to keep trusses plumb and accurately aligned under the action of wind or other forces as may occur during construction. As a minimum, comply with TPI "Bracing Wood Trusses: Commentary and Recommendation. "Such temporary bracing shall remain in place until all permanent bracing and sheathing is in place.
- B. Attach trusses with standard metal hurricane anchors each end of each truss, unless other connection is required by the Drawings.
- C. Install all permanent truss bracing called for in the Drawings, as well as any compression web, or other member bracing as may be required by Truss Fabricator in accordance with his design.

END OF SECTION

SECTION 06400

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Standing and Running Trim.
 - 2. Casework.
 - 3. Countertops.
 - 4. Wood Handrails.
 - 5. Closet Pole and Shelf.

- B. Related Sections:
 - 1. 06100, Rough Carpentry.
 - 2. 09900, Painting.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Provide millwork only from manufacturers complying with AWI Standards producing similar Work for min. 5 yrs.
 - 2. Installer: Employ only experienced personnel for fabrication and installation of millwork.

- B. Design Criteria:
 - 1. Reference Standards:
 - a. Refer to AWI Quality Standards for definition of Premium, Custom, or Economy.
 - b. Any item not given specific quality grade shall be Custom Grade.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit shop drawings showing detail construction of woodwork, based on Drawings, and modified or revised as may be required to achieve intended structural character.
 - 2. Elevations: Draw at scale of min. 1/2 in. = 1 ft.
 - 3. Details: Draw at scale of min. 3 in. = 1 ft.

- B. Manufacturer's Data: Submit literature of specialty items not manufactured by millwork manufacturer.

- C. Samples:
 - 1. Submit min. 12 in. sq. or 12 in. length of each wood specie to receive transparent finish and factory finished items.
 - 2. Submit one sample of each item of hardware for review.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protection and Storage:
 - 1. Deliver woodwork fully protected from weather and damage.
 - 2. Store woodwork in weathertight, well ventilated area.
 - 3. Do not install woodwork in any space until plaster, masonry, and other wet work in space is sufficiently dry.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Solid Lumber Stock:
 - 1. General: Comply with AWI 100, plain sawn, S4S and work to shapes indicated, unless otherwise indicated.
 - 2. Preservative Treatment - Exterior Woodwork: Refer to Section 06100, Rough Carpentry.
- B. Plywood:
 - 1. Comply with AWI 200, veneer core.
 - 2. Face Veneer:
 - a. Softwood: Douglas fir.
 - 3. Cut: Plain sliced, smooth.
- C. Particleboard:
 - 1. Comply with AWI 200 and CS236, mat formed.
 - 2. Density: NPA Grade 1-M-3.
 - 3. Finish:
 - a. Paint or varnish all surfaces and edges not covered with plastic laminate.
 - b. At cutouts made for particleboard countertops, seal all edges to prevent water damage or swelling of material.
- D. Hardboard:
 - 1. Comply with AWI 200, Grade 1, tempered smooth two sides for both side exposure, smooth one side for one side concealed.
 - 2. 1/4 in. thick tempered for use as substitute for 1/4 in. plywood when surfaces are painted.
- E. Plastic Laminate:
 - 1. NEMA LD3 General Purpose Type 0.05 in. thick, finish and color as selected.
 - 2. Backing sheets on shelves 0.02 in. thick.
- F. Fasteners:
 - 1. Wood Screws: ANSI B18, type, size, and material as required for condition of use.
 - 2. Bolts and Nuts: ANSI B18 and ASTM A307 type, size, and material as required.
- G. Adhesives: Melanine, phenol-resin, or seasoned-resin to AWI standards and manufacturer's recommendations

suiting for purpose.

2.02 FABRICATION

A. Standing and Running Trim and Rails:

1. General:
 - a. Quality Standard: AWI Section 300.
 - b. Rout or groove backs of flat trim members, kerf backs of other wide flat members, except for members with ends exposed in finished work.
 - c. Assemble casings in plant except where limitations of access to place of installation require field assembly.
2. Exterior Trim - Opaque Finish:
 - a. Grade: Custom.
 - b. Lumber Species: Pine.
3. Interior Trim and Rails - Transparent Finish:
 - a. Grade: Premium.
 - b. Lumber Species: Red Oak, rift sawn.
 - c. Provide split species on trim which face areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
4. Interior Trim - Opaque Finish:
 - a. Grade: Custom.
 - b. Lumber Species: Poplar

B. Architectural Cabinets - Laminate Clad:

1. Quality Standard: AWI Section 400 and Division 400B.
2. Laminate Clad Cabinets:
 - a. Grade: Custom.
 - b. Type of Cabinet Construction: Flush overlay.
 - c. Laminate Cladding: High pressure decorative laminate complying with NEMA LD 3.
 - d. Colors, Pattern and Finishes: As selected by Architect from laminate manufacturer's standard products.
3. Laminate Grade - Exposed Surfaces:
 - a. Horizontal Surfaces Other Than Tops: GP-50, 0.050 in. nominal thickness.
 - b. Postformed Surfaces: PF-42, 0.042 in. nominal thickness.
 - c. Vertical Surfaces: GP-50, 0.050 in. nominal thickness.
 - d. Edges: GP-50, 0.050 in. nominal thickness.
 - e. Semi-Exposed Surfaces: High pressure laminate, GP-28.
 - f. Dust Panels: 1/4 in. plywood or tempered hardboard above compartments and drawers except where located directly under tops.

C. Cabinet Hardware and Accessory Materials:

1. Hardware Finishes:
 - a. Comply with BHMA 1301 for finishes indicated by BHMA Code Numbers.

- b. 626, satin chromium plated, brass or bronze base.
 - c. 652, satin chromium plated, steel base.
 - d. 630, satin stainless steel.
 - e. Concealed Hardware: Provide manufacturer's standard finish complying with product class requirements of ANSI/BHMA A156.9.
2. Hinges:
 - a. Concealed, self-closing, 180 deg. operation.
 - b. Product: Stanley Model 1503-2.
 3. Drawer Slides:
 - a. Full extension, side mount, stay-close, self-closing.
 - b. Capacity: 100 lb.
 - c. Manufacturer: Knapp & Vogt, Grant Hardware Co.
 4. Pulls: As selected.
 5. Locks:
 - a. 3/4 in. dia. disc tumbler, pivoting cam type with 1 in. throw.
 - b. Doors: 7/8 in. dia. disc tumbler, plunger type with 15/32 in. throw.
 6. Adjustable Shelf Hardware:
 - a. Standards: 0.080 in. thick, 1/2 in. slots, 1 in. o.c., 11/16 in. wide.
 - b. Bracket: 1-13/16 in. wide with reinforced top hook length as required.
- D. Countertops and Vanities:
1. AWI 400C, Custom Grade for quality of fabrication.
 2. Finish: Plastic laminate.
 3. Core: NPA Grade 1-M-3 particleboard.
 4. Thickness: As detailed.
- E. Wood Handrails:
1. Pressure glued and doweled end returns, eased edges to profiles indicated.
 2. Specie: Poplar
 3. Provide radius finger grip on back edge of rail.
 4. Include all fillers, plugs, and mitered returns to match railing.
- F. Closet Pole and Shelf:
1. Shelf: 3/4 in. birch plywood with solid wood edgeboard stock.
 2. Pole:
 - a. 1-1/16" o.d. tubing.
 - b. Product: Knap & Voyt Model 660 with 764 heavy duty flanges.
 3. Apartment Shelving: Open welded wire shelving, vinyl coated; with anchors, brackets and bracing.
- G. Fasteners and Anchors:
1. Screws:
 - a. Select material, type, size, and finish required for each use.
 - b. Comply with FS FF-S0111 for applicable requirements.
 - c. For metal framing supports, provide screws as recommended by metal framing manufacturer.
 2. Nails:

- a. Select material, type, size, and finish required for each use.
 - b. Comply with FS FF-N-105 for applicable requirements.
 - c. Provide stainless steel or aluminum nails for exposed exterior woodwork which is to receive transparent finish, if any.
 - d. Provide any type of non-corrosive nail for other exterior woodwork.
3. Anchors:
- a. Select material, type, size, and finish required by each substrate for secure anchorage.
 - b. Provide non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion-resistance.
 - c. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.
 - d. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and adjoining construction, and conditions under which Work will be installed.
- B. Do not proceed with Work until conditions detrimental to proper and timely completion of Work have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Verify dimensions before proceeding and obtain measurements at site for Work required to be accurately fitted to other construction.
 - 2. Coordinate Work with other trades affected by this installation.
 - 3. Give particular attention to work of supporting and attachment items so as not to delay progress.
 - 4. Backprime lumber for painted finish exposed on exterior, or in moisture or humidity locations on interior, to requirements of Section 09900, Painting.
 - 5. Discard material which is unsound, warped, bowed, twisted, improperly treated, too small to fabricate work with minimum joints, or of defective fabrication with respect to surface, size, or pattern.
 - 6. Scribe and cut work to fit adjoining work and refinish cut surfaces.
- B. Standing and Running Trim:
 - 1. Install with minimum joints using full-length pieces.

2. Stagger joints in adjacent and related members.
3. Cope at returns and miter at corners.
4. Use scarf joints for end-to-end joints.
5. Secure to grounds, stripping, and blocking with concealed and blind nails using fine finishing nails.

C. Casework:

1. Install without distortion for proper opening and accurate alignment of doors and drawers.
2. Adjust hardware to center doors and drawers.
3. Anchor tops to base units and other support systems.

- D. Finishes: Refer to Section 09900, Painting, for field finished items.

3.03 FIELD QUALITY CONTROL

A. Tolerances:

1. Plumb and Level: 1/8 in. in 8 ft.
2. Offset in Surface Alignment: Max. 1/16 in.
3. Offset in Revealed Adjoining Surface: Max. 1/8 in.

3.04 ADJUSTING AND CLEANING

A. Adjustments:

1. Repair damaged Work or replace with new to eliminate defects.
2. Adjust joinery for uniform appearance.
3. Clean, lubricate, and adjust hardware.

B. Cleaning:

1. Clean all surfaces.
2. Provide protection and maintain installed condition until Substantial Completion.

- END OF SECTION -

SECTION 07200

INSULATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Rigid Board Insulation.
 - 2. Fibrous Batt or Blanket Insulation.
 - 3. Vapor Barrier.
- B. Related Sections:
 - 1. 03300, Cast-In-Place Concrete.
 - 2. 09250, Gypsum Board.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each type of insulation and vapor barrier material required.
- B. Certified Tests: With product data, submit copies of certified test report showing compliance with specified performance values, including k-values - aged values for plastic insulations - densities, compression strengths, burning characteristics, perm ratings, water absorption ratings, and similar ratings.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Protection:
 - 1. Protect insulation materials from weather and construction processes.
 - 2. Do not allow insulation to become wet or soiled.
 - 3. Comply with precautions and recommendations of manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Rigid Board - Foamed Polystyrene:
 - 1. Description: ASTM C578, extruded polystyrene foam insulation.
 - 2. Fire Resistance: ASTM E84 to following standards:
 - a. Flame Spread: 0 - 25.
 - b. Fuel Contributed: 0.
 - c. Smoke Developed: 0 - 160.
 - 3. Density: 1.6 to 3.
 - 4. Water Vapor Permeance: ASTM E96, max. 1.0 perm.
 - 5. Thermal Resistance: R-value = 4 to 6 @ 1 in.
 - 6. Product: Dow Chemical U.S.A. Model Styrofoam TG, UC Industries Model Foamular 250 TG, Amoco Corp.

- B. Fibrous - Batt or Blanket Glass Fiber:
 - 1. Description: ASTM C665, glass fiber blanket thermal and acoustical insulation.
 - 2. Fire Resistance: ASTM E84 to following standards:
 - a. Flame Spread: 0 - 25.
 - b. Fuel Contributed: 0 - 50.
 - c. Smoke Developed: 0 - 50.
 - 3. Density: 0.50 to 4 lbs. per cu. ft.
 - 4. Thermal Resistance: R-value = 3.16 @ 1 in.
 - 5. Manufacturer: Owens Corning Fiberglas Corp., Certainteed Corp., Manville.
- C. Miscellaneous Materials:
 - 1. Vapor Barrier Tape: 2 mil, dead soft aluminum foil backing with transparent synthetic rubber adhesive, rated UL Class 1.
- D. Vapor Barrier:
 - 1. Cross laminated high strength, high density poly sheeting. 6 mil.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
 - 1. Extend insulation full thickness over entire area to be covered unless indicated otherwise.
 - 2. Cut and fit insulation, where required, tightly around all obstructions so no voids exist in insulation course.
 - 3. Comply with manufacturer's instructions for particular condition of use and type of insulation and accessory items.
 - 4. Consult manufacturer's representative for specific instructions if instructions are not applicable to conditions of use.
- B. Rigid Board:
 - 1. Stagger end joint locations in single layer installation.
 - 2. Coat edges of insulation boards with adhesive at joints when insulation system is set in adhesive.
 - 3. Shove boards into place so that compound seals joints.
 - 4. Apply vapor barrier tape to all seams, joints, penetrations, and terminations where shown to receive vapor barrier facing to achieve full integrity of vapor barrier.
 - 5. Foundations:
 - a. Extend around entire perimeter underslab of conditioned spaces to 24 in. from foundation wall.
 - b. Extend down foundation wall to footings on inside of foundation wall around entire perimeter of conditioned spaces.

C. Batt or Blanket:

1. Flanged Blankets:

- a. Insert between framing members with vapor barrier facing inward.
- b. Recess 1/2 in. from face of framing.
- c. Attach flanges to sides of framing members at each end of blankets and along length of flanges.
- d. Fasten max. 6 in. o.c. on walls and ceilings and max. 4 in. o.c. on floors.

2. Non-Flanged Blankets - Metal Studs:

- a. Install between studs from interior side of wall.
- b. Attach to gypsum sheathing using 9/16 in. staples with divergent points placed at each corner and in center of each blanket.
- c. Hold blanket tightly against metal lath backing with taut horizontal tie-wires spaced max. 36 in. o.c.

D. Vapor Barrier:

1. Extend to perimeter of areas to be protected from vapor transmission.
2. Secure in place and seal all joints by lapping min. 2 in. and sealing all joints.
3. Repair any tears or penetrations.

- END OF SECTION -

SECTION 07310

SHINGLES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Shingles.
 - 2. Underlayment.
 - 3. Fasteners.
 - 4. Ridge Vent.
 - 5. Soffit Vent.
 - 6. Flashing.
 - 7. Ice and Water Shield.
 - 8. Gutters and Downspouts.

- B. Related Sections:
 - 1. 06100, Rough Carpentry.
 - 2. 07900, Joint Sealers.

1.02 QUALITY ASSURANCE

- A. UL Listing: Provide labeled materials tested and listed by UL for Class and Rating indicated for each shingle type required.

1.03 SUBMITTALS

- A. Product Data: Submit technical product data, installation instructions, and recommendations from shingle manufacturer, including data that materials comply with requirements.

- B. Samples:
 - 1. Submit full range of samples for color and texture selection.
 - 2. After selection, submit 2 full-size shingles for verification of each color/style/texture selected.

- C. Maintenance Stock: 2 percent of each type, color, and texture of shingle used in Work.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's unopened, labeled containers.

- B. Storage:
 - 1. Store materials to avoid water damage.
 - 2. Store rolled goods on end.
 - 3. Comply with manufacturer's recommendations for job-site storage and protection.

1.05 PROJECT/SITE CONDITIONS

- A. Substrate: Proceed with shingle Work only after substrate construction and penetrating Work have been completed.
- B. Weather Conditions: Proceed with shingle Work only when weather conditions are in compliance with manufacturer's recommendations and when substrate is completely dry.

1.06 WARRANTY

- A. Specified Product Warranty:
 - 1. Provide shingle manufacturer's warranty on installed Work, agreeing to pay for repair or replacement of defective shingles as necessary to eliminate leaks.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Shingles - Fiberglass:
 - 1. Description: ASTM D3018, Type 1 fiberglass mat shingles with asphalt, mineral stabilizers, ceramic granules, UL Class A and Wind Resistant Label, 3-tab self-sealing square tab design.
 - 2. Strips Per Square: 80.
 - 3. Bundles Per Square: 3.
 - 4. Exposure: Nom. 5 in.
 - 5. Size: Nom. 12 in. x 36 in.
 - 6. Headlap: 2 in.
 - 7. Color: As selected from manufacturer's standard.
 - 8. Product: Celotex Model Fiberglass Asphalt Shingles 20, Certainteed Model Glassguard, or equal.
- B. Ridge Vent: Roof Ridge Ventilator
 - 1. Roll-formed 0.019 in. aluminum, stucco embossed, complete with adapter pieces and glass fiber weather filter, 18 sq. in. net free area per lin. ft.
 - 2. Color: As selected.
 - 3. Fasteners: Aluminum nails.
 - 4. Manufacturer: Cor-A-Vent Inc.
- C. Soffit Vent:
 - 1. Roll-formed 0.019 in. aluminum, with built-in venting strip, 9 sq. in. net free area per lin. ft.
 - 2. Vent Style: Linear slots backed with insect screening.
 - 3. Color: As selected.
 - 4. Size: As selected.
 - 5. Manufacturer: Air Vent Inc., or equal.
- D. Underlayment:

1. No. 15 Asphalt Felt:
 - a. UL 55A, Type 15, plain.
 - b. Size: 36 in. wide x 72 in., 108 in., or 144 in., as required to cover roof length with no splices where possible.

- E. Metal Flashing:
 1. Flashing: 0.024 in. mill finish sheet aluminum, job cut to size and configuration indicated.
 2. Drip Edge: Min. 0.024 in. mill finish aluminum sheet brake-formed to provide 3 in. roof deck flange and 1-1/2 in. fascia flange with 3/8 in. drip at lower edge, min. 8 ft. lengths.

- F. Gutters and Downspouts:
 1. Aluminum: 3003-H14 alloy, min. 0.032 in. ga. for gutters and min. 0.019 in. ga. for downspouts; white baked enamel.
 2. Provide gutters complete with strainers, outlet tubes, gutter ends, expansion joints, screens, baffles, and hangers.

- G. Ice and Water Shield:
 1. Type: Cold-applied, self-adhering preformed membrane.
 2. Size: 36 in. wide.
 3. Product: W.R. Grace Model Bituthene Ice and Water Shield, Certainteed Corp. Model Winter Guard, Owens Corning Model Deck Dri, or equal.

- H. Fasteners: Hot-dipped galvanized steel, 10-1/2 to 12 ga. roofing nails having 3/8 in. dia. heads, min. 1-1/4 in. long.

- I. Cement: ASTM D2822, fibrated asphalt cement.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Underlayment:
 1. Comply with recommended specifications of ARMA.
 2. Lap each sheet 2 in. over preceeding sheet and turn up vertical surface 4 in.
 3. Use one layer 30 lb. or two mopped layers 15 lb. in field area of roof.

- B. Shingles:
 1. Apply with max. 5-5/8 in. weather exposure and min. 4 nails per strip.
 2. Lay starter strip at eaves over underlayment full length of roof area.
 3. Lay full width strip shingles vertically at gable ends.
 4. Start laying full width strip shingles over starter strip and maintain exposure during laying.
 5. Do not lay any strip having less than 3 in. wide

- tab.
 - 6. Apply hip and ridge shingles to match field shingles.
 - 7. Lay shingles in interlayers and fasten to substrate min. 6 in. away from centerline on each side of valley.
- C. Gutters and Downspouts - Metal:
- 1. Use slip joint connectors to connect gutter sections, end joints, or miter corners together.
 - 2. Attach gutter sections to building using spike and ferrule every other rafter, on each side of any miter course, and two on each end section.
 - 3. Make all connections in direction of water flow.
 - 4. Fasten downspout to wall with hangers, min. 2 per length of downspout.
 - 5. Install drip edge under shingles to prevent water reaching roof.
 - 6. Wash system with detergent and touch up scratches and chips.
- D. Ice and Water Shield:
- 1. Apply membrane to manufacturer's instructions for eaves, rakes, valleys, hips, and ridges.
 - 2. Roll entire membrane and apply second course with min. 6 in. overlap.
 - 3. Cover all valleys with initial min. 11 in. wide strip centered on axis of valley and lay full width membrane.
 - 4. Apply double layer around penetrations occurring in membrane min. 6 in. in all directions and seal.
 - 5. Install drip edge at eaves before placing shield and after placing shield for rakes.
 - 6. Do not use in open valleys.

- END OF SECTION -

SECTION 07460 - CLADDING/SIDING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Horizontal Plastic Siding.
 - 2. Plastic Louver.
 - 3. Ventilated Soffit Panel.
 - 4. Accessories.

- B. Related Sections:
 - 1. 06100, Rough Carpentry.
 - 2. 07200, Insulation.
 - 3. 07900, Joint Sealers.
 - 4. 09900, Painting.

1.02 SUBMITTALS

- A. Product Data: Submit specifications, installation instructions, and general recommendations from siding manufacturer including data that materials comply with requirements.

- B. Samples: Full range of samples for color and texture selection, two 12 in. lengths or two 12 in. sq. pieces for verification of each color, style, and texture selected.

1.03 DELIVERY STORAGE AND HANDLING

- A. Storage:
 - 1. Store siding materials at site to prevent warping and weather damage, elevating above ground on level blocking, covering to prevent water damage and to permit adequate ventilation in bundles.
 - 2. Acclimatize hardboard siding by storing at site min. 5 days before installation.

1.04 PROJECT/SITE CONDITIONS

- A. Substrate: Proceed with siding work only after substrate construction and penetrating Work are completed.

- B. Weather Conditions: Proceed with siding work only when substrate is completely dry.

1.05 WARRANTY

- A. Provide manufacturer's specific product warranty covering full cost of material and labor for designated period.
 - 1. Vinyl: 10 year limited warranty for manufacturing defects and 10 year material replacement warranty for hail damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plastic Clapboard Siding Materials:
 - 1. Formed Plastic Siding:
 - a. Solid PVC panels of size and pattern indicated, with concealed fastening system and integral color as selected.
 - b. Style: Triple 3 in. exposure with metal nail hem, smooth low gloss surface.
 - c. Color: As selected from standard colors for siding, trim pieces and horizontal banding.
 - 2. Accessories: Solid PVC inside and outside corner posts, starter strips, drip caps, and trim channels to match vinyl siding.
 - 3. Fasteners:
 - a. Aluminum or hot-dipped zinc-coated siding or common nails, in sufficient length to penetrate min. 1 in. into substrate.
 - b. Provide prefinished fasteners in color to match siding where face nailing is required.
 - 4. Product: Wolverine Technologies Model Triple 3 with Flotrac, or equal.

- B. Plastic Louver:
 - 1. Rectangular integral color PVC louver.
 - 2. Size: 18 in. x 24 in. or 12 in. x 18 in., as detailed.
 - 3. Color: As selected.
 - 4. Product: VIPCO Inc. Model VRL, or equal.

- C. Sealants: Refer to Section 07900, Joint Sealers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Comply with instructions and recommendations of siding manufacturer except to extent more stringent requirements are indicated.

- B. Plastic Clapboards Siding:
 - 1. Install starter strip, corner posts, and necessary trim as recommended by manufacturer.
 - 2. Install siding with tolerances and fastener spacings as recommended by manufacturer, interlocking subsequent courses to form weathertight surfacing.

END OF SECTION 07460

SECTION 07500

FLEXIBLE SHEET ROOFING SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Types of roofing systems specified in this Section using flexible sheet roofing membranes of a Non-Penetrating Membrane Anchor Roofing System.
2. Flexible Sheet Roofing Membranes Consist of Ethylene Propylene Diene Monomer (EPDM).
3. Roof Insulation.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:

- a. Obtain primary flexible sheet roofing from a single manufacturer.
- b. Provide secondary materials as recommended by manufacturer of primary materials.

2. Installer: A firm with min. 5 years of successful experience in installation of roofing systems similar to those required for this Project and which is acceptable to or licensed by manufacturer of primary roofing materials.

3. Pre-Roofing Conference:

- a. Before installation of roofing and associated work, meet at Project site, or other mutually agreed location, with Installer, roofing manufacturer, Installers of related work, and other entities concerned with roofing performance, including (where applicable) Owner's insurer, test agencies, governing authorities, Architect, and Owner.
- b. Record discussions and agreements and furnish copy to each participant.
- c. Provide min. 72 hours advance notice to participants before convening pre-roofing conference.

B. Design Criteria:

1. UL Listing: Provide labeled materials which have been tested and listed by UL in "Building Materials Directory" for application indicated, with "Class A" rated materials/system for roof slopes shown.
2. Fire Performance Characteristics:

- a. Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and in-

- specting agency acceptable to authorities having jurisdiction.
- b. Surface Burning Characteristics: ASTM E84.
- c. Fire Resistance Ratings: ASTM E119.
- d. Combustibility Characteristics: ASTM E136.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Submit specifications, installation instructions, and general recommendations from manufacturers of flexible sheet roofing system materials, for types of roofing required.
 - 2. Include data substantiating that materials comply with requirements.
- B. Samples:
 - 1. Submit 12 in. square samples of finished roofing sheets, including "T-shaped" side/end-lap seam.
 - 2. Submit 12 in. square samples of required insulation.
- C. Pre-Roofing Conference: Submit copies of pre-roofing conference records.

1.04 WARRANTY

- A. Special Project Warranty:
 - 1. Provide written warranty, signed by Manufacturer of primary roofing materials and authorized installer, agreeing to replace/repair defective materials and installation.
 - 2. Repairs and replacements required because of events beyond Contractor's/Installer's/Manufacturer's control, and which exceed performance requirements, shall be completed by Contractor/Installer and paid for by Owner.
 - 3. Warranty period is 10 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- * A. EPDM Membrane:
 - 1. Ethylene propylene diene monomers formed into uniform, flexible sheets complying with ANSI/RAM IPR-1.
 - a. Thickness: .045" mechanically attached and .060" 8'-6" fully adhered section at perimeter of roof.
 - 2. EPDM membrane roofing system:
 - a. Manufacturer: Carlisle Sure-Seal M.A.R.S. Design "NP" Non-Penetrating Membrane Anchor Roofing System, Firestone RubberGuard or Stevens Roofing System.
- B. Miscellaneous Materials For FSR:

1. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer or cover exposed spliced edges as recommended by manufacturer.
 2. Cant Strips, Tapered Edge Strips, and Flashing Accessories: Types recommended by manufacturer, provided at locations indicated and at recommended locations, including adhesive tapes, flashing cements, and sealants.
 3. Membrane Adhesive: As recommended by the membrane manufacturer for particular substrate and project conditions, formulated to withstand min. 60 psf uplift force.
- C. Insulating Materials:
1. Polyisocyanurate Board Roof Insulation:
 - a. Rigid, cellular thermal insulation with polyisocyanurate closed-cell foam core and manufacturer's standard facing laminated to both sides; complying with FS HH-1-1972/2, Class 1.
 - b. Aged R-values as designated at mean temperatures indicated, after conditioning per RIC/TIMA Bulletin #281-1, and as follows:
 - c. Surface Burning Characteristics: Max. flame spread of 25.
 - d. Thermal Resistivity: 14.4 @ 75 deg. F (23.9 deg. C) for 2 in. thick insulation board.
- D. Miscellaneous Insulation Materials:
1. Mastic Sealer: Type recommended by insulation manufacturer for bonding edge joints and filling voids.
 2. Mechanical Anchors: As recommended by insulation manufacturer for deck type, and complying with fire and insurance rating requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. General:

1. Comply with manufacturer's instructions for preparation of substrate to receive the system.
2. Clean substrate of dust, debris, and other substances detrimental to the system work.
3. Remove sharp projections.
4. Install cant strips, flashings, and accessory items as shown and as recommended by manufacturer even though not shown.
5. Prime substrate where recommended by manufacturer of materials being installed.
6. Prevent compounds from entering and clogging drains and conductors, and from spilling or migrating onto surfaces of other work.

3.02 INSTALLATION

A. Insulation Installation:

1. General:

- a. Extend insulation full thickness as multiple layers over entire surface to be insulated, cutting and fitting tightly around obstructions.
 - b. Form cant strips, crickets, saddles, and tapered areas with additional material as shown and as required for proper drainage of membrane.
 - c. Stagger all joints in one direction for each course.
 - d. For multiple layers, stagger joints both directions between courses.
2. Do not install more insulation each day than can be covered with membrane before end of day and before start of inclement weather.
 3. Secure roof insulation to substrate with mechanical anchors of type and spacing indicated; but in no case provide less than one anchor per 4 square feet of surface area, or less anchorage than required by FM "Loss Prevention Data Sheet 1-28".
 4. Limit joints between adjacent units to max. 1/4 in.

B. The Membrane Installation:

1. General: Start installation only in presence of manufacturer's technical representative.
2. Application of roofing:
 - a. Install membrane by unrolling over prepared substrate, lapping adjoining sheets as recommended by manufacturer.
 - b. Locate membrane anchors as recommended by the manufacturer. Installation of roofing to comply with the manufacturers recommendations for project.
 - c. Treat seams with special cement and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer.
 - d. Install mechanical fasteners, flashings and counterflashings, and accessories at locations and as recommended by manufacturer.

C. Walkway Protection:

1. Install paver units at locations shown and where required for access to roof-mounted equipment.
2. Place protection boards carefully to avoid damage to membrane, laying over an additional layer of roof membrane material, loosely applied, for additional protection.

- END OF SECTION -

SECTION 07600 - FLASHING AND SHEET METAL

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. This Section includes the following:
 - 1. Metal counter flashing and base flashing.
 - 2. Built-in metal valleys, gutters, and scuppers.
 - 3. Gutters and downspouts (rain drainage).
 - 4. Exposed metal trim/fascia units.
 - 5. Miscellaneous sheet metal accessories.
 - 6. Elastic roof/wall expansion joint systems.
 - 7. Laminated and composition flashing.
 - 8. Copper roofing and siding.
- B. Integral masonry flashings are specified as masonry work in sections of Division 4.
- C. Roofing accessories installed integral with roofing membrane are specified in roofing system sections as roofing work.
- D. Roof accessory units of premanufactured, set-on type are specified in Division 7 Section "Roof Accessories."

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
- C. Samples of the following flashing, sheet metal, and accessory items:
 - 1. 8-inch-square samples of specified sheet materials to be exposed as finished surfaces.

2. 12-inch-long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.

D. Shop drawings showing layout, profiles, methods of joining, and anchorages details, including major counterflashings, trim/fascia units, gutters, downspouts, scuppers, and expansion joint systems. Provide layouts at 1/4-inch scale and details at 3-inch scale.

1.4 PROJECT CONDITIONS

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM MATERIALS

All sheet metal flashing and trim materials shall be as indicated on drawings; copper or aluminum baked enamel finish

A. Copper: ASTM B 370; temper H00 (cold-rolled) except where temper 060 is required for forming; 16 oz. (0.0216-inch thick) except as otherwise indicated.

1. Provide lead coating of 0.06 psf on exposed copper surfaces.

B. Sheet Aluminum: ASTM B 209, alloy 3003, temper H14, AA-C12C42R1X baked enamel finish; 0.040-inch thick (20 gauge) except as otherwise indicated. Color selected by architect. Gravel stop and fascia; furnish all joint covers, preformed shapes and corners, screw and accessories.

2.3 LAMINATED COMPOSITION SHEET FLASHING

A. Copper/Paper Flashing: 5-oz. copper sheet laminated between 2 sheets of bituminous impregnated creped Kraft paper or saturated fabric.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Afco Products, Inc.; "Cop-A-Bond Duplex."

2. Phoenix Building Products, Inc.; "Duplex Cop-R Flash."
3. York Manufacturing, Inc.; "Cop-R-Tex Duplex."

D. Miscellaneous Materials and Accessories:

- E. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.
- F. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.
- G. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
- H. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- I. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.
- J. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealers."
- K. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior nonmoving joints including riveted joints.
- L. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.
- M. Paper Slip Sheet: 5-lb. rosin-sized building paper.
- N. Polyethylene Underlayment: Minimum 6-mil carbonated polyethylene film resistant to decay when tested in accordance with ASTM E 154. (Alternate: 30 lb Felt).
- O. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, noncorrosive.
- P. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

- Q. Gutter and Conductor-Head Guards: 20-gage bronze or nonmagnetic stainless steel mesh or fabricated units, with selvaged edges and noncorrosive fasteners. Select materials for compatibility with gutters and downspouts.
- R. Elastic Flashing Filler: Closed-cell polyethylene or other soft closed-cell material recommended by elastic flashing manufacturer as filler under flashing loops to ensure movement with minimum stress on flashing sheet.
- S. Roofing Cement: ASTM D 2822, asphaltic.

2.4 FABRICATED UNITS

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.
- F. Aluminum Extrusion Units: Fabricate extruded aluminum running units with formed or extruded aluminum joint covers

for installation behind main members where possible. Fabricate mitered and welded corner units.

2.5 ELASTIC EXPANSION JOINTS

- A. General: Provide factory-fabricated units of size and profile indicated, complete with prefabricated corner units, intersection units, and splicing materials. Provide complete with elastic sheet flashing forming the primary joint membrane, in a supported, "bellows" arrangement designed for securement to both sides of expansion joints. Underside of bellows insulated with adhesively applied, flexible, closed-cell rubber or plastic not less than 3/8-inch thick.
- B. Type: Plain sheet or encapsulated metal flanged edges, for embedment in other construction or nailing to substrates, 4-inches minimum flange width.
- C. Type: Metal flanged edges, 3 to 4 inches wide, formed to profiles as indicated to fit curbs and designed for nailing to curb substrate. Provide metal flanges in the following thicknesses:
 - 1. Copper: 16 oz.
- D. Looped Bellows Width: 5 to 6 inches, exclusive of flanges.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Afco Products, Inc.
 - 2. Celotex Corporation
 - 3. International Permalite/Roofing Components Group.
 - 4. Manville/Roofing Systems Division.
 - 5. Phoenix Building Products, Inc.
 - 6. York Manufacturing, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units;

conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

- B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.
- C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- D. Install reglets to receive counterflashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of Division 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of Division 4 sections.
- E. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.
- F. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6 inches o.c. Fabricate seams at joints between units with minimum 3-inch overlap, to form a continuous, waterproof system.
- G. Install "beehive"-type strainer-guard at conductor heads, removable for cleaning downspouts.

3.2 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION 07600

SECTION 07700 - ROOF SPECIALTIES AND ACCESSORIES

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 and locations of roof accessories is indicated on the drawings and by provisions of this section.
- B. Types of units specified in this section include the following:
 - 1. Ridge Vents
 - 2. Skylights
- C. Refer to roofing system sections of these specifications for roofing accessories to be built into roofing system (not work of this section).

1.3 SUBMITTALS:

- A. Product Data; Roof Accessories: Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations. Submit glazing samples, mock-up, warranty.

1.4 QUALITY ASSURANCE:

- A. Standards: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS:

- A. Provide manufacturers' standard units, modified as necessary to comply with requirements. Shop fabricate each unit to greatest extent possible.

2.2 MATERIALS

- A. RIDGE VENT to be decorative type aluminum plain vented ridge with ventilated drip edge, with profile as indicated on drawings, as manufactured by Old World Distributors, Inc., Red Bank Building Masterpieces, Solar Group, Inc. or Vent-A-Ridge by Alcoa.

END OF SECTION 07700

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Exterior Joints in Vertical Surfaces and Non-Traffic Horizontal Surfaces.
 2. Exterior Joints in Horizontal Traffic Surfaces.
 3. Interior Joints in Vertical Surfaces and Horizontal Non-Traffic Surfaces.
 4. Interior Joints in Horizontal Traffic Surfaces.
 5. Fire-Resistant Joint Sealers.

1.02 QUALITY ASSURANCE

- A. Qualifications:
1. Installer:
 - a. Firm who has successfully completed within the last 3 years min. 3 joint sealer applications similar in type and size to that of this Project.
 - b. Firm who will assign mechanics from these earlier applications to this project, of which one will serve as lead mechanic.
 - B. Design Criteria:
 1. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.
 2. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each joint sealer product required, including instruction for joint preparation and joint sealer application.
- B. Samples for Initial Selection Purposes: Submit manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- C. Samples for Verification Purposes:
1. Submit samples of each type and color of joint sealer required.
 2. Install joint sealer samples in 1/2 in. wide joints formed between two 6 in. long strips of material matching the appearance of exposed surfaces adja-

cent to joint sealers in the Work.

- D. Certificates: Submit certificates from manufacturers of joint sealers attesting that products comply with Specification requirements and are suitable for the use indicated.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.05 PROJECT/SITE CONDITIONS

- A. Environmental Conditions:
 - 1. Do not proceed with installation of joint sealers under the following conditions:
 - a. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg. F(4.4 deg. C).
 - b. When joint substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers when joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Compatibility: Provide joint sealers, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
 - 2. Use self-leveling compounds for horizontal joints and non-sag compounds for all other areas except as indicated or specified.
 - 3. Sealant Color:
 - a. Concealed Joints: Use sealant with manufacturer's standard color having best overall performance qualities for indicated application.

- b. Exposed Joints: Use sealant as selected from manufacturer's standard colors unless special colors are shown or specified.
- 4. ASTM C920, Classification Method:
 - a. Type S: One-part prepackaged.
 - b. Type M: Multi-part, job-mixed.
 - c. Grade P: Horizontal flowing.
 - d. Grade NS: Vertical non-sag.
 - e. Use T: Pedestrian and vehicular traffic.
 - f. Use NT: Non-traffic exposure.
 - g. Use M: Mortar.
 - h. Use G: Glass.
 - i. Use A: Aluminum.
 - j. Use O: Other.

B. Elastomeric Joint Sealants:

- 1. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those referenced for Type, Grade, Class, and Uses.
- 2. One-Part Mildew-Resistant Silicone Sealant:
 - a. Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with non-porous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.
 - b. Product: Dow Corning Corp. Model Dow Corning 786, General Electric Co. Model SCS 1702, Pecora Corp. Model 863 #345 White, Rhone-Poulenc Inc. Model Rhodorsil 6B White, Sonneborn Building Products Division Rexnord Chemical Products Inc. Model OnmiPlus, Tremco Inc. Model Proglaze White.
- 3. Multi-Part Non-Sag Urethane Sealant for Use NT:
 - a. Type M, Grade NS, Class 25.
 - b. Product: Bostik Construction Products Division Model Chem-Calk 500, Mameco International Inc. Model Vulkem 227, Mameco International Inc. Model Vulkem 922, W.R. Meadows Model Dualthane, Pecora Corp. Model Dynatrol II, Products Research & Chemical Corp. Model Permapol RC-2, Sika Corp. Model Sikaflex-2c NS, Sonneborn Building Products Division Rexnord Chemical Products Inc. Model Sonolastic NP 2, Tremco Inc. Model Dymeric.
- 4. Multi-Part Pourable Urethane Sealant for Use T:
 - a. Type M, Grade P, Class 25.
 - b. Product: Bostik Construction Products Division Model Chem-Calk 500, Mameco International Inc. Model Vulkem 245, Mameco International Inc. Model Vulkem 255, W.R. Meadows Model Pcurthane, Pecora Corp. Model NR-200 Urexpan, Products Research & Chemical Corp. Model PRC 280, Sika Corp. Model Sikaflex-2c SL, Sonneborn Building

Products Division Rexnord Chemical Products
Inc. Model Sonolastic Paving Joint Sealant,
Tremco Inc. Model THC-900.

C. Fire-Resistant Joint Sealers:

1. General: Provide manufacturer's standard fire-stopping sealant, with accessory materials, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E814 by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
2. One-Part Fire-Stopping Sealant:
 - a. One-part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes, and similar penetrations through walls and floors.
 - b. Product: Dow Corning Corp. Model Dow Corning Fire Stop Sealant, General Products Division/3M Model 3M Fire Barrier Caulk CP-25, General Electric Co. Model RTV 7403, Standard Oil Engineered Materials Co. Model Fyre Putty.

D. Joint Sealant Backing:

1. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Plastic Foam Joint Fillers:
 - a. Preformed, compressible, resilient, non-waxing non-extruding strips of plastic foam of material indicated and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - b. Either flexible, open cell polyurethane foam or non-gassing closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.
3. Elastomeric Tubing Joint Fillers:
 - a. Neoprene, butyl, or EPDM tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg. F(-15 deg. C).
 - b. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
4. Bond-Breaker Tape:
 - a. Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back, third surface, of joint.
 - b. Provide self-adhesive tape where applicable.

E. Miscellaneous Material:

1. Primer: Provide type recommended by sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealer-substrate and field tests.
2. Cleaners for Non-Porous Surfaces: Provide non-staining chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent non-porous materials.
3. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.
4. Accessory Materials for Fire-Stopping Sealants: Provide forming, joint fillers, packing, and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

PART 3 EXECUTION

3.01 INSPECTION

- A. Require Installer to inspect joints indicated to receive joint sealers for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealer performance.
- B. Obtain Installer's written report listing any conditions detrimental to performance of joint sealer Work.
- C. Do not allow joint sealer Work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Pre-Installation Meeting: At Contractor's direction, installer, joint sealer manufacturers' representatives, and other trades whose Work affects installation of joint sealers shall meet at Project site to review procedures and time schedules proposed for installation of joint sealers which is coordinated with other, related Work.
- B. Surface Cleaning of Joints:
 1. Clean out joints immediately before installing joint sealers to comply with recommendations of sealant manufacturers and the following requirements.
 2. Remove all foreign materials from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.

3. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with sealers.
4. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
5. Remove laitance and form release agents from concrete.
6. Clean metal, glass, glazed surfaces of ceramic tile, and other non-porous surfaces by chemical cleaners or other means which are not harmful to substrate or leave residues capable of interfering with adhesion of joint sealers.

C. Joint Priming:

1. Prime joint substrates where indicated or where recommended by sealant manufacturer based on pre-construction joint sealer-substrate tests or prior experience.
2. Apply primer to comply with sealant manufacturer's recommendations.
3. Confine primers to area of joint sealer bond.
4. Do not allow spillage or migration to adjoining surfaces.

D. Masking Tape:

1. Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears.
2. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION

- A. General: Comply with sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Sealant Backings:

1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
2. Do not leave gaps between ends of joint fillers.
3. Do not stretch, twist, puncture, or tear joint fillers.
4. Remove absorbent joint fillers which have become wet before sealant application and replace with dry materials.

5. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where required to prevent third side adhesion of sealant to back of joint.
6. Install compressible seals serving as sealant backings to comply with requirements indicated for joint fillers.

C. Installation of Fire-Stopping Sealant:

1. Install sealant, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs.
2. Comply with installation requirements established by testing and inspecting agency.

3.04 PROTECTION AND CLEANING

A. Protection:

1. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.
2. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

- B. Clean off excess sealants or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

- END OF SECTION -

SECTION 08111 - STANDARD STEEL DOORS AND FRAMES

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 this Section.

1.2 SUMMARY

- A. This Section includes the following products manufactured in accordance with SDI Recommended Standards:
 - 1. Doors: Seamless, hollow or composite construction standard steel doors for interior and exterior locations.
 - 2. Frames: Pressed steel frames for doors, transoms, sidelights, mullions, interior glazed panels, and other interior and exterior openings of following type:
 - a. Welded unit type.
 - b. Knockdown field assembled type.
 - 3. Assemblies: Provide standard steel door and frame assemblies as required for the following:
 - a. Labeled and fire rated.
 - b. Thermal rated (insulated).
 - 4. Provide factory primed doors and frames to be field painted.
- B. Painting primed doors and frames is specified in Division 9 Section "Painting."
- D. Wood doors are specified in another Division 8 Section.
- E. Door hardware is specified in another Division 8 Section.
- F. Glass and Glazing are specified in another Division 8 Section.
- G. Building in of anchors and grouting of frames in masonry construction is specified in Division 4.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- C. Shop drawings showing fabrication and installation of standard steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
 - 2. Indicate coordinate of glazing frames and stops with glass and glazing requirements.
- D. Samples for verification purposes of each type of exposed finish required, prepared on samples not less than 3 inches by 5 inches and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
- E. Label Construction Certification: For door assemblies required to be fire-rated and exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

1.4 QUALITY ASSURANCE

- A. Provide doors and frames complying with Steel Door Institute "Recommended Specifications Standard Steel Doors and Frames" ANSI/SDI-100 and as herein specified.
- B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies whose fire resistance characteristics have been determined per ASTM E 152 and which are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide manufacturer's certification that doors conform to all standard construction requirements of tested and labeled fire-rated door assemblies except for size.
2. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 450 deg F (232 deg C) maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inches spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering standard steel doors and frames which may be incorporated in the work include; but are not limited to, the following:
 1. Standard Steel Doors and Frames:
 - a. Amweld Building Products, Inc.
 - b. Ceco Corp.
 - c. Copco Door Co.
 - d. Curries Company.
 - e. Deansteel Manufacturing Co.
 - f. Fenestra Corp.
 - g. Kewanee Corp.
 - h. Mesker Door Co.
 - i. Pioneer Industries.
 - j. Premier Products, Inc. (Formerly Dittco).
 - k. Republic Builders Products.

1. Steelcraft Manufacturing Co.

2.2 MATERIALS .

- A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, or drawing quality, ASTM A 642, hot dipped galvanized in accordance with ASTM A 525, with A60 or G60 coating designation, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 18-gage sheet steel; galvanized where used with galvanized frames.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable.
- F. Shop Applied Paint: Apply after fabrication.
 - 1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

2.3 DOORS

- A. Provide metal doors of types and styles or grades and models indicated on drawings or schedules.
- B. Provide metal doors of SDI grades and models specified below or as indicated on drawings or schedules:
 - 1. Interior Doors: ANSI/SDI-100, Grade II, heavy-duty, Model 3 or 4, minimum 18-gage cold-rolled sheet steel faces.
 - 2. Exterior Doors: ANSI/SDI-100, Grade III, extra heavy-duty, Model 4, minimum 16-gage galvanized steel faces.
 - 3. Apartment Entry Doors (ILU): Six panel embossed cold-rolled steel with polystyrene core, 22 Gage; DE series by Republic Builders or equal.

- C. Door Louvers: Provide sightproof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gage cold-rolled steel set into minimum 20-gage steel frame.

2.4 FRAMES

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16-gage cold-rolled steel.
 - 1. Fabricate frames with mitered or coped corners, welded construction for exterior applications and knocked-down for field assembly at interior applications.
 - 2. Form exterior frames from 16-gage galvanized steel.
- B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- C. Plaster Guards: Provide minimum 26-gage steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

2.5 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site. Comply with ANSI/SDI-100 requirements.
 - 1. Internal Construction: Manufacturer's standard honeycomb, polyurethane, polystyrene, unitized steel grid, vertical steel stiffeners, or rigid mineral fiber core with internal sound deadener on inside of face sheets where appropriate in accordance with SDI standards.
 - 2. Clearances: Not more than 1/8 inch at jambs and heads except between non-fire-rated pairs of doors not more than 1/4 inch. Not more than 3/4 inch at bottom.
- B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.

- C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel.
- F. Fabricate exterior doors, panels, and frames from galvanized sheet steel in accordance with SDI-112. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels.
- G. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U factor of 0.41 Btu/(hr x sq ft x deg F.) or better.
- H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series Specifications for door and frame preparation for hardware.
 - 1. For concealed overhead door closers, provide space, cutouts, reinforcing and provisions for fastening in top rail of doors or head of frames, as applicable.
- I. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at project site.
- J. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames," published by Door and Hardware Institute.
- K. Shop Painting: Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
 - 1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.
- L. Glazing Stops: Minimum 20 gage steel or .040-inch-thick aluminum.
1. Provide non-removable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
 2. Provide screw applied removable glazing beads on inside of glass, louvers, and other panels in doors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
- B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames," unless otherwise indicated.
1. Except for frames located at existing concrete, masonry or drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 2. In masonry construction, locate 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry Tee anchors.
 3. At existing concrete or masonry construction, provide 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb, set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 4. Install fire-rated frames in accordance with NFPA Standard No. 80.
 5. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In closed steel stud partitions, attach wall anchors to studs with screws.
- C. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.

1. Install fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

- A. Prime Coat Touch-up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
- B. Protection Removal: Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.
- C. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08111

SECTION 08210

WOOD DOORS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Solid Core Doors.
- B. Related Sections:
 - 1. 07900, Joint Sealers.
 - 2. 08100, Metal Doors and Frames.
 - 3. 08710, Finish Hardware.
 - 4. 09900, Painting.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Provide wood flush doors complying with following standards:
 - a. ANSI/NWMA I.S-1, Industry Standard for Wood Flush Doors.
 - b. AWI Quality Standards: Section 1300, Architectural Flush Doors of Architectural Woodwork Quality Standards, designations for grade and door construction.
- B. Source Quality Control:
 - 1. Manufacturer: Obtain doors from single manufacturer to ensure uniformity in quality of appearance and construction, unless otherwise indicated.

1.03 SUBMITTALS

- A. Product Data: Submit door manufacturer's product data for each type of wood door including details of core and edge construction, trim for openings and louvers, and finishing specifications for doors to receive factory finish.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, requirements for factory finishing, and other pertinent data.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General:
 - 1. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration.
 - 2. Comply with requirements of referenced ANSI Standard and recommendations of NWMA Pamphlet, How to

- Store, Handle, Finish, Install, and Maintain Wood Doors, and manufacturer's instructions.
3. Package doors at factory before shipping using manufacturer's standard method.
 4. Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable, or concealed markings.

1.05 SPECIFIED PRODUCT WARRANTY

- A. Door Manufacturer's Warranty:
1. Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup, or twist) or show telegraphing of core construction in face veneers, or do not conform to NWMA and AWI tolerance limitations.
 2. Include reinstallation which may be required due to repair or replacement of defective doors where defect was not apparent before hanging.
 3. Warranty:
 - a. Shall be in effect during following period of time after date of Substantial Completion.
 - b. Solid Core Flush Interior Doors: Life of installation.
 4. Contractor shall be responsible for replacement or refinishing doors where Contractor's work contributed to rejection or voiding of manufacturer's warranty.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Solid Core Doors:
1. Type, Face and Finish:
 - 7-ply particleboard rotary cut birch face for painted finish.
 2. Finish: Refer to Section 09900, Painting.
 3. Manufacturer: Weyerhaeuser Co., Algoma, Eggers. Mohawk

PART 3 EXECUTION

3.01 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area before hanging.
- B. Hardware: Refer to Section 08710, Finish Hardware.
- C. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions, of referenced

AWI standard, and as indicated.

D. Job-Fit Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated.
2. Do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors.
3. Machine doors for hardware.
4. Seal cut surfaces after fitting and machining.

E. Fitting Clearances:

1. Non-Rated Doors:
 - a. 1/8 in. at jambs and heads.
 - b. 1/16 in. per leaf at meeting stiles for pairs of doors.
 - c. 1/8 in. from bottom of door to top of decorative floor finish or covering.
2. Threshold: 1/4 in. clearance from bottom of door to top of threshold.
3. Bevel non-rated doors 1/8 in. in 2 in. at lock and hinge edges.

F. Prefit Doors: Fit to frames and machine for hardware to extent not previously worked at factory as required for fit and uniform clearance at each edge.

G. Job Site Finished Doors: Refer to Section 09900, Painting, for finishing requirements.

3.02 PROTECTION

- A. Protect doors and hardware during construction.
- B. Touch up marred finished to perfectly match adjacent surfaces to satisfaction of Architect or replace unit.

- END OF SECTION -

SECTION 08212 - PANEL WOOD DOORS

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. Extent and location of each type of panel wood doors is indicated on drawings and in schedules.
- B. Types of panel wood doors required include the following:
 - 1. Interior stile and rail doors with raised panels.
 - 2. Interior stile and rail fire doors with raised panels.
 - 3. Exterior stile and rail french doors.
 - 4. Interior stile and rail french doors.
- C. Shop-priming of panel wood doors is included in this section.
- D. Factory-prefitting to frames and factory-premachining for hardware of panel wood doors is included in this section.
- E. Wood door frames and other woodwork in juxtaposition to panel wood doors is specified in Division-6 section "Architectural Woodwork".
- F. Provide aluminum screen door as an alternate attached to exterior of frame at all apartment (ILU) balcony doors.

1.3 SUBMITTALS:

- A. Product Data: Door manufacturer's technical data for each type of door required, including details of construction relative to materials, dimensions of individual components, profiles and finishes.
- B. Shop Drawings: Indicate location and size of each door; elevation of each door; construction details not covered in product data including those for stiles, rails, panels, and moldings (sticking); location and extent of hardware cutouts; fire ratings; and factory finishing requirements.

- C. Samples: Corner section, 1'-0" square, showing edges, faces, joinery and material qualities of typical stile, rail, molding and panel for each exposed material, door type and finish required; and as follows:
- D. Certificate of Product Compliance: Manufacturer's certificate evidencing compliance of panel wood doors with requirements.

1.4 QUALITY ASSURANCE:

- A. Single Source Responsibility: Obtain panel wood doors from a single manufacturer.
- B. Fire-Rated Panel Wood Doors: Provide panel wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152 and which are labeled and listed for fire ratings indicated by UL, Warnock Hersey or other testing and inspection agency acceptable to authorities having jurisdiction.
- C. Product Certification: Require door manufacturer to certify that doors comply with specified requirements including those of referenced door standard.
 - 1. Mark, label or otherwise identify panel wood doors as complying with NWWDA I.S.6.
- D. Safety Glazing Standard: Provide safety glass of type indicated or required by authorities having jurisdiction for doors and sidelights; comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials except where those of Category I are expressly indicated and permitted.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with NWWDA pamphlet "How to Store, Handle, Finish, Install and Maintain Wood Doors" and with manufacturer's instructions and with applicable requirements of referenced door standard.
- B. Identify each door with individual opening numbers which correlate with shop drawing designation system for doors, frames and hardware, using temporary, removable or concealed markings.

1.6 PROJECT CONDITIONS:

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with requirements of the following quality standard applicable to project's geographical location.
1. "Architectural Woodwork Quality Standards" including Section 100-S-3 "Moisture Content" of Architectural Woodwork Institute (AWI).

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering panel wood doors which may be incorporated in the work include, but are not limited to, the following:

1. Panel Molded Doors of Stock Design and Construction:

- a. Blount.
- b. Masonite Corp.
- c. Mohawk

2. Exterior Style and Rail Doors of Stock Design and Construction:

- a. Weather Shield Mfg., Inc.
- b. Hurd Millwork Co.
- c. Eagle Mfg. Co.

3. Panel Wood Doors of Special Design and Construction:

- a. ENJO Custom Interiors Inc.
- b. International Wood Products.
- c. Karona, Inc.
- d. Michael Maiman Co., Inc.
- e. Sun-Dor-Co.
- f. Willdon Creative Woodworking.

2.2 PANEL MOLDED DOORS OF STOCK DESIGN AND CONSTRUCTION:

- A. Interior Apartment Doors (ILU): Comply with the following requirements.
1. Hollow Core Molded Panel Door.

- a. Widths: As indicated.
- b. Thickness: As indicated.
- c. Styles: 1" Min. Softwood.
- d. Top and Bottom Rails: 2-1/4" Softwood.
- e. Core: Corrugated built-up cardboard per current ANSI/NWWDA I.S.1.
- f. Faces: Smooth primed hardboard 1/8" thick physical properties conform ANSI/AHA A-135.4 & ANSI/NWWDA I.S.1

2. Raised Panel Characteristics.

- a. Molding Profile: Manufacturer's standard.
- b. Panel Thickness: 1-3/8"
- c. Panel Design: As indicated.

2.3 STYLE AND RAIL DOORS OF STOCK DESIGN AND CONSTRUCTION:

- A. NWWDA Quality Standard: Comply with NWWDA I.S.6 "Industry Standard for Wood Stile and Rail Doors" of National Wood Window and Door Association (NWWDA).

- 1. Design and Layout: Panel design as described below under NWWDA design group, with minimum dimensions for stiles, rails, panels, mullions and bars complying with referenced NWWDA standard.

- a. NWWDA Design Group: "French or Casement Doors":
 - 1) Panel Design: As indicated.

2.4 PANEL WOOD DOORS OF SPECIAL DESIGN AND CONSTRUCTION:

- A. AWI Quality Standard: Comply with "Architectural Woodwork Quality Standards" including Section 1400 "Stile and Rail Doors" of Architectural Woodwork Institute (AWI).

- B. Interior Doors: Comply with the following requirements:

- 1. a. Grade of 1-3/8" thick doors for "opaque" finish: premium.
- b. Grade of 1-3/4" thick doors for "opaque" finish: premium.

- 2. Wood species of doors for opaque finish: plain sawn/sliced: Birch or Poplar.

3. Stile, Rail and Mullion Dimensions: Comply with the following requirements:
 - a. Widths: As standard with the manufacturer but not less than the following:
 - 1) Stiles and Intermediate Rails: 4-1/2".
 - 2) Bottom Rails: 9".
 - b. Stile and rail construction to veenered with solid moulded profile.
 - c. Thickness: As indicated.
4. Raised Panel Characteristics: Comply with the following requirements:
 - a. Molding Profile: Manufacturer's standard.
 - b. Panel Thickness: Manufacturer's standard but not less than 1-1/8" for 1-3/8" door thickness and not less than 1-3/8" for 1-3/4" door thickness..
 - c. Panel Design: As indicated.

- C. Interior Fire Doors: Fire-rated doors with 1-3/4" thick stiles and rails and raised panels of thickness standard with manufacturer but not less than 1-3/8", complying with requirements indicated for interior doors with raised panels.

2.5 FABRICATION:

- A. Fabricate panel wood doors to produce doors complying with following requirements:
 1. In sizes indicated for job-site fitting.
 2. Factory-prefit doors to fit frame opening sizes indicated with uniform clearances and bevels as indicated below:
 - a. Fitting Clearances for Non-rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.
 - b. Fitting Clearances for Fire-rated Doors: Comply with NFPA 80.
 - c. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.
 - d. Bevel fire-rated doors 1/8" in 2" at lock edge; trim stiles and rails only to extent permitted by labeling agency.

- B. Glazed Openings: Factory-preglaze doors for applications indicated. Comply with requirements of Division-8 section "Glass and Glazing".
- C. Glazed Openings: Trim glazed openings with solid wood moldings of profile indicated, removable one side.
- D. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish and quality of construction.
- E. Exterior Doors: Factory-treat exterior doors after fabrication with water repellent to comply with NWWDA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.6 SHOP PRIMING:

- A. Doors for Field-Applied Opaque Finish: Shop prime faces and edges of doors with one coat of wood primer specified in Division-9 section "Painting".

2.7 ALUMINUM SCREEN DOORS:

- A. Aluminum door and frame to be electrostatically painted with white enamel and fully weather stripped with wool pile. Provide charcoal aluminum screen; Model "Hollywood" by Harvey Industries or equal.

RETAIN ONE REQUIREMENT FROM 2 CHOICES BELOW OR REVISE. INSERT NUMERICAL VALUES FOR GLOSS IF DIFFERENT FROM THOSE OF IN AWI

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine installed door frames prior to hanging doors:
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Hardware: For installation see Division-8 "Builder's Hardware" section of these specifications.
- B. Manufacturer's Instructions: Install panel wood doors to comply with manufacturer's instructions, applicable requirements of referenced quality standard, and as indicated.
 - 1. Install fire-rated doors to comply with NFPA 80.
- C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances for Non-rated Doors: Provide 1/8" at jambs and heads; 1/16" per leaf at meeting stiles for pairs of doors; and 1/8" from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.
 - 2. Fitting Clearances for Fire-rated Doors: Comply with NFPA 80.
 - 3. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.
 - 4. Bevel fire-rated doors 1/8" in 2" at lock edge.
- D. Prefit Doors: Fit to frames for uniform clearance at each edge.
- F. Field-Finished Doors: Refer to the following for finishing requirements:
 - 1. Division-9 section "Painting".

3.3 ADJUSTING AND PROTECTION:

- A. Operation: Rehang or replace doors which do not swing or operate freely.
- B. Finish Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that doors are without damage at time of Substantial Completion.

END OF SECTION 08212

SECTION 08305 - ACCESS DOORS

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 this Section.

1.2 SUMMARY

- A. This Section includes access doors for installation in the following types of construction:
 - 1. Gypsum drywall
- B. Provide fire-rated access doors where indicated or scheduled, fire rating to match fire rating of wall or ceiling.
- C. Building-in of anchors and grouting of frames set in masonry construction is specified in Division 4.
- D. Omitted
- E. Access tile in suspended or furred acoustic tile ceilings are specified in Division 9.
- F. Chute doors are specified with chute assemblies in Division 11.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data in form of manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage, devices.

details, finishes, latching or locking provisions, and other data pertinent to installation.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.
- B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s "Building Materials Directory" for rating shown.
 - 1. Provide UL label on each fire-rated access door.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.
- D. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

- A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.
- B. Special-Size Access Doors: Use where required or requested; indicate on schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering access doors that may be incorporated in the work include, but are not limited to, the following:
 - 1. Bar-Co., Inc.
 - 2. Cesco Products
 - 3. J.L. Industries
 - 4. Karp Associates, Inc.
 - 5. Milcor, Inc.
 - 6. Nystrom, Inc.
 - 7. The Williams Brothers Corp.

2.2 MATERIALS AND FABRICATION

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.
- B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
- C. Frames: Fabricate from 16-gage steel.
 - 1. Fabricate frame with exposed flange nominal 1-inch wide around perimeter of frame for units installed in the following construction:
 - a. Exposed masonry.
 - b. Exposed concrete.
 - c. Drywall finish.
 - d. Ceramic tile finish.
 - e. Wood paneling.
 - 2. For gypsum drywall furnish perforated frames with drywall bead.
- E. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
 - 1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.
- F. Recessed Panel Doors: Fabricate from not less than 18-gage sheet steel with face of panel formed to provide recess below surface of applied finish. Reinforce panel as required to prevent buckling. Finish with manufacturer's factory-applied prime paint.
 - 1. Furnish recessed panels for concealed installation in acoustic tile ceiling systems, and gypsum drywall ceilings of apartment units.

- G. Locking Devices: . Furnish flush, screwdriver-operated cam locks of number required to hold door in flush, smooth plane when closed.
 - 1. Where shown or scheduled, provide one cylinder lock per access door. Furnish 2 keys per lock. Key all locks alike unless otherwise indicated.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access doors.
- B. Coordinate installation with work of other trades.
- C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.2 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08305

SECTION 08630 - VINYL WINDOWS

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 this section.

1.2 SUMMARY

- A. This Section includes the following vinyl window types:

1. Awning Window Units.
2. Double-Hung Window Units.
3. Nonoperative (Fixed) Window Units.
4. Decorative Window Units.

- D. Related Sections: The following sections contain requirements that relate to this section:

1. Interior and exterior wood trim that is not included as part of the window units is specified in Division 6 Section "Finish Carpentry."
2. Joint sealing between wood windows and adjacent materials is specified in Division 7 Section "Joint Sealers."

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- B. Testing: Manufacturer's stock units of each grade of required window shall have been tested by a recognized testing laboratory or agency in accordance with ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance. Test samples shall comply with requirements in AAMA for test sample sizes and methods.

- C. Performance Requirements (AAMA Grade 20 Windows): Each required window unit shall comply with the following performance requirements:

1. Air Infiltration: Not more than 0.25 cfm per sq. ft. of overall frame area at an inward test pressure of 1.57 lbf per sq. ft.

2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 4.43 lbf per sq. ft.
3. Structural Performance: No glass breakage, damage to hardware, permanent deformation that would impair operation of the unit, or residual deflection greater than 0.4 percent of the span at a positive (inward) and negative (outward) test pressure of 40 lbf per sq. ft.
4. Forced Entry Resistance: Provide window units that comply with requirements for Performance Level 10 when tested in accordance with ASTM F 588.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections:
 1. Product data for each type of wood window required, including:
 - a. Standard construction details and fabrication methods.
 - b. Profiles and dimensions of individual components.
 - c. Data on hardware, accessories, and finishes.
 - d. Recommendations for maintenance and cleaning exterior surfaces.
 2. Shop drawings for each type of window specified.
 - a. Layout and installation details, including anchors.
 - b. Typical window unit elevations at 3/4-inch scale.
 - c. Full-size details of typical and composite members.
 - d. Hardware, including operators.
 - e. Glazing details.
 - f. Accessories.
 3. Samples for Initial Color Selection: Submit samples of each required finish on 12-inch-long sections of window members. Where finishes involve normal color variations, include sample sets showing the full range of expected variations.
 4. Samples for Verification Purposes: The Architect reserves the right to require additional samples that show fabrication techniques and workmanship and design of hardware and accessories.
 5. Certification: Provide certification by a recognized independent testing laboratory or agency certifying that each required type and grade of window complies with performance requirements indicated.
 6. Material Test Reports: Engage a recognized independent testing laboratory or agency to perform tests

specified. Provide certified test results showing that each required type and grade of window complies with performance requirements indicated.

1.5 QUALITY ASSURANCE

- A. Vinyl Window Standard: Comply with AAMA for standards of performance and fabrication workmanship for vinyl windows.
- B. Safety Glass Standard: Provide the type of products indicated that comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
 - 1. Provide safety glass permanently marked with the certification label of the Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- D. Glazing Standards: Comply with recommendations of the Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated.
- E. Single Source Responsibility: Provide windows produced by a single fabricator who is capable of indicating prior successful production of units similar to those required.
- F. Design Concept: The drawings indicate window sizes, profiles, and dimensional requirements and are based on the specific types and models indicated. Window units by other manufacturers having equal performance characteristics may be considered, provided deviations from indicated dimensions and profiles are minor and do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality is on the proposer.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.
 - 1. Where necessary, proceed with fabrication without measurements, and coordinate tolerances to ensure proper fit of window units.

1.7 WARRANTY

- A. Vinyl Window Warranty: Submit a written warranty, executed by the window manufacturer, agreeing to repair or replace units that fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to:
 - 1. Structural failures, including excessive deflection, excessive leakage, or air infiltration.
 - 2. Faulty operation of window sash or hardware.
 - 3. Deterioration of metals, finishes, and other materials beyond normal weathering.
- B. Warranty Period: 10 years after the date of Substantial Completion.
- C. The warranty shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide window units by one of the following:
 - 1. Vinyl Window Units:
 - a. Weathershield 2000 Series, White vinyl double hung with screens; and grilles between Low E insulating glass.
 - b. Devon Windows by CertainTeed Corporation
 - c. Rehau, Inc.

2.2 MATERIALS

- A. General: Comply with requirements of AAMA and ASTM performance standards.
- B. Vinyl: Multi-chambered vinyl extrusions made from impact resistant exterior grade RAU-PVC polyvinyl chloride. Exterior profile wall nominal thickness shall be .075. Corner joints shall be miter cut and welded. Extruded RAU-PVC surfaces shall be smooth,

glossy and a uniform bright white in appearance. All other components, including fasteners and accessories, shall be stainless steel, aluminum or other non-corrosive material compatible with vinyl.

All window units to include integral interior muntins or grilles within the air space between glass.

C. Screens: All operable sash shall have screens with rewirable fiber glass mesh held by vinyl spline.

a. Color: Color to be white as selected by the Architect from the manufacturer's standard color range.

1. Trim Members: vinyl extrusions.

D. Anchors, Clips, and Accessories: Fabricate anchors, clips and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of ASTM B 633 for SC 3 (severe) service condition; provide strength sufficient to withstand design pressure indicated.

E. Fasteners: Comply with AAMA for fabrication and with manufacturer's recommendations and standard industry practices for type and size of installation fasteners.

1. Use zinc-coated or nonferrous nails and screws for window fabrication and installation.

2. Use brass screws for hardware and accessory installation.

F. Hardware: Manufacturer's standard hardware, necessary to operate, tightly close, and securely lock windows. Do not use aluminum in frictional contact with other metals.

G. Compression Weatherstripping: Provide compressible weatherstripping, designed for permanently resilient sealing under bumper or wiper action, completely concealed when sash is closed.

1. Weatherstripping material: Molded PVC gaskets complying with ASTM D 2287.

2. Weatherstripping material: Molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

1. Provide weatherstripping with integral, center-line barrier fin of semirigid plastic polypropylene sheet.

- H. Glass and Glazing Materials: Provide the manufacturer's standard clear, sealed, insulating safety glazing material with Low-E coating that complies with ANSI Z97.1 and the "Glass and Glazing" Section.
- L. Glazing Seal: Provide the manufacturer's standard extruded vinyl or butyl glazing gasket providing weather weathertight seal.

2.3 AWNING WINDOWS

- A. Window Grade: Comply with the requirements of AAHA Performance Grade 40.
- B. Hardware: Provide awning window units with the following equipment and operating hardware:
 - 1. Operating Device: Gear-type rotary operator located on the jamb at the sill.
 - 2. Limit Device: Manufacturer's standard limit device (2 per ventilator) located on each jamb.
 - a. Provide latch with eye for pole operation for operable sash located more than 6 feet above the floor.

2.5 DOUBLE-HUNG WINDOWS

- A. Window Grade: Comply with the requirements of NWWDA Performance Grade 40.
 - 1. Provide window units that have "tilt-in" feature permitting both sides of the sash to be cleaned from the interior.
- B. Hardware: Provide the following equipment and operating hardware:
 - 1. Sash Balances: Manufacturer's standard concealed, counterbalancing mechanism-type sash balances (2 per sash).

2. Lock: Cam action sweep lock and keeper on the meeting rail.
3. Lock: Pole-operated, cam action locking device on meeting rail of windows with meeting rail more than 6 feet above the floor.
4. Lift Handle: Applied sash lifts on bottom rail of lower sash.
6. Pole Socket: Provide a pole socket or groove on the inside face of top rail of the upper sash on window units with meeting rails more than 6 feet above the floor.

2.7 FIXED WINDOWS

- A. Window Grade: Comply with the requirements of AAMA Performance Grade 20.

2.8 ACCESSORIES

- A. Grilles (False Muntins): Provide grilles in designs shown, inside of each sash light (see drawings for windows with false muntins vs. windows with true divided lights).
 1. Material: Aluminum.
 2. Design: Rectangular, as shown on drawings..
 3. Color: To match exterior window color.

- C. Pole Operator: Provide one pole operator and pole hanger for each room where pole-operated hardware is provided on window sash more than 6 feet above floor. Provide a tubular anodized aluminum pole of proper length, with push-pull hook at top and rubber cap at bottom.

- D. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on the inside or outside of the window sash or ventilator, depending upon window type. Design windows and hardware to accommodate screens in a tight-fitting removable arrangement, with a minimum of exposed fasteners and latches.
 2. Screen Frames: Fabricate frames of tubular-shaped extruded or formed aluminum members of 0.040-inch minimum wall thickness, with mitered or coped joints and concealed mechanical fasteners. Provide removable PVC spline/anchor concealing the edge of the screen frame. Comply with requirements of SMA 1004.
 - a. Finish: Anodize frames to match window members.

2.9 FABRICATION

- A. General: Provide the manufacturer's standard fabrication of units. Comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
 - 1. Comply with requirements of referenced standards for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.
- B. Fabricate windows to produce units that are reglazable without dismantling sash framing. Provide openings and mortises precut, where possible, to receive hardware and other items.
- C. Each window unit includes sash, frame, stops, sill (including undersill or nosing), exterior casing and moldings, integral mullions and muntins, hardware, and accessories.
 - 1. Provide weatherstripping at perimeter of each operating sash.
 - 2. Provide removable insect screen for each operating sash, with location determined by manufacturer.
 - 3. Provide glazing stops, nailed or snap-on type, coordinated with glass selection and glazing system indicated.
 - 4. Preglazed Window Units: Except for light sizes in excess of 100 unites inches, preglaze window units at the shop before delivery, unless preglazing is not available from the fabricator.
- D. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to the project site, to the maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect openings before beginning installation. Verify that the opening is correct and the sill plate is level. Do not proceed with installation of window units until unsatisfactory conditions have been corrected.
 - 1. Masonry surfaces shall be visibly dry, and free of excess mortar, sand, and other construction debris.
 - 2. Wood frame walls shall be dry, clean, sound and well-nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in the opening and within 3 inches of the corner.
 - 3. Coordinate window installation with wall flashings and other built-in components.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions and recommendations for installation of window units, hardware, operators, accessories, and other window components.
- B. Set units plumb, level, true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
- C. Set sill members in a bed of compound or with joint fillers or gaskets as indicated, to provide weathertight construction.

3.3 ADJUSTING

- A. Adjust operating sash and hardware to provide a tight fit at contact points and weatherstripping, and to provide smooth operation and a weathertight closure. Lubricate hardware and moving parts.

3.4 CLEANING

- A. Clean interior and exterior surfaces promptly after installation. Take care to avoid damage to protective coatings and finishes. Remove excess glazing and sealants, dirt, and other substances.
- B. Clean glass of preglazed window units promptly after installation. Wash and polish glass on both faces before Substantial Completion. Comply with manufacturer's recommendations for final cleaning and maintenance. Remove nonpermanent labels from glass surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded or damaged during the construction period.

3.5 PROTECTION

- A. Protect window units from damage or deterioration until time of substantial completion.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Hardware Finishes.
 - 2. Fasteners.
 - 3. Hardware Items.
 - 4. Mounting Heights.
- B. Related Sections:
 - 1. 08100, Metal Doors and Frames.
 - 2. 08210, Wood Doors.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Obtain each type of hardware from single offering products complying with requirements.
 - 2. Supplier: Recognized architectural finish hardware supplier, with warehousing facilities, furnishing hardware in Project vicinity min. 2 years, and who is, or employs, experienced architectural hardware consultant available at reasonable times during course of Work, for consultation about project's hardware requirements, to Owner, Architect, and Contractor.
- B. Design Criteria:
 - 1. Fire Rated Openings: Provide hardware for fire rated openings in compliance with NFPA 80 and local building code requirements.
 - 2. Provide only hardware tested and listed by UL or FM for types and sizes of doors required, and complies with requirements of door and door frame labels.
 - 3. Where emergency exits devices are required on fire rated doors, with supplementary marking on doors' UL or FM labels indicating fire door to be equipped with fire exit hardware, provide UL or FM label on exit devices indicating Fire Exit Hardware.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturers technical product data for each item in accordance with Division 1.
 - 2. Include information necessary to show compliance with requirements and include instructions for installation and maintenance of operating parts and finish.

B. Hardware Schedule:

1. Submit final hardware in manner indicated below.
2. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.
3. Final Hardware Schedule Content:
 - a. Based on finish hardware indicated, organize Hardware Schedule into Hardware Sets indicating complete designations of every item required for each door or opening.
 - b. Include Following Information: Type, style, function, size, and finish of each hardware item; name and manufacturer of each item; fastenings and other pertinent information; location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule; explanation of all abbreviations, symbols, codes, etc. contained in Schedule; mounting locations for hardware; door and frame sizes and materials; keying information.
 - c. Submittal Sequence: Submit Schedule at earliest possible date, particularly where acceptance of Hardware Schedule must precede fabrication of other Work which is critical in Project Construction Schedule.
 - d. Include with Schedule product data, samples, and shop drawings of other Work affected by finish hardware, and other information essential to coordinated review of Hardware Schedule.
4. Keying Schedule: Submit separate detailed Schedule indicating clearly how Owner's final instructions on keying of locks has been fulfilled.

C. Samples: Before submittal of final Hardware Schedule and before final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finished as required, and tagged with full description for coordination with Schedule.

D. Templates:

- a. Furnish hardware templates to each fabricator of doors, frames, and other work to be factory prepared for installation of hardware.
- b. Check shop drawings of such other work, to confirm adequate provisions are made for proper location and installation of hardware.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Tag each item or package separately, with identification related to final Hardware Schedule, and include basic installation instructions with each item or package.
2. Packaging of hardware is responsibility of sup-

- plier.
3. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate Hardware Set Number to match Set Numbers of approved Hardware Schedule.
 4. Two or more identical sets may be packed in same container.
 5. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
 6. Deliver individually packaged hardware items at proper times to proper locations, shop, or Project site, for installation.

B. Storage:

1. Provide secure lockup for hardware delivered to Project but not yet installed.
2. Control handling and installation of hardware items which are not immediately replaceable, so completion of Work will not be delayed by hardware losses, both before and after installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Provide complete Hardware Set Schedule for application of individual items as required for each opening or function; review with Architect and Owner before purchase of hardware.
2. Hardware Finishes:
 - a. Produce finishes to exact match with selected sample(s).
 - b. Reduce variance in hue of each finish whether base metal is cast, forged, or stamped, or when plating is applied over steel, brass, or bronze.
 - c. Match finishes of same designation from two or more sources when viewed at arms' length and approximately 2 ft. apart.
 - d. Unless otherwise specified, match finish of each item of hardware with finish selected for locksets and latches.
 - e. Indicate type of finish in Hardware Schedule.
3. Fasteners:
 - a. Provide concealed fastening wherever possible.
 - b. Use of self-tapping or sheet metal screws is prohibited except for application of flush mounted push and kick plates.
 - c. Concealed: Furnish hardware items with appropriate type and length of screws or other fastenings suitable to ensure permanent anchorage.
 - d. Exposed: Furnish hardware with countersunk oval Phillips head type screws where concealed fastening is not possible.

- e. Finish to match hardware item being fastened.
- 4. Hardware Quality Level: Comply with following for design, grade, function, finish, size, and operation.
 - a. Usage: Moderate frequency.
 - b. Type: Builder's hardware.
 - c. Style: As selected.
 - d. Finish: As selected.
- 5. ANSI/BHMA Designations: Provide products complying with standards and requirements specified elsewhere in this Section.
 - a. Butts and Hinges: ANSI A156.1, BHMA 101.
 - b. Locks and Lock Trim: ANSI A156.2, BHMA 601.
 - c. Exit Devices: ANSI A156.3, BHMA 701.
 - d. Door Controls and Closers: ANSI A156.4, BHMA 301.
 - e. Auxiliary Locks: ANSI A156.5, BHMA 501.
 - f. Architectural Door Trim: ANSI A156.6, BHMA 1001.
 - g. Template Hinge Dimensions: ANSI A156.7.
 - h. Door Controls and Overhead Holders: ANSI A156.8, BHMA 311.
 - i. Auxiliary Hardware: ANSI A156.16, BHMA 1201.
 - j. Materials & Finishes: ANSI A156.18, BHMA 1301.

B. Hinges:

- 1. Pack all hinges with machine or wood screws as required by door and frame construction.
- 2. Furnish hinges with leaves of width to clear door jamb or trim products.
- 3. Furnish template hinges in accordance with door and frame material requirements.
- 4. Hinge Type: Standard weight, two ball bearings, painted steel for interior and brass for exterior, full mortise, 4-1/2 in. high, 0.134 in. ga., non-rising pin for interior and non-removable pins for exterior, flush tip.
- 5. Hinge Quantity: Up to 60 in. high doors provide 2 butts, and for each 30 in. additional height provide one additional butt.
- 6. Hinges at pre hung door to be standard factory finish to match hardware.

C. Latches and Locks:

- 1. Furnish locksets and latchsets with anti-friction deadlocking latchbolts and deadlocks.
- 2. Provide locksets, latchsets, or deadlocks complete with trim and armor fronts.
- 3. Conceal fastenings, washers, and bushings.
- 4. Provide wrought box strikes for each lockset, latchset, or deadlock with curved lips of sufficient length to protect frames.
- 5. Heavy duty construction with min. 0.093 in. thick wrought case.
- 6. Knobs and Roses: ANSI A156.2.
- 7. Provide latchsets and locks of one manufacturer.
- 8. Deadlocks:
 - a. Furnish deadlocks from same manufacturer as locksets and latchsets, with same turnpiece and

- cylinder trim furnished for locksets and latch-sets.
- b. Provide units with 3/4 in. throwbolts typical, 1 in. throw where required and designated by Architect.
- 9. Latchbolts: Min. 5/8 in. projection.
- D. Panic Devices:
 - 1. Furnish panic devices as required to following requirements:
 - a. Mounting: Furnish devices with provision for concealed mounting; throughbolts will not be accepted.
 - b. Keying: Key cylinders to Building system as specified.
 - c. Bolts: Provide retract feature for all concealed vertical rod devices provided at center hung doors.
- E. Overhead Closers:
 - 1. Closer size per manufacturer's recommendation for application.
 - a. Full rack and pinion.
 - b. Independent closing speed and latch regulating valves.
 - c. Adjustable back-check.
 - d. 180 degree opening where construction will permit.
- F. Accessories:
 - 1. Push/Pull Assemblies:
 - a. Push Plate: 4 in. x 15 in. x 1/4 in. stainless steel, beveled all edges, with oval Phillips head fasteners.
 - b. Pull Assembly: 8 in. c. to c. of bases, stainless steel, with 1-1/4 in. flat face half round grip, 2 in. overall projection, machined to accept concealed throughbolt attachment.
 - 2. Wall Bumpers: Wrought disc type with convex rubber bumper and concealed attachments suited to substrate.
 - 3. Kickplates and Armor Plates:
 - a. Surface mount plates, beveled three sides, 0.050 in. metal thickness and mounted with oval Phillips head fasteners.
 - b. Kickplate: 8 in. high x door width less 1-1/2 in. or 3/4 in.
 - c. Armor Plate: 40 in. high x door width less 1-1/2 in. or 3/4 in.
 - 4. Door Mutes: Furnish for hollow metal frames, 3 door mutes for each single door and 4 door mutes for each pair of doors.
- G. Miscellaneous Hardware:
 - 1. Door bottom seal.
 - 2. Head and jamb gaskets.
 - 3. Astragal gaskets.

H. Thresholds:

1. General: Except as otherwise indicated, provide standard metal threshold unit of type, size, and profile as shown or scheduled.
2. Exterior Hinged/Pivoted Doors:
 - a. Provide units min. 4 in. wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware, and to fit door frames, and as follows.
 - b. In-Swinging Doors: Provide units with interlocking lip and interior drain channel; include hook on bottom edge of door and drain pan.
 - c. Out-Swinging Doors: Provide units with interlocking lip and with hook on bottom edge of door to act as weather bar.
 - d. Out-Swinging Doors: Provide rabbeted type units with replaceable weatherstrip insert in stop.

I. Lock Cylinders and Keying:

1. General: Supplier will meet with Owner to finalize keying requirements and obtain final instructions in writing.
2. Standard System: Except as otherwise indicated, provide new masterkey system for Project.
3. Review keying system with Owner and provide type required, either new or integrated with Owner's existing system.
4. Equip locks with manufacturer's special 6-pin tumbler cylinder, with construction master key feature, which permits voiding of construction keys without cylinder removal.
5. Equip locks with cylinders for interchangeable-core pin tumbler inserts.
 - a. Furnish only temporary inserts for construction period and remove when directed.
 - b. Owner will provide final inserts.
6. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock not designated to be keyed alike with group of related locks.
7. Key Quantity:
 - a. Furnish 3 change keys for each lock; 5 master keys for each master system; and 5 grandmaster keys for each grandmaster system.
 - b. Deliver keys to Owner's Representative.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:

1. Mount hardware units at heights indicated in Recommended Locations for Builders Hardware for Standard Steel Doors and Frames by Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and

- 3. except as may be otherwise directed by Architect. Install each hardware item in compliance with manufacturer's instructions and recommendations.
- 4. Wherever cutting and fitting is required to install hardware onto or into surfaces later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protections with finishing work specified in Division 9.
- 5. Do not install surface-mounted items until finishes have been completed on substrate.
- 6. Set units level, plumb, and true to line and location.
- 7. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- 8. Drill and countersink units not factory prepared for anchorage fasteners.
- 9. Space fasteners and anchors in accordance with industry standards.
- 10. Set thresholds for exterior doors in full bed of sealant to requirements of Section 07900, Joint Sealers.

- B. Deliver hardware for doors as shown and scheduled, and as specified in applicable hardware portions of these Specifications.
- C. Store in locked space to prevent loss.
- D. Apply to doors as recommended by hardware manufacturer and as required.
- E. Fit locks and latchsets in their respective doors and remove before painting.
- F. Reinstall after painting of doors is complete.
- G. On completion, adjust and lubricate hardware for proper operation.
- H. Instruct Owner's personnel in proper adjustment and maintenance of hardware.

3.02 ADJUSTING AND CLEANING

- A. Adjustments:
 - 1. Assist installer in adjusting and checking installation of finish hardware.
 - 2. Furnish proper lubricant, graphite, or special oil to installer.
 - 3. Check, test, and adjust moving parts to ensure free and smooth operation.
 - 4. Furnish Owner with special tools required to adjust and maintain hardware.
- B. Post-Installation Adjustments:
 - 1. After building is completed and in use, assist

- installer with adjustment of hardware to compensate for air movement and other conditions, so all items will operate properly.
2. Examine all hardware furnished with Owner's Representative 6 months after preliminary acceptance by Owner.
 3. Adjust hardware for proper operation.

3.03 HARDWARE SET SCHEDULE

- A. Schedule is appended to this Section to serve as a guide in preparing Bids and to ensure compliance with design intent.

PART 4 MANUFACTURERS

- A. Interior butts shall be of steel, prime painted; exterior butts of solid bronze, US26D finish. Finish for door closers shall be aluminum enamel. All other items are to be of solid bronze, US26D finish. Stainless steel shall be US 32 D finish. Finish of hardware at exterior aluminum doors shall match finish of doors.
- B. Door holders shall be Glynn Johnson, Checkmate, Sargent or approved equal.
- C. Exit devices shall be Von Duprin or approved equal. Floor strikes shall be flush with finish floor.
- D. Flush bolts at top and bottom of doors shall be automatic type, with dustproof floor strikes, as manufactured by H.B.Ives, Glynn Johnson or Von Duprin.
- E. Locksets, latchsets, and bathsets shall be mortise locks with levers, heavy duty 2-3/4" backset, six pin tumbler cylinder. Provide reinforcing units for hollow metal doors.

Locksets shall be based on Schlage, K Line with lever design No. 68 and Trim No. 713 or Ventura "A" series.
- U. L. Label doors shall have proper throw latch bolts.
- F. Dead locks shall be Schlage B160P or similar.
- G. Mortise bolts shall be Corbin 162; Ives 150B; or approved equal with 2-1/2" backset.
- H. Interior pulls shall be Brookline 808; Baldwin 902 or approved equal. Exterior pulls shall be Dor-Line K, Brookline 807; Baldwin 941 or approved equal.

- I. Combination push pulls shall be Brookline 775; Corbin 2324; Russwin 6127 with corners of projecting lip cut to 1/2" radius and edges rounded. Plate shall be engraved with letter not less than 1/2" high, reading "PUSH" or "PULL" as required.
- J. Wall bumpers shall be installed wherever an opened door or any item of hardware thereon strikes a wall, column, casework or other part of the building construction. Where wall bumpers cannot be effectively used, a floor stop shall be installed.
- K. Door stripping and seals shall be Pemko #18062 GP .
- L. Silencers shall be Glynn Johnson 64, Corbin 33, Yale 890 or approved equal. Silencers shall be omitted from exterior, lightproof and stairhall doors.

PART 5 HARDWARE SETS

- A. The hardware sets shown are furnished as information and as a guide only. The complete quantity requirements for each and every opening shall be the responsibility of the Contractor. Lock numbers shown are for operating features

General Hardware Notes

Unless noted otherwise:

- All doors to have 1 1/2 pair butts
- All doors to have door stops (overhead stops where required).
- All doors to have silencers
- All exterior doors to have threshold and weatherstripping.
- Provide hinges as specified for doors which are pre-hung in lieu of hinges which are standard with unit.
- Provide lever handles unless noted otherwise.
- All hardware on fire rated doors to be fire rated.
- Hardware listed applies to each leaf of double doors.

*Finishes:

US10 (Satin Bronze, clear coated)

All areas except as noted below.

US26D (Brushed Chrome):

Inside all public toilet rooms and apartment bathrooms

Set #1

Lockset
Closer

Set #2

Lockset, knurled lever
Closer

Set #3

Not Used

Set #4

Lockset
Closer
Kickplates

Set #5

Lockset
Closer
Armor Plates

Set #6

Lockset, knurled lever
Closer
Kickplates

Set #7

Latchset
Closer
Kickplates

Set #8

Closer
Push pull
Kickplates

Set #9

Latchset
Closer
Kickplates
Panic device
Magnetic hold-open w/ auto release

Set #10

Lockset
Closer
Armor Plate
Threshold
Weatherstrip

Set #11

Lockset
Closer
Kickplates
Threshold
Weatherstrip
Panic Device

Set #12

Not used

Set #13

Lockset
Closer
Flush bolts
Astragal
Armorplates
Threshold
Weatherstrip

Set #14

Lockset
Closer
Kickplates
Threshold
Weatherstrip

Set #15

Lockset

Set #16 (Apt. Entry)

Spring hinges
Lockset
Threshold
Door knocker with viewer
Door #

Set #17 (Apt. Bedroom doors)

Privacy set
Butts
Stop

Set #18 (Apt. Bathrm doors)

Privacy set
Butts
Stop

Set #19 (other int. apt. doors)

Latchset
Butts
Stop

Set #20

Recessed pulls
Sliding door hardware

Set #21

Lockset
Closer
Magnetic hold-open in closer
w/ auto release
Astragal
Automatic bolts

Set #22

Lockset
Kickplates

Set #23

Lockset
Closer
Threshold
Weatherstrip

END OF SECTION 08710

SECTION 06800

GLAZING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Storefront Construction.
 - 2. Entrances and Other Doors, not indicated as Pre-glazed.
- B. Related Sections:
 - 1. 08400, Entrances and Storefronts.

1.02 SYSTEM DESCRIPTION

- A. Performance:
 - 1. Provide glass and glazing that has been produced, fabricated, and installed to withstand normal temperature changes, wind loading, impact loading, where applicable, without failure including loss or breakage of glass, failure of sealants or gaskets to retain watertight and airtight, deterioration of glass and glazing materials, and other defects in the Work.
 - 2. Normal thermal movement is defined as that resulting from an ambient temperature range of 120 deg. F(67 deg. C) and from a consequent temperature range within glass and glass framing members of 180 deg. F(100 deg. C).
 - 3. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any, resulting from seal failure, and any other visual evidence of seal failure or performance.

1.03 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Glazing Standards:
 - a. Comply with recommendations of FGMA Glazing Manual and Sealant Manual except where more stringent requirements are indicated.
 - b. Refer to those publications for definitions of glass and glazing trims not otherwise defined in this Section or other referenced standards.
 - 2. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate Certification Label of Insulating Glass Certification Council (IGCC).

- B. Single Source Responsibility: Provide materials obtained from one source for each type of glass and glazing product indicated.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.
- B. Samples:
 - 1. Submit, for verification purposes, 12 in. sq. samples of each type of glass indicated except for clear single pane units, and 12 in. long samples of each color required (except black) for each type of sealant or gasket exposed to view.
 - 2. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.
- C. Certificate:
 - 1. Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for Project comply with requirements.
 - 2. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect glass and glazing materials during delivery, storage, and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.
- B. Where insulating glass units will be exposed to substantial altitude changes, avoid hermetic seal ruptures by complying with insulating glass fabricator's recommendations for venting and sealing.

1.06 PROJECT/SITE CONDITIONS

- A. Environmental Conditions:
 - 1. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation, or other cause.
 - 2. Install glazing sealants only when temperatures are

in middle third of manufacturer's recommended installation temperature range.

3. Install liquid sealants at ambient and substrate temperatures above 40 deg. F(4.4 deg. C).

1.07 WARRANTY

A. Manufacturer's Special project Warranty on Insulating Glass:

1. Provide written warranty signed by manufacturer of insulating glass agreeing to furnish FOB point of manufacture, freight allowed Project site, within specified warranty period indicated below, replacements for those insulating glass units developing manufacturing defects.
2. Manufacturing defects are defined as failure of hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting, and maintaining units have been complied with during the warranty period.
3. Warranty Period: Manufacturer's standard min. 10 years after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Primary Glass Standard: Provide primary glass which complies with FS DD-G-451 requirements, including those indicated by reference to type, class, quality, and form.
2. Heat-Treated Glass Standard: Provide heat-treated glass which complies with FS DD-G-1403 requirements, including those indicated by reference to Grade, Style, Type, Quality, and Class.
3. Sizes:
 - a. Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer.
 - b. Provide thicknesses indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

B. Primary Glass Products:

1. Clear Float Glass: Type I, Class 1 (transparent), Quality q3 (glazing select).

C. Heat-Treated Glass:

1. Manufacturing Process: Horizontal (roller hearth) process with roll wave distortion parallel with

bottom edge of glass as installed, unless otherwise indicated.

2. Clear Tempered Float Glass: Grade B (fully tempered), Style I (uncoated surfaces), Type I (float), Quality q3 (glazing quality), Class 1 (transparent).

D. Sealed Insulating Glass Units:

1. General:

- a. Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design, and dessicant.
- b. For properties of individual glass panes making up units, refer to product requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products indicated.
- c. Provide heat-treated panes of kind and at locations indicated or, if not indicated, provide heat-strengthened panes where recommended by manufacturer for application indicated and tempered where indicated or where safety glass is designated or required.
- d. Performance characteristics designated for coated insulating glass are nominal values based on manufacturer's published test data for units with 1/4 in. thick panes of glass and 1/2 in. thick air space.
- e. U-values indicated are expressed in the number of Btu's per hour per sq. ft. per deg. F difference.
- f. Performance Classification per ASTM E774: Class A.
- g. Thickness of Each Pane: 1/4 in.
- h. Air Space Thickness: 1/2 in.
- i. Sealing System: Manufacturer's standard.
- j. Spacer Material: Manufacturer's standard metal.
- k. Dessicant: Manufacturer's standard; either molecular sieve or silica gel or blend of both.
- l. Corner Construction: Manufacturer's standard.

E. Glazing Sealants:

1. General:

- a. Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants which have performance characteristics suitable for applications indicated and conditions at time of installation.
- b. Compatibility: Select sealants with proven compatibility with surfaces contacted in the installation and under service conditions indi-

cated, as demonstrated by testing and field experience.

- c. Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

F. Miscellaneous Glazing Materials:

1. General:
 - a. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.
 - b. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
2. Setting Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
3. Spacers: Neoprene, EPDM, or silicone blocks, or continuous extrusions as required for compatibility with glazing sealant, of size, shape, and hardness recommended by glass and sealant manufacturers for application indicated.
4. Edge Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
5. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

PART 3 EXECUTION

3.01 INSPECTION

A. General:

1. Require glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery.
2. Obtain Glazier's written report listing conditions detrimental to performance of glazing Work.
3. Do not allow glazing Work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Pre-Installation Meeting: At Contractor's direction, glazier, sealant and gasket manufacturers' technical representatives, glass framing erector, and other trades whose Work affects glass and glazing shall meet at Project site to review procedures and time schedule proposed for glazing and coordination with other Work.

B. Cleaning:

1. Clean glazing channels and other framing members to receive glass immediately before glazing.
2. Remove coatings which are not firmly bonded to substrates.
3. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.03 INSTALLATION

A. General:

1. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.
2. Glazing Channel Dimensions:
 - a. As indicated in details, intended to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
 - b. Adjust as required by job conditions at time of installation.
3. Protect glass from edge damage during handling and installation.
4. Use a rolling block in rotating glass units to prevent damage to glass corners.
5. Do not impact glass with metal framing.
6. Use suction cups to shift glass within openings.
7. Do not raise or drift glass with a pry bar.
8. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
9. Remove from Project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.
10. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

B. Glazing:

1. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but no closer than 6 in., unless otherwise required.
2. Set blocks in thin course of sealant which is acceptable for heel bead use.
3. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches, except where gaskets or glazing tapes with continuous spacer rods are used for glazing.
4. Provide min. 1/8 in. bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final

- compressed thickness of tape.
5. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
 6. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
 7. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.
 8. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 9. Tool exposed surfaces of sealants to provide a substantial wash way from glass.

3.04 PROTECTION AND CLEANING

A. Protection:

1. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass.
2. Do not apply markers to surfaces of glass.
3. Remove nonpermanent labels and clean surfaces.
4. Protect glass from contact with contaminating substances resulting from construction operations.
5. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

B. Cleaning and Damaged Glass Replacement:

1. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, min. once a month, for build-up of dirt, scum, alkali deposits, or staining.
2. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.
3. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.
4. Wash glass on both faces max. 4 days before date scheduled for inspections intended to establish date of Substantial Completion in each area of Project.
5. Wash glass by method recommended by glass manufacturer.

- END OF SECTION -

TSMIDES ASSOCIATES ARCHITECTS PLANNERS/TAAP
 VOA PEAKS ISLAND ELDERLY HOUSING
 ROOM FINISH SCHEDULE

Page 1 of 4
 September 15, 2003

Room Name	Rm. No.	Floor	Base	Walls	Cling.	Cling Ht. (see wall sections)
Typical Apartments: 123-126, 139-143, 145-146						
Foyer		Carpet	V	GWBP	GWBP	8'-6"
Closets		Carpet	V	GWBP	GWBP	8'-6"
Kitchen		Sheet V	V	MRGWBP-E	GWBP	8'-6"
Living Room:		Carpet	V	GWBP	GWBP	8'-6"
Bedroom		Carpet	V	GWBP	GWBP	8'-6"
Bath		Sheet V	V	MRGWBP-E	GWBP	7'-6"
Manager's 2 Bdrm. Unit: 115						
Foyer		Carpet	V	GWBP	GWBP	8'-6"
Closets		Carpet	V	GWBP	GWBP	8'-6"
Kitchen		Sheet V	V	MRGWBP-E	GWBP	8'-6"
Living Room		Carpet	V	GWBP	GWBP	8'-6"
Bedroom		Carpet	V	GWBP	GWBP	8'-6"
Master BRM.		Carpet	V	GWBP	GWBP	8'-6"
Bath		Sheet V	V	MRGWBP-E	GWBP	7'-6"
W/D		Sheet V	V	GWBP-E	GWBP	7'-6"

ROOM FINISH SCHEDULE 09000 -

TSOMIDES ASSOCIATES ARCHITECTS PLANNERS/TAAP
 VOA PEAKS ISLAND ELDERLY HOUSING
 ROOM FINISH SCHEDULE

Page 2 of 4
 September 15, 2003

Room Name	Rm. No.	Floor	Base	Walls	Cing.	Cing Ht. (see wall sections)
Vestibule	114	Entrance Mat.	V	GWBP	GWBP	8'-0"
Laundry	121	VCT	V	GWBP	GWBP	8'-6"
Janitor's Cl.	140	VCT	V	GWBP	GWBP	8'-6"
H.C. Women	119	NSCT	CT	GWBP-E	GWBP-E	8'-0"
H.C. Men	120	NSCT	CT	GWBP-E	GWBP-E	8'-0"
Mechanical Rm.	126	Conc.-S	V	GWBP	GWBP	8'-6"
Oil Tank Room	127	Conc.-S	V	GWBP	GWBP	8'-3" 4hr. F.R. encl.
Corridors	118, 130, 139	Carpet	V	GWBP	GWBP	8'-0"
Kitchen	122	VCT	V	GWBP-E	GWBP-E	8'-6"
Offices	123, 124	Carpet	V	GWBP	GWBP	8'-6"

ROOM FINISH SCHEDULE

09000 -

TSOMIDES ASSOCIATES ARCHITECTS PLANNERS/TAAP
 VOA PEAKS ISLAND ELDERLY HOUSING
 ROOM FINISH SCHEDULE

Room Name	Rm. No.	Floor	Base	Walls	Cling.	Cling Ht. (see wall sections)
Community Rm.	125	Carpet	V	GWBP	GWBP	Varies
Vestibule	142	Entry Mat.	V	GWBP	GWBP	8'-0"
Lobby	143	Carpet	V	GWBP	GWBP	8'-0"
Sitting Rm.	132	Carpet	V	GWBP	GWBP	8'-0"
HEALTH CENTER CLINIC						
Vestibule	100	Entry Mat	V	GWBP	GWBP	8'-0"
Waiting Area	101	Carpet	V	GWBP	ACT-2	8'-0"
Reception/Sec.	102	Carpet	V	GWBP	ACT-2	8'-0"
Mechanical Closet	102A	VCT	V	GWBP	GWBP	8'-0"
Office	103	Carpet	V	GWBP	ACT-2	8'-0"
Lab	104	Carpet	V	GWBP	ACT-2	8'-0"
Exam	105, 107	Carpet	V	GWBP	ACT-2	8'-0"
Storage	109 106	VCT	V	GWBP	ACT	8'-0"
Dentist	108	Carpet	V	GWBP	ACT-2	8'-0"
ROOM FINISH SCHEDULE						09000 -

TSOMIDES ASSOCIATES ARCHITECTS PLANNERS/TAAP
 VOA PEAKS ISLAND ELDERLY HOUSING
 ROOM FINISH SCHEDULE

Page 4 of 4
 September 15, 2003

Room Name	Rm. No.	Floor	Base	Walls	Cling.	Cling Ht. (see wall sections)
Unisex Toilet	110	NSCT CT		GWBP-E	ACT-2	7'-8"
HEALTH CENTER CLINIC cont.						
Corridors	111	Carpet	V	GWBP	ACT-2	8'-0"
Check-out	112	Carpet	V	GWBP	ACT-2	8'-0"
Closet	113	Carpet	V	GWBP	ACT-2	8'-0"

LEGEND

- Carp = Carpet (by others)
- Sheet V = Sheet Vinyl
- V = Vinyl
- Conc.-S = Concrete w/ sealer
- GWBP = Gypsum wallboard painted
- GWBP-E = Gypsum wallboard - washable, see paint spec.
- MRGWBP-E = Moisture resistant gypsum wallboard - washable, see paint spec.
- ACT = Acoustic Tile, 2' x 4' panels
- ACT-2 = Acoustic Tile, 2' x 2' panels, tegular edged
- NSCT = Non-slip ceramic tile
- VCT = Vinyl composition tile
- * = Not in contract

SECTION 09250

GYPSUM BOARD

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Gypsum Board.
 - 2. Fasteners.
 - 3. Accessories.

- B. Related Sections:
 - 1. 06100, Rough Carpentry.
 - 2. 07210 Insulation.
 - 3. 09300, Tile.
 - 4. 09900, Painting.

1.02 QUALITY ASSURANCE

- A. Design Criteria:
 - 1. Fire-Resistance Rating:
 - a. Where gypsum drywall systems with fire resistance ratings are indicated, provide materials and installations identical with applicable assemblies tested per ASTM E119 by fire testing laboratories acceptable to authorities having jurisdiction.
 - b. Provide fire-resistance rated assemblies identical to those indicated by reference to GA File No's. in GA Fire Resistance Design Manual or to design designations in UL Fire Resistance Directory or in listing of other testing and agencies acceptable to authorities having jurisdiction.
 - 2. Gypsum Board Terminology Standard: GA505 by Gypsum Association.
 - 3. Single Source Responsibility: Obtain gypsum board products from single manufacturer or from manufacturers recommended by the prime manufacturer of gypsum board.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each gypsum drywall component, including other data as required to show compliance with Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Storage:

1. Store materials inside under cover, dry, protected from weather, direct sunlight, surface contamination, corrosion, damage from construction traffic, and other causes.
2. Neatly stack gypsum boards flat to prevent sagging.

C. Handling:

1. Handle gypsum boards to prevent damage to edges, ends, or surfaces.
2. Protect metal corner beads and trim from being bent or damaged.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. General: Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer for environmental conditions before, during, and after application of gypsum board.
2. Cold Weather Protection: When ambient outdoor temperatures are below 55 deg. F, maintain continuous, uniform, comfortable building working temperatures min. 55 deg. F min. 48 hour period before, during, and following application of gypsum board and joint treatment materials or bonding adhesives.
3. Ventilation:
 - a. Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after application.
 - b. Avoid drafts during dry, hot weather to prevent too rapid drying.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ceiling Support Materials and Systems:

1. Furring Members:
 - a. ASTM C645, min. 0.0179 in. thickness of base metal, hat-shaped.
 - b. Where shown as resilient, provide manufacturer's special type designed to reduce sound transmission.
2. Furring Anchorages: 16 ga. galvanized wire ties, manufacturer's standard wire type clips, bolts, nails, or screws as recommended by furring manufacturer and complying with ASTM C754.

B. Gypsum Board:

1. Gypsum Wallboard:
 - a. ASTM C36, in maximum lengths available to minimize end-to-end butt joints.
 - b. Type: Regular or Type X for fire-resistant rated assemblies and where indicated.

- c. Edges: Tapered
- d. Thickness: 5/8 in. or 1/2 in. as indicated.
- 2. Water-Resistant Backing Board:
 - a. ASTM C630, tapered edges, in maximum lengths available to minimize end-to-end butt joints.
 - b. Type: Regular or Type X for fire-resistant rated assemblies and where indicated.
 - c. Thickness: 5/8 in. or 1/2 in. as indicated.
- C. Trim Accessories:
 - 1. General:
 - a. Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound.
 - b. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads.
- D. Screws, Adhesives, and Sealants:
 - 1. Screws:
 - a. ASTM C1002, Grade 1013 to 1022 steel wire meeting ASTM A548.
 - b. Gypsum Board to Wood Framing: Type W.
 - 2. Sealant: Refer to Section 07900, Joint Sealers, for materials and application.
 - 3. Concealed Acoustical Sealant: Non-drying, non-hardening, non-skinning, non-staining, non-bleeding, gunnable sealant for concealed applications per ASTM C919.
 - 4. Sound Attenuation Blankets: Refer to Section 07210, Insulation.
- E. Joint Treatment:
 - 1. General: ASTM C475; type recommended by manufacturer for application indicated, except as otherwise indicated.
 - 2. Joint Tape: Paper reinforcing tape.
 - 3. Joint Compound: Ready-mixed vinyl-type for interior use.
 - 4. Water-Resistant Joint Compound: Special water-resistant type for treatment of joints, fastener heads, and cut edges of water-resistant backing board.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wall/Partition Support System: Install supplementary framing, runners, furring, blocking, and bracing at openings and terminations in gypsum drywall and where required for support of other work which cannot be

adequately supported on gypsum board alone.

B. Drywall Installation and Finishing:

1. Install gypsum boards in lengths and directions which will minimize number of end joints, and avoid end joints in central area of ceilings.
2. Install walls and partitions with exposed gypsum boards vertical, with joints offset on opposite sides of partitions.
3. Install boards with edges perpendicular to supports, with end joints staggered over supports, except where recommended in a different arrangement by manufacturer.
4. Form control joints with 1/2 in. space between boards.
5. Install acoustical sealant at base of space, and apply trim accessory at face.
6. Acoustical Sealant: Where work is indicated as sound retarding or shown with STC rating, apply acoustical sealant as recommended by manufacturer.
7. Form floating construction for gypsum boards at internal corners, except where special isolation or edge trim is indicated.
8. Isolate drywall work from abutting structural and masonry work; provide edge trim and acoustical sealant as recommended by manufacturer.
9. Install sound attenuation blankets where shown, without gaps; and support where necessary to prevent movement or dislocation.
10. Screw gypsum board to metal supports.

C. Drywall Finishing:

1. Except as otherwise indicated, apply joint tape and joint compound at joints, both directions, between gypsum boards.
2. Apply compound at accessory flanges, penetrations, fasteners heads and surface defects.
3. Install compound in 3 coats plus prefill of cracks where recommended by manufacturer; sand after last 2 coats.
4. Treat joints, fastener heads, cut edges and penetrations in water-resistant backing board using water-resistant joint compound to comply with water-resistant joint compound manufacturer's directions.

- END OF SECTION -

SECTION 09300

TILE

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Glazed Tile.
 - 2. Ceramic Mosaic Tile.
 - 3. Glazed Tile Trim.
 - 4. Ceramic Mosaic Tile Trim.
- B. Related Sections:
 - 1. 07900, Joint Sealers.
 - 2. 09250, Gypsum Board.

1.02 QUALITY ASSURANCE

- A. Source Quality Control:
 - 1. Provide tile of standard grade conforming to TCA/ANSI 137.1.
 - 2. Obtain each material required for any one type and color from single source.
 - 3. Furnish Master Grade Certificate signed by both tile manufacturer and installer.
- B. Reference Standards: Comply with standards of TCA and ANSI as referenced in this Section.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required, except bulk materials.
- B. Samples for Verification Purposes:
 - 1. Samples for each type of tile and for each color and texture required, min. 12 in. sq., on plywood or hardboard backing and grouted.
 - 2. Full size samples for each type of trim, accessory and for each color.
 - 3. Omitted.
 - 4. Samples of metal edge strip.
- C. Certification: Furnish Master Grade Certificate for each shipment and type of tile, signed by manufacturer and installer.

1.04 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain temperature at 50 deg. F. min. during tile work and for 7 days after completion.

- B. Provide adequate lighting for good grouting and clean up.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. ANSI Standard for Ceramic Tile:
 - a. Comply with ANSI A137.1 American National Standard Specifications for Ceramic Tile for types and grades for tile indicated.
 - b. Furnish tile complying with Standard Grade requirements unless otherwise indicated.
2. ANSI Standard - Tile Installation Materials: Comply with ANSI standard referenced with installation products and materials indicated.
3. Colors, Textures and Patterns:
 - a. For tile and other products requiring selection of colors, surface textures or other appearance characteristics, provide products to match characteristics indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.
 - b. Provide tile trim and accessories which match color and finish of adjoining flat tile.

B. Tile Products:

1. Unglazed Ceramic Mosaic Tile:
 - a. Factory mounted flat tile.
 - b. Type: Porcelain.
 - c. Wearing Surface: Slip-resistant tile with abrasive content.
 - d. Size: 2 in. x 2 in. x 1/4 in.
 - e. Face: Plain with cushion edges.
 - f. Product: American Olean, or equal.
2. Glazed Wall Tile.
 - a. Flat tile.
 - b. Size: 2-1/4 in. x 4-1/4 in. x 1/4 in.
 - c. Face: Plain with square edge.
 - d. Mounting: PregROUTED sheets of tiles factory-assembled and grouted with manufacturer's standard elastomeric material.
 - e. Product: American Olean, or equal.
3. Quarry Tile:
 - a. Unglazed square edged flat tile.
 - b. Wearing Surface: Slip-resistant with abrasive embedded in top surface.
 - c. Size: 6 in. x 6 in. x 1/2 in.
 - d. Product: American Olean, or equal.
4. Trim Units:
 - a. Provide tile trim units to match characteristics of adjoining flat tile.
 - b. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile, where applicable.
 - c. Shapes: Select from manufacturer's standard

shapes.

- C. Stone Thresholds: Not Used.
 - 1. General: Provide stone uniform in color and finish, fabricated to sizes and profiles indicated or required to provide transition between tile surfaces and adjoining finished floor surfaces.
 - 2. Marble Thresholds:
 - a. Comply with ASTM C503 for exterior use and abrasion resistance for uses subject to heavy foot traffic.
 - b. White, bonded marble complying with MIA Group A requirements for soundness.
- D. Sealant: Refer to Section 07900, Joint Sealers.
- E. Latex Thinset Admixture - Grout and Mortar:
 - 1. ANSI A108.5 and A118.4, compounded and stabilized latex for blending with neat portland cement or portland-sand mix.
 - 2. Service Life: Min. 10 yrs.
 - 3. Compressive Strength: Min. 5,000 psi.
 - 4. Bond Strength - Shear: Min. 600 psi @ 28 days.
 - 5. Water Absorption: Max. 3 percent.
 - 6. Density: 83 lbs. per cu. ft.
- F. Epoxy Adhesive Mortar:
 - 1. Chemical-resistant, water cleanable mortar.
 - 2. Service Life: Min. 10 years.
 - 3. Compressive Strength: Min. 3500 psi.
 - 4. Bond Strength: Min. 750 psi @ 28 days.

PART 3 EXECUTION

3.01 PREPARATION

- A. Report all unacceptable surfaces and do not tile until surface conditions meet requirements specified.
- B. Concrete Substrate:
 - 1. Etch with 10 percent solution of muriatic acid as required to remove curing compound or other substances which would interfere with bonding of mortar or adhesive.
 - 2. Rinse with water to remove all traces of acid.
 - 3. Seal substrate as required with material recommended by mortar or adhesive manufacturer.

3.02 INSTALLATION

- A. Layout:
 - 1. Lay tile to minimize cuts less than one-half tile in size.
 - 2. Locate cuts in walls and floors at least conspicuous location.
 - 3. Align all wall joints to achieve straight uniform grout lines, plumb and level.

4. Align floor joints to achieve straight uniform grout lines parallel with walls.

B. Placing:

1. Clean cut edges before installing.
2. Smooth exposed cut edges.
3. Fit against trim and accessories so escutcheons, plates, and collars will completely overlap cut edges.

C. Floor Installation Methods:

1. Interior - Concrete Subfloor: TCA Method F113-88, latex-portland cement mortar and grout, thinset.
2. Interior - Wood Subfloor: TCA Method F142-88, epoxy mortar and latex-portland cement grout, thinset.
3. Stone Thresholds: Install at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.

D. Wall Tile Installation Methods:

1. Interior - Solid Backing: TCA Method W223-88, organic adhesive and latex-portland cement grout, thinset.

3.03 ADJUSTING AND CLEANING

- A. Clean surfaces on completion of grouting.
- B. Remove all grout haze to manufacturer's instructions.
- C. Polish surface with soft cloth.
- D. Protect against damage and replace damaged items at no cost to Owner.

- END OF SECTION -

SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Ceiling Suspension System.
 - 2. Ceiling Panels.
- B. Related Sections:
 - 1. Division 15, Mechanical.
 - 2. Division 16, Electrical.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Acoustical Materials: FS SS-S-118.
 - 2. Suspension System: ASTM C635 for materials, C636 for installation.
- B. Special Requirements:
 - 1. Surface Burning Characteristics: Flame spread - max. 25, smoke developed - max. 50, per ASTM E84, UL listed marked.
 - 2. Fire-Resistance Rating: As indicated by reference to design designation in UL Fire Resistance Directory, tested per ASTM E119.

1.03 SUBMITTALS

- A. Samples: Submit 6 in. square samples of each exposed acoustical unit; 24 in. long samples of each exposed suspension member and molding.
- B. Extra Stock:
 - 1. Furnish extra materials matching products installed equaling 2 percent of acoustical units and exposed suspension members installed.
 - 2. Package materials in protective covering and identify with appropriate labels.

1.04 PROJECT CONDITIONS

- A. Scheduling:
 - 1. Do not install acoustical materials unless temperature and humidity approximate interior conditions of occupied building.
 - 2. Maintain temperature and humidity during and after installation.
 - 3. Insure all Work is complete in area to receive acoustical materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Suspension System:

1. As required to support acoustical units, fixtures, and other components as indicated, including anchorages, hangers, runners, cross runners, splines, clips, moldings, fasteners, and other members, devices, and accessories.
2. Comply with requirements of ASTM C635.
3. Hanger Wire: Min. 12 ga. galvanized steel.
4. Exposed Direct Hung Steel Suspension System:
 - a. Exposed Runner Type: Single Web.
 - b. Structural Class: Intermediate-Duty System.
 - c. Finish: Painted, white.
4. Edge Moldings:
 - a. Metal channel type with single flange exposed.
 - b. Finish: Painted, white.
5. Comply with U.L. Designs given for fire rated assemblies.

B. Ceiling Panels:

1. Type " 5/8" thk, molded, fine fissured mineral tile; Armstrong, Celotex Celotone or U.S. Gypsum Acoustone; Ceilings to be fire rated where indicated and shall comply with UL Designs.
 - a. ACT = 24"x48"x5/8", lay-in; "Cortega"
ACT-2 = 24"x24"x5/8", tegular edge "Cortega"
MRAT = 24"x48"x5/8", lay-in; "Nonperforated ML Fire Guard"
MRAT-2 = 24"x24"x5/8", lay-in; "Travertine Ceramaguard"
 - b. Panel size: 12"x12" concealed grid, ACT-1 Celotex Chase/Chasetone medium fissure.
 - c. Panel size 24"x24" ACT-2C tegular edge Armstrong Cirrus Classic Motif, Cotillion.
 - d. Panel size 24"x48" INSACT x 3" thick Armstrong Stonebrook vinyl faced fiberglass panels, perforated lay-in, exposed grid with hold down clips.
2. Exposed grid suspension system: Intermediate duty steel T-grid.
3. Concealed grid suspension system: concealed spine, intermediate duty st
4. Exposed grid suspension system for INSACT and MRAT ceilings to have aluminum face cover; Prelude Plus by Armstrong or equal.
5. Exposed grid suspension system for ACT-2C ceilings to have a 9/16" wide exposed grid.

3.01 INSTALLATION

A. General:

1. Install acoustical material and suspension system, including necessary hangers, grillage, splines, and other supporting hardware to ASTM C636.
2. Suspend grid system true and level and tied in with concealed members to eliminate swaying or cocking of main and cross runners.
3. Install edge moldings straight and tight to abutting surfaces, mitered at corners.
4. Frame openings in grid system as required for recessed lighting fixtures, diffusers, etc., with main tees parallel to sides and ends of opening.
5. Patterns: Center tile or board pattern both directions in each major space or room and adjust as necessary to insure edge pieces are min. 1/2 unit in width.
6. Align joints in both directions.

407

- B. Install primary suspension members and mechanical suspension system to support required loads with max. 1/360 deflection of span.

3.02 FIELD QUALITY CONTROL

A. Tolerances:

- 1. Main Runners: Level to within 1/4 in. in 10 ft.
- 2. Cross Runners:
 - a. Center-to-Center: +/- 1/32 in., non-cumulative beyond 12 ft.
 - b. Intersections: 90 deg. +/- 1/2 deg.
 - c. Vertical Alignment: Max. 0.015 in.
- 3. Gaps: Max. 0.020 in.

- END OF SECTION -

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Vinyl Composition Tile.
 2. Vinyl Sheet.
 3. Base.
 4. Accessories.

1.02 QUALITY ASSURANCE

- A. Source Quality Control:
1. Manufacturer: Provide each type of resilient flooring and accessories produced by single manufacturer including recommended primers, adhesives, and sealants and leveling compounds.
- B. Special Requirements:
1. Fire Test Performance: Provide resilient flooring complying with following fire test performance criteria as determined by independent testing laboratory acceptable to authorities having jurisdiction.
 2. Critical Radiant Flux (CRF): Following min. rating per ASTM E648.
 - a. 0.45 watts per sq. cm.
 - b. 0.22 watts per sq. cm.
 3. Flame Spread: Max. 75, ASTM E84.
 4. Smoke Developed: Max. 450, ASTM E84.
 5. Smoke Density: Max. 450, ASTM E662.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of resilient flooring and accessory.
- B. Samples:
1. Initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.
 2. Verification Purposes: Submit following samples of each type, color, and pattern of resilient flooring required, showing full range of color and pattern variations.

Full size tile samples.
2-1/2 in. long samples of resilient flooring accessories.
6 in. x 9 in. sample of sheet flooring.
Other materials as requested.

- C. Certification for Fire Test Performance: Submit certification from independent testing laboratory acceptable to authorities having jurisdiction resilient flooring complies with fire test performance requirements.
- D. Maintenance Instructions: Submit 2 copies manufacturer's recommended maintenance practices for each type resilient flooring and accessory required.
- E. Extra Stock:
 - 1. Deliver stock of maintenance materials to Owner.
 - 2. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
 - 3. Tile Flooring: Furnish min. one box for each 50 boxes, or fraction, for each type, color, pattern, and size installed.
 - 4. Sheet Flooring: Furnish min. 5 lin. yds. for each type, color, and pattern installed.

1.04 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Maintain min. 65 deg. F in spaces to receive resilient flooring min. 48 hours before installation, during installation, and min. 48 hours after installation.
 - 2. Store resilient flooring materials in spaces where they will be installed for min. 48 hours before beginning installation.
 - 3. Subsequently, maintain min. 55 deg. F in areas where Work is completed.
- B. Coordination:
 - 1. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.
 - 2. Do not install resilient flooring over concrete slabs until latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturer's recommended bond and moisture test.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide color and patterns as indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standards.
- B. Tile Flooring:
 - 1. Vinyl Composition:
 - a. FS SS-T-312, Type IV, 12 in. sq., unless otherwise indicated.

- b. Composition 1 - asbestos-free.
- c. Gage: 1/8 in.

- C. Filled Vinyl Sheet:
 - 1. Provide vinyl sheet products whose vinyl wearlayer complies with description in FS L-F-475A
 - 2. Filled Vinyl Sheet with Backing:
 - a. FS L-F-475 A, Type II, Grade 1A, manufacturer's recommended static load limit of 100 psl, min. 72 in. sheet width.
 - b. Manufacturer: Armstrong World Industries Inc., Possibilities Tapestry.
- D. Printed Vinyl Sheet: At all apartment units, see finish schedule for rooms
 - 1. Provide vinyl sheet product with printed construction with backing and urethane no wax wear layer, min. 72 in. sheet width.
 - 2. Manufacturer: Armstrong World Industries Inc., Visions Solarium.
- E. Accessories:
 - 1. Vinyl Wall Base: FS SS-W-40, Type II; 4 in. high; 0.080 in. ga., with matching stops, preformed corner units, standard top-set cove, unless otherwise indicated.
 - 2. Resilient Edge Strips: Min. 1 in. width; 1/8 in. ga., tapered bullnose edge, color to match flooring or as selected.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and adjoining construction, and conditions under which Work is to be installed.
- B. Do not proceed with Work until unsatisfactory conditions detrimental to proper and timely completion of Work have been corrected.
- C. Surface Preparation:
 - 1. Clean substrate to remove deleterious substances which would impair Work.
 - 2. Fill cracks, holes, and depressions in substrate.
 - 3. Surface shall be smooth, level, and at proper elevation.
 - 4. Surface shall not vary more than 1/8 in. in 10 ft. in any direction from level, plumb, or slopes shown.
 - 5. Remove roughness and protrusions from concrete surfaces by grinding.
 - 6. Use compounds for filling complying with resilient flooring manufacturer's recommendations.
 - 7. Prime, seal, or cover substrates which manufacturer of resilient flooring recommend be primed, sealed, or covered.
- D. Bond and Moisture Test:
 - 1. Using specified flooring materials, install 3 ft. x 3 ft. panels spaced 50 ft. apart throughout designated floor area.
 - 2. Install test panels with correct pattern direction using adhesive to be used in actual installation.
 - 3. If panels are securely bonded after 72 hrs., sur-

face is to be considered dry and clean of foreign materials.

4. Test panels can be considered securely bonded if unusual force is required to lift from floor and adhesive clings to both floor and back of resilient flooring.

3.02 INSTALLATION

- A. Standards: Install resilient flooring in accordance with manufacturer's instructions.
- B. Edging Strips: Install in continuous lengths at exposed edges of resilient flooring.
- C. Prime Coat:
 1. Apply primer to concrete surfaces.
 2. Work well into surface.
 3. Use quantity to assure complete surface coverage with non-absorptive base.
 4. Allow primer to dry before applying adhesive.
 5. Prime coat may be omitted if recommended by resilient flooring manufacturer.
- D. Adhesive:
 1. Apply to substrate with properly notched steel trowels.
 2. Allow adhesive to become tacky before applying resilient flooring.
- E. Extensions:
 1. Extend resilient flooring into closets and offsets, and under movable equipment of rooms and spaces shown or Scheduled to receive resilient flooring, including recessed covers within those spaces.
 2. Extend unexposed edges of flooring under set-on bases and similar trim work.
 3. Scribe, cut, and fit exposed edges of flooring and base adjoining other Work accurately and neatly with tight joint.
- F. Tile Units:
 1. Lay tile units symmetrically about center line of major room or space in square pattern, unless otherwise shown.
 2. Adjust so edge units are not less than one-half of tile width.
 3. Lay tile units with bottom surface securely bonded to substrate and top surface left smooth, clean and free from imperfections.
 4. Fit tiles tightly with each unit in contact to surrounding tiles and joints in proper alignment.
 5. Make neat tight joints where exposed edges abut other surfaces.
 6. Lay tile with grain running in single direction as directed, unless otherwise shown.
 7. Align joints both directions in square pattern

unless otherwise shown.

G. Sheet Flooring:

1. Lay with minimal seams and economical use of material.
2. Match edges for color shading and pattern at seams.
3. Use conventional full spread adhesive method, unless indicated otherwise.
4. Prepare seams with special routing tool and heat weld with vinyl thread.

H. Resilient Bases:

1. Secure bases to surfaces with waterproof cement.
2. Make joints tight.
3. Keep top and bottom edges in firm contact with adjacent surfaces.
4. Use longest lengths possible.
5. Straight pieces less than 23 in. long not permitted.

3.03 CLEANING AND ADJUSTING

A. Cleaning:

1. Not more than 4 days before acceptance or occupancy by Owner, clean resilient flooring and base.
2. Wash thoroughly with cleaner recommended by flooring manufacturer, to manufacturer's recommendations.

B. Protection: Protect Work from damage and normal wear and tear throughout construction period, free from any indication of use or damage at time of acceptance by Owner.

- END OF SECTION -

SECTION 09680

CARPET

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Carpet.
 - 2. Resilient Bases.
 - 3. Accessories.

1.02 QUALITY ASSURANCE

- A. Design Criteria:
 - 1. Carpet Flammability:
 - a. Pass pill test, ASTM D2859 (DOC FF-1-70).
 - b. Radiant Panel Test: Rating of 0.22 for corridors, circulation spaces, and rooms larger than 400 sq. ft.; ASTM E648.
 - c. Radiant Panel Test: Ratio of 0.45 for corridors, circulation spaces, and rooms larger than 400 sq. ft.; ASTM E648.
 - d. Tunnel Test: Max. flame spread 75, ASTM E84.
 - e. Smoke Density Test: Density of 450 or less; NFPA No. 258.
 - 2. Static Electricity: 3.5 KV max. @ 70 deg. F and 20 percent relative humidity, AATCC 134.

1.03 SUBMITTALS

- A. Samples: 18 in. x 27 in. sample of each color, type, and pattern with 6 in. long carpet edge strip.
- B. Shop Drawings: Submit showing layout, seam locations, and edge strip locations with direction of pattern and lay of pile indicated and details of cutouts.
- C. Manufacturer's Data.
- D. Certificates: Submit certified laboratory test reports for fire hazard classification of carpet and carpet cushion.
- E. Maintenance Instructions: Submit 2 copies for care, cleaning, maintenance, and repair.
- F. Spare Parts:
 - 1. Deliver all unused carpet and scraps larger than 2 sq. ft. in area and 12 in. wide to Owner.
 - 2. Store where directed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Carpet:
 - 1. Fiber Content: Multi-lobe nylon.
 - 2. Dye Method: Solution dyed.
 - 3. Method of Manufacture: Tufted low pile.
 - 4. Pile Yarn Weight: 24 oz. in Apartments
28 oz. in Corridors & Public Areas.
- B. Accessories:
 - 1. Carpet Adhesive: Release-type as recommended by manufacturer.
 - 2. Edge Strip: Manufacturer's standard vinyl edge guards in style and color as selected by Architect. Provide types appropriate to conditions
 - 3. Seaming Tape: "Rubber-Loc" (Reiling), "Rug Sealz" (Naugatuck Chemical Div.).
 - 4. All Other Materials: Manufacturer's standard for product specified. Primary backing: woven polypropylene; Secondary backing: Action Bac
- C. Resilient Bases:
 - 1. Solid homogeneous vinyl toe base in continuous lengths.
 - 2. Size: 0.080 in. ga. x 4 in. high.
 - 3. Accessories: Provide inside and outside corners, and end stops where applicable.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of carpet not to delay occupancy of building or interfere with completion of construction.
- B. Examine substrates, adjoining construction, and conditions under which Work is installed.
- C. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's instructions and recommendations.
 - 2. Place seams at locations indicated on accepted shop drawings.
 - 3. Maintain direction of pattern, texture, and lay of pile.
 - 4. Extend carpet into closets and offsets, and under movable equipment of rooms and spaces shown or Scheduled to receive carpet, including recessed covers within those spaces.
 - 5. Provide cutouts as required for removable access covers in substrates except do not cut out for floor closer cover plates.
 - 6. Bind edges neatly and secure to substrate.
 - 7. Cut only 3 sides where feasible to provide carpet flap in lieu of fully removable cutout.

8. Cut openings in carpet for electrical outlets, piping, and other penetrations.
9. Maintain close tolerances so edges of carpet will be covered by plates and escutcheons.
10. Install edge strip at every location where edge of carpet is exposed to traffic, unless otherwise indicated.
11. Install in single lengths wherever possible, secured in accordance with manufacturer's directions.

B. Glue-Down Installation:

In all areas.

1. Install test sample to demonstrate proper adhesion and removal capability of bonding system.
2. Cut and fit sections of carpet before application of adhesive.
3. Apply adhesive in accordance with manufacturer's directions, complying with procedure demonstrated to be satisfactory by test sample.
4. Butt carpet seams and edges tightly together and cement edges of backing together with continuous bead of latex cement in accordance with manufacturer's directions.
5. Eliminate air pockets and roll to ensure uniform band over entire area.
6. Promptly remove adhesive from carpet face.

C. Resilient Bases: (where indicated on Room Finish Schedule)

1. Secure bases to surfaces with waterproof cement.
2. Make joints tight.
3. Keep top and bottom edges in firm contact with adjacent surfaces.
4. Use longest lengths possible.
5. Straight pieces less than 23 in. long not permitted.

3.03 ADJUSTING AND CLEANING

- A. Vacuum carpet with commercial vacuum, with rotating agitator or beater in nozzle.
- B. Remove soil spots in accordance with manufacturer's recommendations.
- C. Protect carpet from damage and soiling.
- D. Use non-staining cover material for protection.
- E. Tape joints in protective covering.

- END OF SECTION -

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Primers.
 2. Finish Paints.
 3. Sealers.
 4. Stains.
 5. Varnish.

1.02 SYSTEM DESCRIPTION

- A. Performance:
1. Refer to Drawings and Schedules for extent of Work.
 2. Work includes painting and finishing interior and exterior exposed items and surfaces throughout Project, except as indicated.
 3. Surface preparation, priming, and coats of paint specified are in addition to shop priming and surface treatment specified in other Sections.
 4. Do not include painting of factory finished or installer finished items, finished metal surfaces, operating parts, and labels or nameplates.

1.03 SUBMITTALS

- A. Before beginning Work, Architect will furnish color chips for surfaces to be painted.
- B. Product Data: Submit manufacturer's data, application instructions, and label analysis for each coating material.
- C. Samples:
1. Submit samples for Architect's review of color and texture only.
 2. Resubmit samples if requested until required sheen, color, and texture is achieved.
 3. 12 in. x 12 in. Hardboard: Provide 2 samples of each color and material, with texture to simulate finish conditions.
 4. Actual Wall Surfaces and Other Building Components: Duplicate painted finishes of acceptable samples as directed by Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Handling:
1. Do not paint when air is dust-laden or when weather and temperature conditions are unsuitable.
 2. Do not paint exterior surfaces in damp or rainy

weather.

3. Comply with manufacturer's recommendation with respect to application and drying period temperatures and application conditions.

B. Fire Protection:

1. Place materials which might constitute fire hazard into metal containers.
2. Remove from premises at close of each days' Work.
3. Take every precaution to avoid damage by fire.

C. Surface Protection:

1. Provide suitable coverings to protect surfaces not requiring painting.

D. Accessories:

1. Remove or protect items which are not to be painted and which were placed before painting.
2. Reposition or remove protection upon completion of each space.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Tint primers and undercoats to approximate shade of selected finish coat color.
2. For deep tone finish colors, use Deep Base Primers recommended by manufacturer for surface.
3. Dry Mil Thickness:
 - a. Comply with manufacturer's specifications.
 - b. If thinning of materials is performed, apply additional coats to achieve full film thickness of coats specified.
4. Color Selections:
 - a. If color is not listed for any specific area or item, it does not relieve Contractor of responsibility for providing colors to be selected.
 - b. Color selection made by Architect is to determine basic color required for surface.
 - c. Colors with same designation but produced from two or more sources shall match when viewed from distance of 24 in. or more.
 - d. Final application of colors shall match prepared samples approved by Architect.
5. Manufacturer:
 - a. For purpose of designating type and quality of Work, Specifications are based on products of Benjamin Moore.
 - b. Products of other manufacturers shall fully match type and quality of product specified.
 - c. Alternate Manufacturer: Glidden, Pratt & Lambert, Pittsburgh Paints, Sherwin Williams, or equal.

B. Exterior Surfaces:

1. Wood - Gloss, Painted:
 - a. Primer: 1 coat, Moorwhite Primer.
 - b. Finish: 2 coats, Moore's House Paint.
 2. Metal - Galvanized:
 - a. Primer: 1 coat, Iron Clad Retardo Rust Inhibitive Paint.
 - b. Finish: 2 coats, Impervo Enamel.
 3. Metal - Aluminum:
 - a. Primer: 1 coat, Iron Clad Retardo Rust Inhibitive Paint.
 - b. Finish: 1 coat, Impervo Enamel.
- C. Interior Surfaces:
1. Gypsum Board Ceilings - Flat:
 - a. Primer: 1 coat, Latex Quick Dry Prime Seal.
 - b. Finish: 1 coats, Regal Wall Satin.
 2. Gypsum Board Walls - Eggshell:
 - a. Primer: 1 coat, Latex Quick Dry Prime Seal.
 - b. Finish: 1 coats, Regal Aquavelvet.
 3. Gypsum Board Walls, Kitchens and Bathrooms - Satin:
 - a. Primer: 1 coat, Latex Quick Dry Prime Seal.
 - b. Finish: 1 coats, Satin Impervo Enamel.
 4. Omitted.
 5. Wood - Clear:
 - a. First Coat: 1 coat, Benwood Paste Wood Filler, tint to stain shade.
 - b. Sealer: 1 coat, Benwood Architectural Penetrating Stain.
 - c. Finish Coat: 2 coats, Benwood Urethane Finish Low Lustre.
 6. Wood Painted
 - a. First coat: 1 coat, alkyd enamel under body.
 - b. Finish: 2 coats, alkyd enamel semi-gloss.
 7. Metal - Gloss:
 - a. Primer: 1 coat, Iron Clad Retardo Rust Inhibitive Primer for ferrous metal and 1 coat, Iron Clad Galvanized Metal Primer.
 - b. Finish: 2 coats, Impervo Enamel.

PART 3 EXECUTION

3.01 PREPARATION

A. General:

1. Prepare surfaces to receive paint; thoroughly clean off substances that may interfere with proper adhesion of paint.
2. Fill dents, cracks, hollow places, open joints, and other irregularities with filler suitable for purpose and, after setting, sand to smooth finish.
3. Prime surfaces not more than 8 hrs. after cleaning.

B. Metals:

1. Clean metal surfaces of foreign matter before priming coat is applied.
2. Remove grease and oil with cleaner manufactured

419

- for purpose.
 - 3. Galvanized Iron: Clean as recommended by paint manufacturer.
 - 4. Exercise care to prevent damage to shop coat.
 - 5. Touch up abraded or marred shop coats with paint used for priming.
- C. Gypsum Drywall: Repair minor cracks and holes with finishing compound; sand smooth after drying.
- D. Woodwork:
- 1. General:
 - a. Sandpaper woodwork to remove roughness, loose edges, splinters, or splinters and then brush to remove dust.
 - b. Treat surfaces of open-grained woods with two coats of paste filler.
 - c. Remove surplus filler. After primer or paste filler has dried, fill nail holes and other indentations with putty, flush with adjacent surfaces.
 - d. Sand wood surfaces smooth with No. 00 sandpaper and remove dust.
 - 2. Painted Woodwork:
 - a. Clean knots, pitch streaks, or visible sap spots of residue and treat with two coats of "Formula WP-578 Knot Sealer" (Western Pine Association).
 - b. Prime millwork on all sides before installation.
 - 3. Varnished Woodwork: Comply with manufacturer's instructions for surface being varnished.

3.02 APPLICATION

- A. Mixing:
- 1. Mix materials thoroughly and strain if necessary.
 - 2. Do not change ready-mixed materials except according to manufacturer's instructions.
- B. Application:
- 1. Apply materials with care to uniform and proper film thickness.
 - 2. Apply with minimum brush marks.
 - 3. Insure finishes are uniform in sheen, color, and texture.
 - 4. Allow coats to dry thoroughly before succeeding coats are applied.

3.03 ADJUSTING AND CLEANING

- A. Remove paint spots, oil or stains upon adjacent surfaces not requiring painting and leave entire job clean.

- END OF SECTION -

SPECIALTY SIGNS

SECTION 10400

Division 1, General Requirements, are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.1 SCOPE

A Work Included: Furnish and install all materials required to complete the work of this Section. Such work includes but is not limited to the following:

1. Room number and identification signs.
2. Toilet and Bath room identification signs.
3. Office door signs.

1.2 SUBMITTALS

A In addition to the Sign Contractor's submittal of a sign schedule, this Contractor shall submit color and material samples of all signage for the Architect's review in accordance with Section 01340, "Shop Drawings and Submittals".

2 PRODUCTS

2.1 MATERIALS

A Plaques and Small Signs:

1. Vinyl and acrylic plastic plaques shall be 0.015 inch rigid vinyl laminated to 1/8 inch acrylic plastic. The size shall be as required to accommodate as many as three (3) numerals and twenty-four (24) letters.
 - a. Plaque finish shall be matte and shall not exceed 10 percent gloss in its natural condition.
 - b. Plaque edges shall be beveled to reveal a continuous black border and be free from imperfections and the corner shall be square.
 - c. The color of the plaque shall be as selected by the Architect.

- d. Typography is to be set in Helvetica Medium in a height of one inch.
- e. The color of the imprinting shall be black figures on a white field.
- f. Imprinting shall be sub-surface printing on the reverse side of 0.015 inch rigid vinyl. When typography exceeds 9 inches in length, signs shall have more than one line of typography. Mounting substance shall be all purpose pressure sensitive adhesive (APPSA).
- g. Imprinting shall be correctly spaced and free from imperfections.

B Three Dimensional Signs: Signs shall be mounted. The signs shall be double faced as indicated on the drawings. The typography shall be Kabel style, upper case, 8 and 12 inches high. The overall size shall be as indicated on the drawings.

C Mounting Attachments:

- 1. All purpose pressure sensitive adhesive (APPSA) for smooth surfaces.
- 2. Special silastic adhesives (SA) for mounting surfaces.
- 3. Magnetic fastening tape (MT).
- 4. Mechanical fasteners and accessories shall be stainless steel.

2.2 Identification Systems

A Elevator Warning Identification - Surface mount identification sign above control panel for elevator at each floor.

- 1. Signs shall be 6 1/2" X 4 1/2" with 1/2" high letters as follows - "IN CASE OF FIRE EXIT BY STAIRWAY - DO NOT USE ELEVATOR".
- 2. Signs shall be fabricated of red background and white lettered laminated sheets of plastic. Machine engrave to expose white letters.

B Dwelling Unit Entry

1. Unit entry signs shall be surface mounted on corridor wall adjacent to room entry door latch side. Signs shall have number designations (i.e. 208) and place for occupant's name. Signs shall be 8" x 8" with 2" high characters.
- C Directional Sign Designators
1. On each typical apartment ~~#166F~~ directional designators shall be surface mounted on wall opposite elevators. Two signs each 4" x 12" (i.e. 201-248) with arrow and 262-298 with arrow.
- D All public rooms and other spaces shall be designated by name (i.e. "Trash Room", 2" x 12" sign; "Men or "Women", 2" x 10" sign). All letters shall be minimum of 1-1/2" high.
- E All sign shall have raised or engraved characters.
- F All exits shall be identified according to the required fire codes.
- G Signs shall be provided to indicate the existence and location of facilities for the handicapped. Use of international symbol for the handicapped shall be provided.
- H Signs shall be fabricated using materials as manufactured by Signs O'Life, or Metalphoto Corp. Plates shall be of anodized photosensitized aluminum alloy 1100 Series or equivalent, .032" thick with a satin finish or plastic laminate type, colors to be selected by Architect.

2.3 Cast Letters and Numbers

- A General - Furnish cast metal letters and numbers 6" high in Helvetic style for address identification on the exterior of the building. Furnish cast units with smooth flat faces, sharp corners, true lines and accurate profiles. Provide units free of pits, scale, sand holes or other defects. Protect exposed surfaces with 2 coats of clear non-yellowing lacquer.
- B Aluminum - Use alloy as recommended by aluminum producer to suit casting and finishing required.

1. Furnish satin hard coat anodic finish to match finish of storefront construction.
2. Manufacturer - Provide cast letters and numbers as manufactured by one of the following:

Allstate Sign and Plaque Corp., Andco Industries Corp., Architectural Bronze and Aluminum Corp., Metal Arts Division of L & H Mfg., Mettalic Arts, or Spencer Industries, Inc.

3 EXECUTION

3.1 SURFACE PREPARATION. Surfaces to which surface mounted signage is to be attached shall be clean, free of oil, dust, dirt or foreign matter which may adversely affect bondage of the sign to the surface.

3.2 INSTALLATION

- A Plaques shall be mounted with adhesives and in the locations as directed by the Architect.
- B Three dimensional signs shall be installed at the locations as directed by the Architect and as per the manufacturer's recommendations and shall be 1 inch from face of wall.
- C This Contractor shall be responsible for any damage done to surrounding areas at no cost to owner. The entire installation shall be left clean and in approved condition.

+ + END OF SECTION 10400 + +

SECTION 10950 - MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Omitted
 - 2. Fire Extinguishers and Fire Extinguisher Cabinets
 - 3. Postal Specialties
 - 4. Omitted
 - 5. Horizontal Blinds in Apartments
 - 6. Floor Entry Mats
 - 7. Knox Box
 - 8. Residential Kitchen Appliances
 - 9. Toilet Accessories

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Postal Regulations:
 - a. Do not use less than 3 and nor more than 7 mail compartments per single frame.
 - b. Comply with latest regulations of USPS for materials, sizes, construction, and installation.
- B. Source Quality Control:
 - 1. Field Measurements:
 - a. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work
 - b. Allow for adjustments within specified tolerances where taking of field measurements before fabrication might delay the Work.
- C. Coordination: Furnish inserts and anchorages which must be built into other Work for installation of related Work; coordinate delivery with other Work to avoid delay.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, and accessories.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of assemblies not fully described by product drawings, templates, and instructions for installation of anchorage devices built into other Work.
- C. Samples:
 - 1. Submit full range of color samples for each type of unit required.
 - 2. Submit 6 in. square samples of each color and finish on same substrate to be used in Work, for color verification after selections have been made.

PART 2 PRODUCTS
2.01 MATERIALS

A.1. Not Used.

A.2 Omitted

B. Fire Extinguishers and Fire Extinguisher Cabinets:

1. Provide fire extinguishers of types as indicated for each fire extinguisher cabinet (FECSB) and other locations indicated.

Type:

- a. Dry Chemical Type (40BC-FE): UL rated 40-BC, 10-lb nom capacity, enameled steel container.
- b. Multi-Purpose Dry Chemical Type A (4A-6-BC-FE): UL rated 4-A; 60-BC, 10-lb nom capacity, enameled steel container.

2. Provide fire extinguisher cabinets; manufacturer's standard units of suitable size for housing fire extinguishers of type and capacity indicated, and as follows;

- a. Recessed: Cabinet box recessed in wall to suit trim style selected.
- b. Trimless with Hidden Flange: Frame of cabinet box overlaps surrounding wall finish, concealed from view by overlapping door. Door style as selected.

C. Postal Specialties: Mailboxes:

1. Mailbox:

- a. General: Recessed wall mounted horizontal rear
- b. Material of Box: 0.025 in. thick terneplate.
- c. Material of Door and Exposed Frame: 0.085 in. thick extruded aluminum.
- d. Finish: Anodized aluminum color as selected by Architect
- e. Omitted.
- f. Compartment Numbers: 1/2" high engraved numerals.
- g. Compartment Size: 6"w x 5"h x 15-1/2"d.
plus 1 large package size unit for Office.

2. Locks:

- a. Provide each mail compartment door with lock, keyed different from all other locks for Project.
- b. Provide min. 1000 key changes for lock type supplied.
- c. Lock Unit: 5-pin tumbler cam type supplied with 3 change keys per lock.

3. Directory: Aluminum extrusion for max. 42 lines to match mailbox unit and installed in same frame as mailboxes.

4. Letter Drop:

- a. Size: 5 in x 6-3/8 in.
- b. Material: Extruded aluminum, finish to match mailboxes.
- c. Provide 1 in high engraved legend "U,S .Mail".

- D. Omitted
- E. Omitted
- F. Horizontal Blinds: Furnish and install in all Apartment windows only.
 - 1. Manufacturer: Levolor Lorentzen, Inc. or approved equal.
Apartments: Levolor 1" Riviera Blinds complete with brackets, lift cord. Color: White.
- G. Floor Mats and Frames: At Building Entries
 - 1. Vinyl fiber loops with solid vinyl backing and integral edging. Color as selected by Architect.
 - 2. Product: 3M Building Service Division Model Nomad All Weather Matting, or approved equal.
- H. Wood Benches: Not In Contract (By Owner)
- I. Knox Box.
 - 1. Recessed Knox Box. Fire/Police Rapid Entry System, recessed mounted, by Knox Life Safety System.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates and adjoining surfaces before installation to ensure adjacent Work has been completed.

3.02 INSTALLATION

- A. General:
 - 1. Install specialties to manufacturer's recommendations.
 - 2. Do not install before completion of Work by other trades on adjacent surfaces.
 - 3. Coordinate requirements for cutouts and openings in wall for recessed mounted units in conjunction with Section 04200, Unit Masonry, or Section 09250, Gypsum Board.
- B. Fire Extinguisher Cabinets:
 - 1. Comply with NFPA 10, securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.

3.03 ADJUSTING AND CLEANING

- A. Clean all surfaces at time of installation and before final acceptance by Owner.
- B. Repair all surfaces damaged during installation.

PART 4 SCHEDULES

A. Residential Kitchen Appliances - Colors: White

The following appliances and their manufacturer are noted to show a level of quality and minimum required operation and not to limit competitive bidding (model numbers shown are those of Whirlpool or Roper). Appliances to be as manufactured by Whirlpool, Roper or GE/Hotpoint (national accounts with the aforementioned manufacturers are maintained by Volunteers of America National Housing Corporation)

Typcial Dwelling Unit:

Refrigerator: Roper RT16VKXB. No-Frost, 15.6 cu. ft.

Electric Slide-in Range: GEJSS16DW, 30", standard-clean, front rotary controls. Provide integral backsplash.

Range Hood: Whirlpool RH2730XX, 30", non-vented.

Disposal: Omitted

Typical Handicap Unit:

Refrigerator: Roper, RS20EKXDW', Side by Side, 19.4 cu. ft.

Electric Range Top: Whirlpool RC8600XBQ, 30", front controls.

Range Hood: Whirlpool RH2730XX, 30", non-vented, with remote switch for fan and light

Wall Oven: Whirlpool RB160PXBQ

Disposal: Whirlpool E20 Emerson, continuous feed, 1/2 hp.

Manager's Unit:

Refrigerator: Roper RT18DKXDW. No-Frost, 18.2 cu. ft.

Stacked Washer/Dryer: Whirlpool LTE5243B

Dishwasher: Whirlpool DU840CWD

Electric Slide-in Range, Range Hood: Whirlpool RS385PCB, 30", self-cleaning, front rotary controls. Provide integral backsplash.

Disposal: Whirlpool E20 Emerson, continuous feed, 1/2 hp.

Community Kitchen:

Refrigerator: Roper RS20EKXDW', Side by Side, 19.4 cu. ft. with Ice Maker

Dishwasher: Whirlpool DU840CWD

Range: Whirlpool RS385PCB with integral backsplash

Range Hood: Whirlpool RH2730XX

Disposal: Whirlpool E20 Emerson, continuous feed, 1/2 hp.

B. Toilet Accessories:

Model numbers listed are those of Bobrick Washroom Equipment Co. or Basco which are used to establish quality, type and size of each item. Toilet Accessories shall be as manufactured by Bobrick Washroom Equipment Co., Basco, or G. M. Ketchum Company, Inc.

Typical Apartment Bathroom

1-24" grab bar (side of w.c.)	B-550.99 x 24
1-30" grab bar (behind w.c.)	B-550.99 x 30
24" Heavy Duty Towel Bar	B-205
Recessed Toilet Paper Holder	B-667
Recessed Medicine Cabinet with Mirror	Basco, 376, 20 x 26
Robe Hook	B-672
Soap Dish	B-680
Toothbrush and Tumbler Holder	B-679

Note: Shower rods are integral with bathing unit, otherwise must be provided.

Typical Handicap Unit Bathroom:

2-42" grab bars	B-550.99 x 42
24" Heavy Duty Towel/Grab Bar	B-550.99 x 24
Recessed Toilet Paper Holder	B-667
Recessed Medicine Cabinet with Mirror	Basco, 376, 20 x 26
Robe Hook	B-672
Soap Dish	B-680
Toothbrush and Tumbler Holder	B-679
Tilt Mirror	B-294, 1830

Note: Grab bars (2-48' and 1-18") at tub are integral with bathing unit, otherwise must be provided.

Manager's Apartment:

2-24" grab bars	B-550.99.99 x 24
2-24" Heavy Duty Towel Bar	B-205
Recessed Toilet Paper Holder	B-667
Recessed Medicine Cabinet with Mirror	Basco, 376, 20 x 26
Robe Hook	B-672
Soap Dish	B-680
Toothbrush and Tumbler Holder	B-679

Public Toilets :

2-42" grab bars	B-550.99 x 42
1-24" grab bar	B-550.99 x 24 (at non-HC w.c.)
Recessed Toilet Paper Holder	B-667
Robe Hook	B-672
Mirror	60"L x 30"H
Towel Dispenser & Waste Receptacle	B-3947

Public Toilets :

2-42" grab bars	B-550.99 x 42
Recessed Toilet Paper Holder	B-667
Robe Hook	B-672
Mirror	60"L x 30"H
Recessed Towel Dispenser & Waste Receptacle	B-3947

Exam Rooms (Rooms 105, 106, 107, 109)

Soap Dispenser	B-195
Paper Towel Dispenser	B-359
Robe Hook	B-671

SECTION 12372 - KITCHEN CASEWORK

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 this Section.

1.2 SUMMARY

- A. This Section includes wood kitchen and bathroom vanity cabinets and countertops.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 11 Section "Residential Equipment" for appliances mounted in kitchen casework.
 - 2. Division 15 Section "Plumbing Fixtures" for sink units mounted in countertops.

1.3 DEFINITIONS

- A. Flush Overlay: Door and drawer faces cover cabinet frame with space between faces sufficient for operating clearance.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each casework type specified.
- C. Product data for each hardware type specified.
- D. Shop drawings for casework showing location and size, accessories, materials, finishes, and filler panels. Include fully dimensioned plans, elevations, and anchorage details to countertop and walls.

- E. Shop drawings for countertops showing sizes, shapes, edge and backsplash profiles, cutouts for plumbing fixtures, and methods of joining.
- F. Samples for initial selection purposes in the form of manufacturer's color charts consisting of sections of units showing full range of colors, textures, and patterns available for each type of material indicated or exposed to view.
- G. Samples for verification purposes in full-size units of each type of material indicated; in sets for each color, texture, and pattern specified, showing full range of variations expected in these characteristics.
 - 1. 12-inch-square samples of wood with transparent finish for each species.
 - 3. 12-inch-square samples of plastic laminate for countertops.
 - 4. 12-inch-square samples of plastic laminate for casework finish.
 - 6. One unit of each type of exposed hardware.
- H. Product certificates signed by the manufacturer certifying that materials furnished comply with specified requirements.
- I. Maintenance data for kitchen casework for inclusion in Maintenance Manual specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Kitchen Casework: Comply with ANSI/NKCA A161.1 and HUD "Minimum Property Standards," Housing 4910.1, paragraph 611-1.1.
 - 1. NKCA Certification: Provide kitchen casework with National Kitchen Cabinet Association (NKCA) "Certified Cabinet" seal affixed in a semi-exposed location of each unit, evidencing compliance with above standard.
- B. Single-Source Responsibility: Obtain kitchen casework from one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework as a factory-assembled unit, packaged individually, and shipped each in its own carton.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with casework manufacturer's recommendations for optimum temperature and humidity conditions during storage and installation. Do not install casework until these conditions have been attained and stabilized.
- B. Field Measurements: Verify casework dimensions by field measurements. Verify kitchen casework can be installed in compliance with the original design and referenced standards.
- C. Field Measurements: Verify countertop size and shape prior to fabrication by field measurements taken after base units are installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Kitchen Casework:

- a. Imperia Cabinet Corp.
- b. Merillat
- c. Yorktowne Cabinets

2. Bathroom Vanities and Medicine Cabinet:

- a. Imperia Cabinet Corp.
- b. Merillat
- c. Yorktowne Cabinets

2. Plastic Laminate for Countertops:

- a. Formica Corp.
- b. Nevamar Corp.
- c. Sterling Engineered Products, Inc., Pionite
- d. Westinghouse Electric Corp., Micarta Div.
- e. Wilson Plastics Co., Dart Industries, Inc.

2.2 MATERIALS, GENERAL

- A. Sizes, dimensions, and thicknesses given are minimum dimensions.
- B. Particleboard: ANSI A208.1, mat-formed particleboard, Grade 1-M-2 with minimum density of 45 pcf, internal bond

435

of 60 psi, and minimum screw-holding capacity of 225 lbs. on faces and 200 lbs. on edges.

- C. Solid Wood: Clear, dry, sound, and free of defects selected from First Grade lumber as defined by NHLA.
- D. Plastic Laminate: NEMA LD 3; in thicknesses indicated and colors or patterns, and finishes as selected from approved samples.
- E. Thermoset Decorative Finish: ALA-1985; Melamine or polyester.

2.3 WOOD CASEWORK SPECIES AND STYLE

- A. Face Style: Standard Overlay Oak.

2.4 WOOD CASEWORK FABRICATION

- A. Face Frame: Frameless.
- B. Door and Drawer Fronts: To be offered in two door materials and finishes. The first is 3/4" thick MDF construction with a white enamel finish. The second is solid 3/4" thick #1 select birch with a stained finish. Door style on both to be traditional square-raised panel. The drawer fronts are to be similar raised panel style.
- C. Back, top, sides and bottom: To be min. 11/16" thick particle board laminated with melamine. Exposed ends to be edge banded with PVC. Color of all interiors to be white.
- D. Exposed Cabinet Ends: 11/16"-inch-thick particleboard with face veneer melamine to match door and drawer fronts.
- E. Base Unit Back Panels: 1/8-inch-thick hardboard with thermoset decorative finish on interior surfaces fastened to rear edge of end panels and to top and bottom rails.
- E. Toe Boards: 11/16" particleboard laminated with melamine color matched to doors.
- F. Drawer sides: To be 1/2" thick particle board coated with white vinyl. Drawer bottoms to be 1/4" thick luan plywood bonded with white melamine.

1. Drawer Suspension: Provide for a minimum capacity of 50 lbs., with twin track, side-mounted drawer-glide suspension with nylon rollers. Provide self-closing feature and positive stop.
- G. Shelves: 11/16"-inch-thick particleboard with thermoset melamine finish on top and bottom. All sides to be edge banded with PVC.
- H. Door and drawer and pulls to be solid brass 3-1/2" long #6, manufacturer's standard.
- I. Light valances: To be 3/4" x 2" Solid oak , finished to match doors.
- J. Vanity Base Height: 33" from to of counter to finish floor including 1-1/2" counter thickness.

2.5 CASEWORK, FINISHES

- A. Factory Finishing: To the greatest extent possible, finish casework at factory. Defer only final touch-up until after installation.
- B. Finish: Match Architect's sample.

2.6 CASEWORK HARDWARE

- A. General: Hinges to be 6 way adjustable concealed and secured to doors by a mortice and fastened by screws into a plastic spreading dowel.

2.7 COUNTERTOPS, PLASTIC LAMINATE

- A. General: Comply with ANSI A161.2.
- B. Countertop Fabrication: Plastic laminate GP 50 on 3/4-inch particleboard.
- C. Backsplash, and Endsplash Fabrication: Backsplash and endsplash to be plastic laminate GP 50 on 3/4-inch exterior plywood. Install backsplash in field with waterproof adhesive.
- D. Configuration: Provide countertops with the following front style, cove, and backsplash style:
 1. Front Style: Square edge.
 2. Backsplash and Endsplash Style: Square edge.

437

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install casework with no variations in flushness of adjoining surfaces, using concealed shims. Where casework abuts other finished work, scribe, and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework face.
- B. Install casework without distortion so that doors and drawers fit openings properly and are aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessories as indicated.
- C. Install casework and countertop level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Fasten unit of casework to adjacent unit and into structural support members of wall construction with #10 sheet metal or wood screws with washer head or washer.
- E. Fasten plastic laminate countertops by screwing through corner blocks in base units into underside of countertop. Spline and glue joints in countertops and provide concealed mechanical clamping of joint.

3.2 ADJUSTING AND CLEANING

- A. Adjust hardware to center doors and drawers in openings and lubricate to provide unencumbered operation.
- B. Clean casework on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 12372

PEAKS ISLAND V.O.A

DIVISION 15000 – PLUMBING & MECHANICAL

DIVISION 15000 GENERAL MECHANICAL

DIVISION 15250 INSULATION

DIVISION 15400 PLUMBING

DIVISION 15700 HVAC

DIVISION 15800 DUCTWORK AND ACCESSORIES

DIVISION 15900 AUTOMATIC TEMPERATURE CONTROLS

DIVISION 15990 TESTING AND BALANCING

PEAKS ISLAND V.O.A

SECTION 15000 - SUPPLEMENTAL GENERAL MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 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.

PEAKS ISLAND V.O.A

1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. Not Applicable

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 and General Contractor for resolution.

1.6 VISITING THE PREMISES

- A. Visit the site and examine existing conditions before submitting bid.

1.7 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.

1.8 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.

1.9 INSURANCE

- A. The mechanical contractor will carry the necessary insurance as set forth in the construction documents.

PEAKS ISLAND V.O.A

1.10 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)
American National Standards Institute (ANSI)
National Fire Protection Association (NFPA)
American Water Works Association (AWWA)
Maine State Plumbing Code
American Welding Society

1.11 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, eight (8) 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 three (3) 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. 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.

PEAKS ISLAND V.O.A

- 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.

1.12 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.

PEAKS ISLAND V.O.A

PART 3 – EXECUTION

3.1 REMOVALS AND RELOCATIONS

- A. Removals shall be performed without damage to adjacent retained work, however, where such work is damaged, patch, repair, or otherwise restore adjacent retained work to its original condition. Existing materials, fixtures and equipment which have been removed or disconnected but are not indicated or specified for reuse in the new work shall be removed from the site at no expense to the Owner. Removals shall be performed in a neat and workmanlike manner to the limits indicated or specified, or to the minimum extent necessary or required for the proper installation of new work. Existing surfaces remaining after removals to which new work is to be applied shall be left in a condition suitable for the application of the new work.
- B. Relocations shall be as indicated and shall be performed by workmen skilled in the trade involved. The removal and reinstallation of relocated items shall be performed in a neat and workmanlike manner and items to be relocated, which are damaged, shall be repaired or replaced with new undamaged items as reviewed by the Engineer. The cost of relocations in order to install new work shall be included as part of the contract bid price. Relocations shall include associated piping, wiring, controls, ductwork, hangers, and supports.

3.2 GRADES AND ELEVATIONS

- A. Establish and maintain grades and elevations in connection with this work.

3.3 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required.

3.4 SLEEVES AND PREPARED OPENINGS

- A. Coordinate core-drilling, cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. The Contractor shall furnish sleeves. Pipe sleeves shall be provided at all floor and wall penetrations. Sleeves shall be Schedule 40 steel pipe for iron pipe, Type "L" copper for copper pipe and Schedule 40 PVC for plastic pipe. Sleeves shall be firestopped, as specified.

3.5 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment

PEAKS ISLAND V.O.A

- 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.

3.6 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.

3.7 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.

3.8 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 by others

3.9 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.

3.10 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.

3.11 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:

PEAKS ISLAND V.O.A

1/2 Horsepower and less -120 volt, 1 phase, 60 Hz. 3/4
Horsepower and larger – 208/240 volt, 1 phase, 60 Hz.

- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be manufactured by Baldor, Magnetek or Toshiba, of the latest type and quality specified under individual items of equipment. Motor efficiencies shall be premium high efficiency type per the Consortium for Energy Efficiency Standard and/or be "Energy Star" compliant.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 16. Each starter furnished 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>(1800RPM)</u>	<u>(3600 RPM)</u>
1,1-1/2,2,3	—	86.5	85.5
5	89.5	89.5	86.5
7.5	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2
20	92.4	93.0	91.0
25	93.0	93.6	91.7

3.12 CLEANING OF SYSTEMS

- A. Piping and duct systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing any foreign substance

PEAKS ISLAND V.O.A

- 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.

3.13 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.

3.14 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.

3.15 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.

3.16 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,

3.17 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.

PEAKS ISLAND V.O.A

- 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.

3.18 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin when the equipment is started by contractor for use, or 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.

3.19 EXISTING UTILITIES AND EQUIPMENT

- A. Care shall be taken to protect or replace damaged existing utilities. Information indicated in the contract documents is the best information available as to the location of underground and concealed utilities and equipment.

PEAKS ISLAND V.O.A

3.19 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07841 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified. Coordinate size, location and type of pipe and duct sleeves as required by firestopping systems.

END OF SECTION

GENERAL MECHANICAL 15000-10

PEAKS ISLAND V.O.A

SECTION 15250 - INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including the project manual 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 15000-"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 15000, Supplemental General Mechanical Requirements, apply are as follows:

1. Piping insulation.
2. Duct insulation.
3. Equipment insulation.
4. Insulation application schedule.
5. PVC jacketing.

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: Mechanical rooms and Elevator machine rooms.
- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures, such as unheated attic spaces or non-air conditioned areas such as mechanical rooms, elevator machine rooms and storage rooms.

PEAKS ISLAND V.O.A

- D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces
- E. 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.
- F. 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.

PART 2 PRODUCTS

2.1 PIPING INSULATION

- A. Flexible Unicellular (ONLY): Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-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.
- B. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, pre-cut, or job fabricated of the same thickness and conductivity as used on adjacent piping.

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- thermal conductivity, white color.

PEAKS ISLAND V.O.A

2.2 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-ft 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-ft 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.

2.3 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-ft 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).

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.

PEAKS ISLAND V.O.A

- 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 preinsulated 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 (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.
- B. 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.

PEAKS ISLAND V.O.A

- C. PVC or Metal Jackets: Provide over insulation. 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 nameplates 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 nameplates, 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 fiberboard insulation. Seal longitudinal and lateral seams with FSK tape. Bond cuts, ends, and mitered sections with adhesive.

PEAKS ISLAND V.O.A

Ductwork:

Acoustically lined Ductwork: Unless indicated otherwise, acoustical duct liner shall be 1" thick. Acoustically lined ductwork in unconditioned spaces (such as mechanical rooms) shall have 1" thick duct wrap.

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
----------------	------------------	------------------------

Supply ductwork from the Air Handler Unit to spaces served

1"..... Ductwrap, FSK

Outside air intake ductwork from the air intake louver to the air handling unit

3".....Ductboard, FSK

Plenums at intake and exhaust louvers

3".....Ductboard, FSK

Exhaust Ductwork located in unheated attic spaces

3".....Ductboard,FSK

Equipment

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
----------------	------------------	------------------------

Heating system air separator.....1/2"..... Flexible Unicellular

3.7 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance requirements.

*** END OF SECTION***

INSULATION 15250-7

PEAKS ISLAND V.O.A

SECTION 15400 - PLUMBING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including section 15000 "Supplemental General Mechanical Conditions" are hereby made a part of the work in 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 Maine State Plumbing Code and local ordinances.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to section 15000 – "Substitutions", relative to competition and the (only) notion.
- B. The items for which the submittals paragraph in section 15000, "Supplemental General Mechanical Requirements", apply are as follows:

PIPING MATERIALS

NO HUB COUPLINGS

VALVES

PIPE HANGERS

FIXTURES AND TRIM

MISCELLANEOUS EQUIPMENT

WATER HEATING EQUIPMENT

PIPING VALVES AND EQUIPMENT IDENTIFICATION

BACKFLOW PREVENTERS

PUMPS

PEAKS ISLAND V.O.A

PART 2 – PRODUCTS

2.1 PIPING MATERIALS PLUMBING

- A. Soil and Waste (Sanitary), Vent and Roof Drainage Piping: Schedule 40 PVC or service weight cast iron with push-on joints below grade. Schedule 40 PVC, Service weight or "no Hub" cast iron above grade. Vent piping above grade may be Schedule 40 PVC thru roof.
- B. Domestic Water Piping: Type L hard copper tubing and cast bronze or wrought copper solder fittings.
- C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper or slip joint 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.

2.2 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, BOCA and local codes and requirements.

2.3 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, and Class 125.
- C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap and chain.
- D. Fixture Service Stop Valves: Angle or Straight Handle Stop, ASME A112.18M.
 - 1. Each plumbing fixture and item of equipment shall have individual stop valves in the hot and cold supplies.

PLUMBING 15400-2

PEAKS ISLAND V.O.A

2. Service stop valves exposed in finished areas shall be chrome-plated brass; in non-finished areas, rough brass stops 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 Circuit Setter.
1. Bronze or brass body and internals, teflon seats, memory stop, 175-psi working pressure, 250T-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 5ULP bronze body, bronze internals, 200 psi working pressure, 200°F maximum temperature, adjustable pressure range 10-25 psig. Provide with inlet strainer (screen).

2.4 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.

PEAKS ISLAND V.O.A

2.5 FIXTURES AND TRIM

- A. (P-1) Water Closet: ADA-compliant, floor-mounted, Crane Model 3-1002 "Hymont" elongated bowl, white vitreous china, low consumption (1.6gpf) or equal.
1. Stop Brasscraft 401DL angle supply stop
 2. Seat: Church Model 130TT, heavy weight solid plastic, close front, external check hinges, for elongated bowl, white color.
- B. (P-1A) Water Closet: ADA-compliant, floor-mounted, Crane Model 3-1002 "Hymont" elongated bowl, white vitreous china, low consumption (1.6gpf) or equal.
1. Stop Brasscraft 401DL angle stop
 2. Seat: Bemis 130TT, heavy weight solid plastic, close front, external check hinges, for elongated bowl, white color
- C. (P-1B) Water Closet: ADA-compliant, Crane Model 3-446E "Placidus", wall mounted, elongated bowl, white vitreous china, low consumption (1.6gpf) or equal.
1. Sloan 111 Flush Valve
 2. Seat: Bemis 1955C, heavy weight solid plastic, open front, external check hinges, for elongated bowl, white color
- D. (P-2) Lavatory: Crane #1-280-V countertop lavatory. 4" centerset drilling, ADA-compliant, wall-mounted, white vitreous china, 2 faucet holes on 4" centers or equal
1. Faucet: Symmons Symmetrix Model S-20-2-0, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge, single lever.
 2. Drain: pop up drain assembly
 3. Trap: PVC 1-1/2" P-trap with cleanout plug in cabinets
- E. (P-2A) ADA Lavatory: Crane #1-280-V countertop lavatory. 4" centerset drilling, ADA-compliant, wall-mounted, white vitreous china, 2 faucet holes on 4" centers or equal
1. Faucet: Symmons Symmetrix Model S-90-2-GW, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge, single lever.
 2. Drain: pop up drain assembly w/McGuire 155WC chrome cast brass offset grid strainer, Insulate exposed piping.
 3. Trap: McGuire 8902 P-trap with cleanout plug

PEAKS ISLAND V.O.A

2.5 FIXTURES AND TRIM CONTINUED

- F. (P-3) Shower Lasco Model 1483-OS, one-piece, gelcoat 47-3/4"x33-3/4"x72" overall dimensions, 1-1/2" diameter white L-shaped grab bar, slip-resistant textured bottom or equal,
1. Shower Unit: Symmons Temptrol 2000 Model S-96-1- X-L. Pressure-Balancing mixing valve with adjustable stop screw, lever handle diverter with integral volume control..
- G. (P-3A) Shower: ADA-compliant, Lasco Model 1603-BFST one-piece gelcoat, with fold-up cushioned seat, 60"x34x74-7/8" overall dimensions, w/ (2) 1-1/2" diameter white L-shaped grab bar, slip-resistant textured bottom, and rod or equal.
1. Shower Unit: Symmons. Temptrol 2000 Model S-96-300-B30-X-L-V. Pressure-Balancing mixing valve with adjustable stop screw, lever handle diverter with integral volume control, wall/hand shower with in-line vacuum breaker, flexible 5 ft metal hose, wall connection and flange and 30" slide bar for hand shower mounting.
- H. (P-4) Apartment Kitchen sink, Dayton D-125522 self rimming 20 gauge stainless steel sink. 25" x 22" single bowl, punched for four holes or equal.
1. Faucet: Symmons Symmetrix, S-248-2, two handle faucet w/hose and spray, polished chrome finish
 2. Strainer: Dayton Model D-1125 with removable basket and neoprene stopper,
 3. Manager's apartment to receive I.S.E. 333 Garbage disposal
- I. (P-4A) Kitchen Sink: ADA-compliant, single bowl; Dayton GE-12521 stainless steel, 25"x21.25" overall size, 3 faucet holes on 4" centers, fully sound deadened. Drain shall be located in upper left or right corner of bowl or equal.
1. Faucet: Symmons Symmetrix Model S-23-2, single handle w/spray, 2.0 gpm aerator, 10" spout, polished chrome finish, ceramic control cartridge.
 2. Strainer: Dayton Model D-1125 with removable basket and neoprene stopper,
 3. Sink installation shall be in compliance with the ADA guidelines.

PEAKS ISLAND V.O.A

2.5 FIXTURES AND TRIM CONTINUED

- J. (P-5) Urinal: Crane 7-160 "Embassy" ADA low consumption wall hung urinal or equal. Sloan 186-1.0 royal flush valve.
- K. (P-6) Water Cooler: Halsey Taylor HAC8FS-Q ADA drinking fountain
- L. (P-7) Kitchen sink community room: Elkay LR-3321 or Dayton, self-rimming 18-gauge stainless steel double bowl sink. Provide I.S.E. 333 disposal with Symmons S-2148-2 Symmetrix two handle faucet w/hose spray.
- M. (P-8) Tub/shower in manager's apartment – Lasco 2603-SMH, 60"x33-1/4"x70-1/2" white fiberglass tub shower unit or equal w/two handicapped grab bars. Symmons S-96-2-X-L. Gerber 4-818 trip drain.
- N. (P-9) 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.
- N. (P-10) Washing Machine Connection – Symmons W-602 washing machine box or equal
- O. (P-11) Counter Sink in Health Care Wing – Dayton D-11719 Single bowl bar sink w/garvin strainer. Zum Z-812A4 two handle ADA gooseneck faucet.

2.6 MISCELLANEOUS EQUIPMENT

- A. Floor Drains (FD): Zum Model Z-415, cast iron body with 2" or 3" bottom or side outlet, as indicated, 4" deep seal trap Zum Model Z-1000, combination invertible membrane clamp and adjustable collar.
1. Strainer: 5" diameter Zum "Type B", polished nickel-bronze.

PLUMBING

15400-6

PEAKS ISLAND V.O.A

2.6 MISCELLANEOUS EQUIPMENT CONTINUED

- B. Floor Cleanout (FCO): Zum 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.
- C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind wall access cover.
- D. Water Hammer Arrester (Shock Absorber): Plumbing and Drainage Institute listed. Install where shown on plans.

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

- E. Vacuum Breaker: Watts Model N36, 3/4" size, and 20 CFM capacity.
- F. 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.
- G. Backflow Preventers (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled.
1. 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.
 2. 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.

PLUMBING 15400-7

PEAKS ISLAND V.O.A

2.6 MISCELLANEOUS EQUIPMENT CONTINUED

- H. Hose Bibb (MB) for non-freezing areas: Woodford Model 24, 3/4" size, brass body, with wheel handle and vacuum breaker.
- I. Freeze Proof Hose Bibb (FPHB): Woodford Model 65 series, brass body, automatic draining, with vacuum breaker-backflow preventer, 3/4" hose thread nozzle, chrome finish, loose tee key.
- J. Thermometers: Terice 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.
- K. Pressure Gauges; Terice 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.
- L. 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 Mi-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.

2.7 WATER HEATING EQUIPMENT

- A. Superstor Model Ultra SSU-60C w/Double coil heat exchanger

2.8 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

PEAKS ISLAND V.O.A

2. Recirculated Domestic Hot Water
3. Domestic Cold Water

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.
3. Tags and charts shall be coordinated with Section 15700 HVAC System and when completed this work shall have been done sequentially.

PEAKS ISLAND V.O.A

PART 3 EXECUTION

3.1 PLUMBING CONDITIONS.

Inspection:

1. Verify that plumbing may be installed in strict 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 fluids under working conditions
- E. Install stops valves and unions to facilitate isolation and removal of equipment. Provide stop valves in plumbing service connections to equipment provided under all sections of the specifications. Provide final plumbing connections to equipment furnished under all sections of the specification.
- F. Copper pipe shall be reamed to remove burrs.
- 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.

PEAKS ISLAND V.O.A

- H. Pipe penetrations through walls and floors shall be in accordance with Section 15000, 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.
- I. Provide a cleanout in the vertical position at the base of each sanitary and roof drainage drop.
- J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope or as indicated and in no case less than 1/8" per foot.

3.3 PIPE HANGERS SUPPORT

- A. Impact driven studs are prohibited.
- B. Piping: supported at intervals with rod sizes as follows,

Copper Tube	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	7'	3/8"
1"	7'	3/8"
1-1/4"	8'	3/8"
1-1/2"	8'	3/8"
2"	10'	3/8"

PEAKS ISLAND V.O.A

HANGERS CONTINUED

- A. PVC Pipe: Supported at 4 foot intervals.
- B. Verticals: supported at intervals as follows by use of clamp hangers: Copper Pipe and Tubing; 1-1/2" and larger. Not more than 12 ft. 1-1/4" and smaller; Not more than 6 ft.

3.4 CLOSING IN WORK

- A. General: Cover up or enclose work after it has been properly and completely reviewed.
- B. No additional cost to the Owner will be allowed for uncovering and recovering any work that is covered or enclosed prior to required inspections and review.

3.5 CLEANUP

- 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 by the General Contractor and the premises left in a clean and neat condition.
- C. Caulk around fixtures at floor, wall, or countertop as appropriate.

PEAKS ISLAND V.O.A

3.6 DOMESTIC WATER SERVICE

- A. Domestic water service to be equipped with water meter in accordance with Portland Water District or local authority. Meter to be equal to Hersey Series "M.H.D." & per local Water Department standards. Plumbing Contractor shall install water meter furnished by the water district per local water district standards.
- B. All Fees and associated Water District charges to be paid for by the Owner.
- C. Furnish & install a new reduced pressure backflow preventer, at water service "Watts" 009 Series, in accordance with local water company standards.
- D. Furnish and install a full size by-pass in accordance with local authority. All valves to be of ball valve design.

3.7 FLUSHING OF DOMESTIC WATER PIPING SYSTEMS

- A. Flush underground mains and lead-in connections to system risers before connection is made to the domestic water piping system. Flush piping until water flows clear. Connect the water service to the building piping system, flush the building piping system until the water flows clear.

3.8 DISINFECTING

- A. Disinfect the water piping in accordance with AWWA C601 and the Maine State Plumbing Code. 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 disinfections 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 are not greater than 0.2 parts per million.

PEAKS ISLAND V.O.A

3.9 TESTS

- A. Sanitary soil, waste/root drain and vent piping shall be filled with water or air, and tested for leaks.
- B. Interior Piping Test: Water piping shall be tested at a pressure of 100 lbs. per square inch for 1 hour. Pressure drop in this period shall not exceed one pounds per square inch. Leaks shall be repaired and system retested. Notify General Contractor and Architect 24 hours before test is to be performed.

3.10 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.

3.11 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07841 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped by the General Contractor as specified.

• END OF SECTION *

PEAKS ISLAND V.O.A

SECTION 1 - HVAC SYSTEM

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, cooling and ventilation systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "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 15000- 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 15000, 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. Oil-Fired Boiler/burner unit.
 - 8. Water Treatment.
 - 9. Boiler Breeching
 - 10. Fans
 - 11. Pumps (See Hydronic specialties)
 - 12. Air handling unit.
 - 13. Horizontal unit heaters.
 - 14. Space Heaters
 - 15. Radiation
 - 16. Oil Tanks and piping

PEAKS ISLAND V.O.A

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 or Schedule 40 carbon steel pipe with threaded joints and malleable iron fittings, or Schedule 40 carbon steel pipe with rolled or cut grooves and rigid couplings or flexible coupling where required for expansion, or Schedule 05 carbon steel pipe up to 2" with the Victaulic or Victaulic "Pressfit" fitting system.

2.2 FITTINGS FOR STEEL PIPE

- A. Fittings in sizes 1/2" through 2": Steel or malleable iron with requirements as follows:

1. Steel fittings socket welding or screwed type conforming to ANSI B16.11.
2. Malleable iron fittings screwed type conforming to ANSI B16.3.
3. Victaulic rolled or cut grooves with rigid couplings and flexible couplings where required for expansion.
4. Victaulic "Pressfit" system.

B. Fittings in sizes

- 2-1/2" and larger:
1. Butt welding type conforming to ANSI B16.9.
 2. Flanged type conforming to ANSI B16.5.
 3. Victaulic rolled or cut grooves with rigid coupling and flexible couplings where required for expansion.

PEAKS ISLAND V.O.A

C. Steel Flanges: Forged steel, welding type conforming to ANSI B16.5. Bolting and gaskets shall be as follows:

1. Bolting: Material used for bolts and studs shall conform to ASTM A 307, Grade B, and material for nuts shall conform to ASTM A 194, Grade 2. Dimensions of bolts, studs, and nuts shall conform to ANSI B18.2.1 and ANSI B18.2.2 with threads conforming to ANSI B1.1 coarse type, with Class 2A fit for bolts and studs, and Class 2B fit for nuts. Bolts or bolt-studs shall extend completely through the nuts.
2. Gaskets: Gasket material for flanged joints for steam application under saturated conditions shall be composition asbestos or copper. Gaskets shall be of a material that resists attack by the fluid or gas in the pipeline and shall be suitable for the pressure and temperature ranges encountered. Gaskets shall be as thin as the finish of surfaces will permit. Raised-face steel flanges shall have ring gaskets with an outside diameter extending to the inside of the boltholes. Gaskets shall have an inside diameter equal to or larger than the port openings.

D. Butt Weld Joints: Shall conform to ANSI B31.1. The use of backing rings shall conform to ANSI B31.1. Ferrous rings shall be of weldable quality and shall not exceed 0.05 percent sulfur. Backing rings shall be of the continuous machined or split band type.

E. Grooved Joint Couplings: Couplings shall be self-centering and shall engage and lock in place the grooved or shouldered ends of pipe and pipefittings in a positive watertight couple. The couplings shall provide some degree of angular pipe deflection, contractions, and expansion. The coupling clamp shall be malleable iron conforming to ASTM A 536, Grade 65-45-12. The gasket shall be molded rubber conforming to ASTM D 2000, the "line call-out" number shall be suitable for a water temperature of 230 degrees F. Coupling nuts and bolts shall be steel conforming to ASTM A 183. Grooved fittings shall be malleable iron conforming to ASTM A 47, Grade 32510 or ductile iron conforming to ASTM A 536, Grade 65-45-12. Mechanical couplings and fittings shall be of the same manufacturer. Before couplings are assembled, pipe ends and outside of gaskets shall be lightly coated with lubricant approved by the coupling manufacturer to facilitate installation.

2.3 HANGERS

A. Adjustable Swivel Hanger: Carpenter and Paterson Fig. 400 conforming to MSS-SP-58, Type 1-A for piping systems,

PEAKS ISLAND V.O.A

B. Riser Clamp: Carpenter and Paterson Fig. 126 and Fig. 126 CT conforming to MSS-SP-58, provide copper plated clamps on copper pipes.

2.4 VALVES

- A. Ball Valves: Apollo 70-200 Series, bronze body, 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.
- 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. Outside Screw and Yoke (OS&Y) Gate Valves: Nibco Model F-617-0, iron body, Fed. Spec. WW-V-58 with bronze trim, 125-pound class.
- D. Check Valves: Nibco Model S-413 or T-413, bronze body Fed. Spec. WW-V-51, regrinding swing check type, 200-pound class.

2.5 PIPING, VALVE AND EQUIPMENT IDENTIFICATION

A. Pipe Identification: Provide plastic "wrap around" identification markers by Seton or Setmark indicating flow direction and fluid flowing for the following:

Hot Water Supply Piping Hot Water Return Piping Hot Water

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.
3. Piping identification shall be color-coded and in accordance with ANSI.

B. Equipment Identification:

1. Provide clear identification for pumps

PEAKS ISLAND V.O.A

C. 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.
4. Tags and charts shall be coordinated with Section 15000 Plumbing and when completed this work shall have been done sequentially.

2.6 HYDRONIC SPECIALTIES

- A. Thermometers: Terice 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 5°F increments. 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: Terice 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: 0-60 psig with 5-psi graduations.
- C. Expansion Tanks (Captive Air Type) (ET): Taco or Amtrol Model as scheduled, tank shall be of capacity indicated and shall be welded steel, constructed and tested hydrostatically. 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 to 18 psig.

PEAKS ISLAND V.O.A

- 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 or Amtrol model as scheduled, steel construction, designed for not less than 125 psig and constructed and tested. Tank shall have tangential (ONLY) connections, screwed for sizes 2" and smaller, flanged for sizes 2-1/2 inches and larger. Each air separator shall have an internal design suitable for creating the required vortex and subsequent air separation. 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 premium high efficiency motors. Motors shall be premium high efficiency type, open drip-proof or TEFC by Baldor, Magnetek or Toshiba. Motor efficiencies shall comply with the Consortium for Energy Efficiency Standard.

PEAKS ISLAND V.O.A

- I. Suction Diffuser: Taco; start-up strainer and magnetic insert shall have free area equal to 5 times the area of the pump suction. Remove the start-up strainer after 72 hours of continuous operation.
- J. Circuit Balance Valves: Taco circuit setter.
 - 1. Bronze or brass body and internals, teflon seats, 175 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.
- K. Water Pressure Reducing Valve: Watts Regulator series 5ULP bronze body, bronze internals, 200 psi working pressure, 200°F maximum temperature, adjustable pressure range 10-25 psig. Provide with inlet strainer (screen). Install where shown on plans.
- L. Flexible Connectors 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.

PEAKS ISLAND V.O.A

- M. 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.
- N. Flexible Connections at Coils: Mason type BSS line size with male nipples for 2" and smaller, flanged for 2-1/2" and larger. Provide series EM-RF-150 for application of extreme movement (3/4") or misalignment (1-1/2").
- O. Triple Duty Valve: Taco MPV, cast-iron body, 200 psig rating, lockable in position and incorporating a non-slam silent operating check valve, flow measuring ports and positive shut-off valve with position indication.
- P. Expansion Joints: Expansion joints shall be Hyspan Model 3501, American Boa, or approved equal. Joints shall have fixed flanged ends, 150 psig rated working pressure, 750°F. maximum temperature rating. Expansion joints shall be externally pressurized and internally guided and capable of absorbing a minimum of 2" of axial travel. The joint shall be laminated or multi-ply steel bellows construction. Installation of the joint(s) shall be in accordance with the manufacturers recommendations, including anchors and guides. Install as indicated on the drawings.

PEAKS ISLAND V.O.A

2.7 OIL-FIRED BOILER/BURNER UNITS

- A. Provide modular cast iron hot water boiler/burner where shown on Drawings as required by manufacturer's instructions, by Hydrotherm. Boiler/burner shall meet requirements of ASME Boiler and Pressure Vessel Code for 80 psi hot water. Certify efficiency of 80% or higher.
- B. Provide the following:
 1. Cast iron burner base, oil fired burners, cast iron absorption units, cast iron flue collectors, Each module shall be constructed for 100 psi working pressure and tested at 250 psi in accordance with ASME Code.
 2. Cast iron absorption unit, factory-assembled of horizontal sections joined by push nipples at alternate ends to provide zig-zag water flow from boiler return inlet to boiler supply outlet, for 80 psi working pressure and factory-tested at 250 psi hydrostatic pressure as required by ASME Code, Section IV, for Low Pressure Heating Boilers.
- C. Boiler Trim Hot Water
 1. Provide high limit control and low water cutoff.
 2. Provide pressure and temperature gauges on each boiler module. Temperature sensing element shall be next to hot water outlet.
 3. Provide pressure relief valves, drain valves and gate shut-off valves on each module, as required by ASME Code.
 4. Mount temperature controls on unit with temperature sensing elements next to hot water outlet.
 5. Provide unions at water connections to each module.
 6. Provide individual friction and barometric dampers.
- D. Oil Burner
 1. Provide oil burner with the boiler and be forced draft flame retention type for No. 2 fuel oil. Burner shall be wired for power supply as shown on drawings.
 2. Provide oil piping, oil safety valves and any pressure regulators as required by codes, standards and insurers.
 3. Burner to be Beckett or Carlin approved by boiler manufacturer for use with boiler.

PEAKS ISLAND V.O.A

E. Controls

1. Controls for boiler module shall be factory-tested and shall be suitable for firing each module individually. Step firing of each battery shall be accomplished by firing individual boiler modules with signal from control panel.
2. Arrange controls so that one boiler module may be made inoperative and removed from system without interfering with normal operation of other boiler modules.
3. Panel shall be model S-1000 complete with suitable controls for;
 - a. Start-Stop Pump.
 - b. Schedule water.
 - c. Night set-back.
 - d. Operate combustion air damper for domestic water heater and boiler.
 - e. Outdoor control.

- F. Provide supervisory services for start-up, testing and instruction of Owner's personnel.

G. Boiler Room Control Wiring

1. All boiler room wiring from the main disconnect switch to the burner mounted control panels, burners, limits, operating controls and other devices shall be furnished and installed under this section of the work. A manually operated remote heating plant shutdown switch shall be located just outside the boiler room door and shall be marked for easy identification.
2. All safety control switching shall be accomplished in the hot ungrounded conductor. Provide electrical control wiring in rigid conduit, as required by burner manufacturers recommendations and wiring diagrams, and Local and State regulations. Provide all new fusible link safety switches and controls as required by applicable regulations. Control wiring shall conform to applicable provisions of DIVISION 1600, ELECTRICAL.
3. Control wiring shall include, but shall not be limited to, connections to:
 - a. Limit switches, high, operating controls and burner.
 - b. Low water cutoff and pump controllers.
 - c. Wiring between boiler control panel, pumps, combustion air for boiler and domestic water heater etc.

PEAKS ISLAND V.O.A

2.8 WATER TREATMENT

- A. Provide treatment system and service for hot water system as shown on Drawings and specified herein.
- B. Provide piping necessary for complete system.
- C. Hot water treatment system shall consist of 5 gallon Dearborn Model Type AV By-Pass Shot Feeder to feed chemical solution into piping system and bring chemical properties of water to within respective manufacturer's recommended operating limits, in order to minimize corrosion, and reduce build-up of slime or other contaminants.
- D. Flush and clean hot water heating system with Dearborn BC-45 cleaner after completion of installation. After cleaning, add nitrite inhibitor. Dearborn B-239, to control nitrite strength to 800-1,000 ppm maximum. Submit written report indicating that systems have been thoroughly cleaned and charged with corrosion inhibitor.
- E. Apply chemical cleaning operation to interior of systems to remove foreign substances after completion of installation.
- F. Effluent from HVAC system discharged to sewer shall meet requirements of applicable local, state and national water quality standards.
- G. Water treatment shall include feeding devices necessary to feed chemical solution into piping system and bring chemical properties of water to within manufacturer's recommended operating limits, in order to minimize corrosion and reduce build-up of slime or other contaminants.

PEAKS ISLAND V.O.A

2.9 BOILER BREECHING/CHIMNEY

- A. Round Breeching: 18 gauge in accordance with NFPA 31. Suitable cleanouts shall be provided that will permit cleaning the entire breeching without dismantling.
- B. Cleanouts: Provide cleanouts secured to the ends and sides of the breeching where indicated on drawings or where required to effectively clean the breeching.

2.10 FANS

- A. Shall be model indicated. Fan manufacturers shall be Greenheck, Cook or equal. 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.
- B. Bearings shall be precision, flange-mounted self-aligning ball bearings at inlet and discharge. Minimum average L50 design life shall be 200,000 hours at maximum catalogued operating conditions. 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.

PEAKS ISLAND V.O.A

2.12 AIR HANDLING UNIT

- A. Provide air handling units and coils of manufacturer, model and performance indicated.
- B. The air handling units shall consist of a fan section, face-and-bypass dampers, coil sections, coils, blank access sections, and filter/mixing box section with cartridge-type final filters as scheduled. Performance shall be ARI 430 certified. Provide access doors in each section.
- C. Cabinet Construction: Steel reinforced and braced with steel angle framework, factory-assembled, sectionalized fan and coil sections, removable access panels to internal parts. Metal parts galvanized steel or chemically cleaned, phosphatized, primed and finished with enamel top coat. The cabinets shall be double-wall, lined with 2" thick thermal insulation covered with an inner solid metal liner. Provide insulated stainless steel drain pan in cooling coil sections. Provide a 4" high base rail.
- D. Fans: Shall be as scheduled, multiblade centrifugal type, statically and dynamically balanced and tested. Bearings shall be self-aligning, grease lubricated ball type. Fan motor shall be 1800 RPM, open drip-proof or TEFC type, with greasable ball bearings, variable pitch sheave and mounted on an adjustable base. Provide extended grease lines. The fan drive shall have a 1.5 service factor for the maximum rated horsepower. Motors shall be premium high efficiency with minimum motor efficiency conforming to Section 15000 "Electric Motors and Motor Controls". Submit certificate of conformance for motor efficiency. Motors shall be inverter-duty rated by Baldor, Magnetek or Toshiba conforming to the Consortium for Energy Efficiency Standard.

PEAKS ISLAND V.O.A

- E. 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.
 - 1. Heating Coils: Copper tubes, aluminum fins and copper headers. Casings shall be 16 gage galvanized steel.
- F. Mixing box section: Outside air and return air dampers shall be galvanized steel, airfoil blade, Ruskin Model CD60, or approved equal, "ultra low leak" type. Blade seals shall be neoprene and jamb seals shall be compressible aluminum or stainless steel. The mixing box shall be double-wall insulated construction with 2" thick fiberglass insulation.
- G. Filters and filter housings: Provide Farr Model 3P "Glide/Pak", Cambridge, or approved equal, 2-stage weatherproof side access multistage filter housings for each air handling unit. The filter housings shall be constructed of 16 gauge galvanized steel with extruded aluminum filter tracks and individually sealed filter holding frames. Provide transitions to air handling unit duct connection sizes. Pre-filters shall be 2" deep, Farr 30-30, or approved equal, 30-35% efficient pleated media disposable-type with two (2) spare sets. Final filters shall be Farr "Riga-Flo 15", 60-65% efficient, disposable-type with two (2) spare sets. Final filters shall be 12" thick with an initial air pressure drop of .29" w.g. at a face velocity of 500 FPM. Filter efficiencies shall be as tested in accordance with ASHRAE Standard 52-76.
- H. Spring type vibration isolators: Select for 2" initial deflection. Selections shall be made to compensate for asymmetrical weight distribution. Air handlers that are provided with internal isolation for the fan - motor assembly need not be furnished with external isolators or flexible duct connectors.
- I. Submittal data shall include sound power data for inlet, radiated and discharge sound. CAUTION: Equipment without this data will be rejected.
- J. Submit fan curves for each fan with the design operating point clearly marked.
- K. Provide internal or external heating coil face-and-bypass dampers, as indicated and scheduled. Dampers shall be parallel blade low leakage type. The bypass damper area shall be no less than 25% of the face damper area.

PEAKS ISLAND V.O.A

2.13 HORIZONTAL UNIT HEATERS

- A. Horizontal unit heaters shall be manufactured by the Trane Co., 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.

2.14 SPACE HEATERS

- A. Space heaters shall be VRV Products Model KS 2006, Beacon-Morris, or Embassy, capacities as indicated on drawings. Wall heaters shall be fully recessed or surface-mounted, as indicated, 120V. with pipe-mounted aquastat. The wall heater covers shall be painted by others.

2.15 RADIATION

- A. Baseboard radiation shall consist of 3/4" copper-aluminum, 20 gauge back panel, fully modulating damper, and all necessary trim including, splice pieces, end caps, corners, and etc. Units shall be IBR rated with minimum capacities as scheduled. Baseboard radiation shall be manufactured by Embassy Industries Inc., Sterling Radiator Co., Haydon or Slant Fin.

2.16 OIL TANKS

- 1. Installation of the fuel oil system shall comply with the applicable federal, state and local codes including NFPA 30 and NFPA 31.
 - 2. Furnish and install three 330 gallon oil tanks manufactured in accordance with Underwriters Laboratories. Construction standard for above ground tanks.
- A. Piping
 - 1. Fuel oil lines for supply and return shall be Type "K" soft temper below ground and Type "K" soft temper above for 3/4" and less O.D. tubing.
 - 2. Fuel oil vent and fill shall be schedule 40 steel
 - 3. Vent piping shall terminate with a cap
 - 4. Strainers at equipment shall be single basket type, with inlet and outlet connections at the same horizontal line with honeycomb filters, suitable for 20 gph and 15 psi Fulflo Model FB4.
 - 5. Provide Scully Unifill System including a 45 degree adapter and weather cap and Scully vent alarm.

PEAKS ISLAND V.O.A

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. In every attempt, piping shall not be exposed in occupied spaces.
- 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 as shown on plans.
- 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.

PEAKS ISLAND V.O.A

- 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 shall have screwed or welded 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. Steel Piping 2-1/2" and larger shall have welded connections or Victaulic couplings.
 - 1. Welded Joints:
 - a) Welding Procedure Specifications: Before any welding is performed, submit copies of welding procedure specification for metals included in the work together with proof of qualification as outlined in ANSI B31.1.
 - b) Performance Qualification Record: Before any welder or operator shall perform any welding, submit 2 copies of the Welder's Performance Qualification Record in conformance with ANSI B31.1 showing that the welder was tested under the approved procedure specification submitted. In addition also submit each welder's assigned number, letter, or symbol which shall be used to identify the work of the welder, affixed to the joint immediately upon completion of the weld. Welders making defective welds after passing a qualification test shall be given a requalification test and upon failing to pass the test shall not be permitted to work this contract.
 - c) Previous Qualification: Welding procedures, welders and welding operators previously qualified by test may be accepted for this contract without requalification subject to approval and provided that the conditions specified in ANSI B31.1 are met before a procedure can be used.
 - d) Surface Conditions: Welding shall not be done when the atmospheric temperature is less than 0 degrees F, when the surfaces are wet, when rain or snow is falling or moisture is condensing on the surfaces to be welded, nor during periods of high wind, unless the welder and the work are protected properly.

PEAKS ISLAND V.O.A

- d) At temperatures between 32 degrees and 0 degrees F, the surfaces for an area within 3 inches of the joint to be welded shall be heated with a torch to a temperature warm to the hand before welding. Surfaces to be welded shall be free from loose scale, slag, rust, paint, oil and foreign material. Joint surfaces shall be smooth, uniform, and free from fins, tears and other defects which might affect proper welding. Slag shall be removed from flame cut edges to be welded by grinding, temper colors need not be removed. Each layer of weld metal shall be cleaned thoroughly by wire brushing prior to inspection and deposition of additional weld metal.
- e) Base Metal Preparation: Preparation of pipe ends shall be done by machining and/or grinding, except that oxygen or arc cutting will be permitted on carbon steel pipe only if the cut is reasonably smooth, true and heavy oxide is thoroughly cleaned from the flame cut surfaces by grinding. The ends of pipe-to-pipe, and pipe-to-fitting, joints shall be aligned accurately within a tolerance of twenty percent of the pipe thickness. Alignment shall be maintained during welding by suitable clamps, Jigs, tack welds, or other devices. If tack welds are used to maintain alignment, they shall be kept below the outside surfaces of the pipe and shall not exceed twice the pipe thickness in length or two thirds the pipe thickness in depth, shall be the same quality as the final welds, and shall be fused thoroughly in the final weld. Defective tack welds shall be removed before the final weld is made.
- f) Quality of Welds: The quality of welds shall be in accordance with ANSI 831.1. The surface of the finished welds shall have a bright metallic luster after cleaning, shall be fairly smooth with regular, even ripples, and shall be uniform in contour. Except as necessary to correct defects, the surfaces shall not be dressed, smoothed, or finished for improving their appearance. Welds shall be sound throughout and fused thoroughly, and shall be free from gas pockets, oxides, slag inclusions, and surface porosity, except that very small pores or specs of oxides or slag will be allowed if dispersed widely and if not larger or more numerous than those produced in passing qualification tests. Welds shall be free from overlaps, undercuts and excessive convexity. The inside of the pipe shall be free from bubbles of weld metal which would restrict the pipe area or might become loose.

PEAKS ISLAND V.O.A

- g) Correction of Defects: Defective or unsound welds shall be corrected by removing and replacing the welds with new welds, or as follows:
- 1) Excessive convexity - chip or grind weld to required size.
 - 2) Undercutting, shrinkage cracks, craters, blowholes, and excessive porosity - chip or grind weld to sound weld and base metal and deposit additional weld metal.
 - 3) Undersize and excessive concavity - clean weld and deposit additional weld metal.
 - 4) Overlapping and lack of fusion - remove weld by chipping or grinding and reweld.
 - 5) Slag inclusions - chip or grind weld to remove slag and fill with weld metal.
 - 6) Removal of adjacent base metal during welding - chip or grind weld to sound base and weld metal and form full size by depositing additional weld metal. Pipe or fittings which cannot be rewelded satisfactorily shall be replaced with new pipe or fittings at the Contractor's expense. Caulking of welds shall not be done. Before adding weld metal or rewelding, the surfaces shall be cleaned thoroughly. The removal of weld metal from a defective weld shall not extend into the base metal beyond the weld penetration. Where incomplete fusion is disclosed by chipping or grinding to correct defects, the part of the weld shall be removed and rewelded. In chipping or grinding welds, the weld or base metal shall not be nicked or undercut.

2. Victaulic Joints:

- a) Pipe Preparation: Pipe shall be prepared in accordance with the latest published Victaulic specifications.
- 1) Standard Weight Pipe: Shall be roll grooved without metal removal or square cut grooved.
 - 2) Plain End for "Pressfit": pipe ends shall be thoroughly cleaned on the OD, for 1" from the pipe end to remove pipe coatings, mill scale, rust and raised weld beads, OD burrs and sharp edges shall be removed. Pipe shall be marked 1-1/2" from the end, and pipe end configuration shall be in conformance with Victaulic specifications.

PEAKS ISLAND V.O.A

- b) Assembly: Couplings, fittings, valves and pipe shall be assembled in accordance with latest published manufacturer's instructions.
 - 1) Pipe: pipe shall be checked to be certain it is sufficiently free of indentations, projections, grooves, weld seams, or roll marks on the exterior of the pipe over the entire gasket, that pipe ends are square cut and that preparation (grooving, cleaning, hole cutting) is in accordance with Victaulic pipe preparation standards.
 - 2) Gasket: gaskets shall be of the central cavity pressure-responsive design. Gasket style and elastomeric material (grade) shall be checked to be certain gasket supplied is suited for the intended service.
 - 3) Lubrication: Use manufacturer's recommended lubricant. Lubrication shall be used for proper coupling/fitting assembly as follows: A thin, uniform coat of Victaulic Lubricant shall be applied by brush or by hand by: 1) brushing lubricant on the gasket lips (ID) and the entire exterior of the gasket; 2) brushing lubricant on the pipe ends around the entire pipe circumference and inside with coupling housing.
- K. Connections between copper and steel piping shall be made with brass fittings.
- L. 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.
- M. 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.
- N. 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.

PEAKS ISLAND V.O.A

- O. Pipe penetrations through walls, floors and ceilings shall have pipe sleeves of the same material as the pipe and in accordance with Section 15000 "Supplemental Mechanical General Requirements" and BOCA. Pipe sleeves shall be suitable for firestopping in accordance with the firestopping manufacturers recommendations. Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- P. Automatic Air Vents: Shall be installed with a manual isolation valve. The vent discharge shall be piped to a local floor drain or 6" above the floor in the boiler room.

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 Size
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.

PEAKS ISLAND V.O.A.

3.4 INSTALLATION OF BOILER

- A. Install boilers per NFPA-31 and manufacturer's instructions. Provide boilers with interconnecting power and control wiring.

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.

PEAKS ISLAND V.O.A

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 be no less than four (4) hours. The time of instruction shall be arranged with the Owner. The prime Mechanical Contractor, General Contractors representative 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 07841 "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 *

PEAKS ISLAND V.O.A

SECTION 15800 – DUCTWORK AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "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 15000-"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 15000, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Ductwork.
 - 2. Ductwork accessories.
 - 3. Air devices.

PART 2 – PRODUCTS

2.1 DUCTWORK

- A. Classification of Ductwork: Low pressure ductwork: 2" W.G. static pressure. The duct pressure class shall be determined by multiplying the total static pressure scheduled in the fan schedules by 1.2.
- B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new copper bearing galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.

PEAKS ISLAND V.O.A

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

2.2 DUCTWORK ACCESSORIES

A. Access Doors:

1. Low Pressure Duct Systems: 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 aluminum frame and blades, extruded vinyl edge seals, field set at 0.10" W.G. pressure differential for full open operation.
- D. Fire Dampers: Ruskin Model IBD2, curtain type, 100% free area, 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. Integral sleeves are not allowed.
- E. 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 Btu/h/°F.-sf-in. and be cleanable and suitable for duct velocities of 4000 FPM. 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. Where shown on prints, all

PEAKS ISLAND V.O.A

ductwork downstream of variable air volume boxes shall have 1/2" thick duct liner. Duct dimension are net inside of liner.

- F. Flexible Duct Connections: Ventfabrics, Inc. neoprene coated glass fabric.
- G. Drawbands for Flexible Ducts: Clinch type stainless steel with screwdriver adjustment, or nylon with lever action tightening tool provided by the drawband manufacturer.
- H. Turning Vanes: (Low Pressure)
 - 1. Solid blade, mounted with the long edge down stream in accordance with duct construction details indicated, or Barber-Colman Model AOOA. Submit a 12"x12" sample elbow for review prior to fabrication.
- I. Volume Dampers:
 - 1. Factory fabricated as specified, or shop fabricated in accordance with SMACNA "HVAC Duct Construction Standards".
 - 2. Rectangular: Ruskin Model MD-35, 12 gauge galvanized steel, locking quadrant, opposed blade over 11", single blade 11" and under.
 - 3. Round: Ruskin Model MDRS25, 20 gauge galvanized steel with locking quadrant(ONLY). Dampers may be provided integral with spin-in fittings.
- J. Flexible Ductwork:
 - 1. Low Pressure Duct Systems: Wiremold type WGCF, polyester core with wire helix, 1-1/2" thick, 3/4 lb fiberglass insulation, polyolefin jacket/vapor barrier, 2" W.G. rated pressure.
- K. Louvers (L): Performance and sizes as indicated on the drawings. Extruded aluminum construction, 0.081" thick, aluminum extrusions, drainable blade, storm-proof, 1/2" expanded metal bird screen, size and performance as indicated/scheduled. AMCA certified leakage shall be 0.03 ounces of water per square foot of free area at 1000 FPM free area velocity. Louvers shall be NCA XAD-6 or American Warming and Ventilating. Finish to be mill.

PEAKS ISLAND V.O.A

L. Joint Sealer:

1. Hardcast DT tape and FTA-20 activator.
2. Provide waterproof sealer where watertight seal is specified.

2.3 AIR DEVICES (Krueger, Anemostat, 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. 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.
- F. **Grilles and Registers:** Construction and finish as indicated, 1/2" louver spacing, 35° curved blade. Registers shall have opposed-blade volume dampers with screwdriver adjuster. Unless otherwise indicated, registers shall be provided. Devices located in holding cell shall be vandal resistant similar to Krueger Model 1330, 3/8" blade spacing, 38° curved blade, 16 ga. steel frame.

PEAKS ISLAND V.O.A

- G. Linear Diffusers: Linear bar grilles/registers and linear slot diffusers shall be as scheduled and indicated. Bar grilles shall have a 1" border. Provide opposed blade volume dampers for each diffuser and adjustable pattern controllers (for linear slot diffusers). Construction shall be extruded aluminum with a white finish.

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 BOCA code.
- B. Joint Sealing: All longitudinal and transverse joints shall be sealed with the specified duct sealing product to minimize air leakage. Joints on exposed ductwork shall be sealed during joint assembly with no visible sealer. Any excess sealer shall be removed.
- 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.

PEAKS ISLAND V.O.A

- 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.

PEAKS ISLAND V.O.A

- 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.

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. Ductwork shall be leak tested in accordance with Section 15990 "Testing and Balancing Air and Water Systems". Provide end cap and closure pieces. Close off and seal openings in ductwork to be tested. Ductwork shall be tested before it is insulated.
- B. Before operating any system, the system shall be cleaned out to remove dust 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 general contractor and the owners representative, and demonstrate that the system functions as designed.

PEAKS ISLAND V.O.A

D. 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, 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 07841 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped by the General Contractor as specified.

* END OF SECTION *

PEAKS ISLAND V.O.A

SECTION 15900 - AUTOMATIC TEMPERATURE CONTROLS

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 to provide the sequences as described in these specifications. The ATC system shall be complete including required components including, low voltage and line voltage wiring, conduit and user interface terminal. Wiring shall be in accordance with Division 16 of the specifications and NFPA 70, National Electrical Code.

1.2 ACCEPTABLE MANUFACTURERS

Honeywell, Siemens, Siebe-Coleman, Trane, Johnson Controls, and Maine Controls

1.3 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS" are hereby made a part of the work of this section.

1.4 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000 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 15000, Supplemental General Mechanical Requirements, apply are as follows:

PEAKS ISLAND V.O.A

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. Switches, relays, transmitters, transformers, including wiring and connection diagrams.

PEAKS ISLAND V.O.A

PART 2 - PRODUCTS

**2.1 AUTOMATIC TEMPERATURE CONTROL SYSTEM
ELECTRIC/ELECTRONIC**

A. General:

1. Provide complete electric/electronic temperature control system by Johnson Controls, Inc., Landis and Staefa, Honeywell Controls Co., Maine Controls or approved independent contractor.
2. Control system shall be installed by competent control mechanics and electricians regularly employed by control equipment manufacturer. Control equipment shall be by one manufacturer and controllers, dampers and devices shall be commercial grade relay type.

B. Scope

1. Control system shall consist of thermostats, temperature transmitters, controllers, automatic valves and dampers, damper operators, control panels, electrical wiring and other components required to fill intent of Specifications and provide for complete and operable system. Control equipment shall be as noted.
2. In general this Specification is intended to cover the following:
occupied-unoccupied control, summer/winter change-over controls, central station air handling unit controls, boiler control wiring, hot water controls and interlocking of fans and equipment.

C. Following incidental work shall be performed under this Section under supervision of control manufacturer

1. Install automatic valves, and separable wells supplied by control manufacturer.
2. Provide necessary valved pressure taps, water drain and overflow connections and piping.
3. Provide necessary auxiliary contacts with buttons and switches in required configurations, on magnetic starters.
4. Install automatic dampers.

PEAKS ISLAND V.O.A

5. Provide necessary blank-off plates required to install dampers that are smaller than duct size.
6. Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
7. Provide sheet metal baffle plates necessary to eliminate stratification and provide air volumes specified. Locate baffles by experimentation and affix and seal permanently in place only after stratification problem has been eliminated.
8. Provide access doors or other approved means of access through ducts for service to control equipment.

D. Electric Wiring:

1. Electric wiring and wiring connections required for installation of temperature control system, as herein specified, shall be provided by temperature control manufacturer, unless otherwise indicated on Drawings.
2. Wiring shall comply with requirements of Section 16100. ELECTRICAL WORK.

E. Submittal Brochure - Submit following for approval:

1. Control drawings with detailed wiring diagrams, including bill of material and description of operation for systems.
2. Panel layouts and nameplate lists for local and central panels.
3. Valve and damper schedules showing size, configuration, capacity and location of equipment.
4. Data sheets for control system components.

F. Instruction and Adjustment: Upon completion of project, temperature control manufacturer shall:

PEAKS ISLAND V.O.A

1. Completely adjust and ready for use: thermostats, controllers, valves, damper operators, relays, and all components and equipment provided under this paragraph.
2. Furnish three instruction manuals covering function and operation of control systems on project for use by Owner's operating personnel. Competent technician shall be provided for instruction purposes.

G. Programmed maintenance:

1. Upon completion of installation, temperature control manufacturer shall submit to Owner an agreement to provide necessary programmed maintenance and to keep various control systems in proper working condition.
2. Programmed maintenance agreement shall fully describe maintenance work to be performed and shall advise cost of work for subsequent years after guarantee period. This programmed maintenance agreement shall be provided free of charge during guarantee period.

H. Room Type Instruments:

1. Modulating room thermostats shall be tamper proof. Thermostats shall have concealed adjustable setpoints. Thermostat shall be solid state with nominal 1000 ohm linear nickel wire sensing element. Element shall have positive temperature coefficient. Temperature limits shall be 0 to 125 F. Accuracy shall be +1%.
2. Two position room thermostats shall be tamper proof without thermometers. Thermostat shall have concealed adjustable setpoints. Sensing elements shall be liquid charged.
3. Thermostats in public and multi-occupancy areas shall have metal cover with tamper proof screws and satin chrome finish, with concealed adjustment without thermometer.
4. Thermostats for private offices and single occupancy type areas shall have open adjustment for use with key, exposed dial and accurate red-reading thermometer.

PEAKS ISLAND V.O.A

5. Room thermostats shall be of heavy duty, all metal type.

I. Automatic Control Valves:

1. Automatic control valves shall be fully proportioning with modulating plug or V-port inner guides, unless otherwise specified. Valves shall be quiet in operation and failsafe in either normally open or normally closed position in event of control failure. Valves shall be capable of operating in sequence when required by operation.
2. Control valves shall be sized by temperature control manufacturer and shall be guaranteed to meet heating loads as specified. Control valves shall be suitable for pressure conditions and shall close against differential pressure involved.
3. Valve actuators shall be modulating sealed electro-hydraulic type with spring return. Actuators shall incorporate solid state electronic internal controller circuitry. Ambient temperature range shall be -40 degrees F to 150 degrees F. Body pressure rating and connection type (screwed or flanged) shall conform to pipe schedule specified elsewhere.

J. Low Temperature Safety Thermostat:

1. Electric low temperature warning thermostats shall have 20 ft. low point sensitive elements (not averaging type) installed to cover entire duct area. Thermostats shall have be two-position manual reset type. Where coils are two banks, provide two freezestats wired in series to shut down supply fan, sound alarm, etc.

K. Dampers:

1. Automatic dampers, furnished by temperature control manufacturer, shall be single or multiple blade as required.
2. Damper frames shall be constructed of 13 gauge galvanized sheet metal and shall have flanges for duct mounting.
3. Damper blades shall not exceed 6-inches in width. Blades shall be of corrugated type construction, fabricated from two sheets of 22 gauge galvanized sheet steel, spot welded together. Blades shall be suitable for high velocity performance

PEAKS ISLAND V.O.A

4. Damper bearings shall be made of nylon. Bushings that turn in bearings shall be oil impregnated sintered metal.
5. Provide replaceable butyl rubber seals with damper. Seals shall be installed along top, bottom and sides of frame and along each blade edge. Seals shall provide tight closing, low leakage damper. Leakage and flow characteristic charts must be submitted prior to approval of dampers.

L. Damper Operators:

1. Damper operators shall be fully two position unless otherwise specified. They shall be quiet in operation and shall have ample power to overcome friction of damper linkage and to position dampers accurately and smoothly. Damper operator mounting arrangement shall be outside air stream.
2. Operators shall be capable of operating in sequence when required by operation. Operators shall have external adjustable stops to limit stroke in either direction. Operator linkage arrangement shall be such as to permit normally open or normally closed damper positions as required.

M. Local Control Panels:

1. Controllers, relays, switches, etc. shall be mounted on enclosed control panels with hinge lock type door mounted adjacent to system controlled. Temperature settings, adjustments and calibrations shall be made at system control panel. Panel shall have canopy light and on-off switch.
2. Details of each panel shall be submitted for approval prior to fabrication. Locations of each panel shall be convenient for adjustment and service. Provide engraved nameplates beneath each panel mounted control device. Manual switches, shall be flush mounted on hinged door.
3. Electrical devices within panels shall be factory-pre-wired to numbered terminal strip. Wiring within panel shall be in accordance with NEMA and UL standards.

AUTOMATIC TEMPERATURE CONTROLS 15900-7

PEAKS ISLAND V.O.A

N. Provide relays, positioners, electric switches, clocks, transformers, etc. necessary to make complete and operable system. Locate these devices on local panel unless specified otherwise. Time clocks shall be 24 hour program type with ten hour spring reserve and manual override.

D. Smoke Detection and Dampers in Air Handling Units

1. Install duct smoke detectors furnished under Division 16000 where shown on Drawings. Wire to fan shutdown. Wiring to fire alarm system shall be part of work of Division 16000.

F. HVAC Control Sequences.

1. General

A. All sequences shall be reversable and all setpoints adjustable.

B. Wall mounted devices, thermostats shown on drawings, and switches require final locations consistent with interior design elevations. Coordinate final location of thermostats with Architect.

C. Smoke detectors located in all air units shall shut units on detection of smoke.

D. All air handling units with fresh air shall be provided with freeze-stats.

2. Cabinet Unit Heater and Unit Heater

A. On a drop in space temperature on call from room thermostat below 65 degree F heater fan shall cycle on. Unit shall be inoperative whenever supply water temperature is less than 90 degrees F.

PEAKS ISLAND V.O.A

3. Kitchen, Laundry/Lounge
 - A.
4. Toilet Exhaust Fans
 - A. Fans shall be energized by a switch
5. Combustion Air (One System Boilers)
 - A. Whenever the boiler and/or domestic water heater is energized normally open control dampers with end switches shall open.
 - B. Whenever boiler room temperature rises above 60 degrees F damper shall open.
7. Fin Tube Radiation
 - A. On a fall in temperature valve sensed by a space thermostat valve shall module open.
8. Pumps
 - A. Pumps shall be provided with manual lead-lag control. Lead pump shall energize from boiler control pump.
 - B. If lead pump fails, audible alarm w/silencer switch shall energize.
 - C. Lead pumps shall start if outdoor temperature falls below 65 degrees F.
9. Boiler
 - A. Whenever outdoor temperature falls below 65 degrees F, boiler shall energize. Refer to boiler paragraph for other controls, and boiler control wiring.

AUTOMATIC TEMPERATURE CONTROLS 15900-9

PEAKS ISLAND V.O.A

10. AHU-I

- A. The fan shall be controlled by an on/off switch mounted at the control panel. Provide 24 hour clock for each fan to allow Owner to set fan operation program.
- B. Whenever the fan is on, the outside air damper shall open fully.
- C. The discharge air thermostat shall control the heating as follows:
 1. When the outside air temperature is above 45 degrees F, the following shall occur: On a drop in discharge air temperature below 70 degrees F, the heating coil valve shall start to modulate open. On a further drop the valve will continue to modulate to its full open position. On a rise in discharge temperature, the valve shall modulate toward the closed position and shall be fully closed at 70 degrees F.
 2. When the outside air temperature is 45 degrees F or below, the following shall occur: The hot water valve shall be fully open. On a drop in discharge air temperature below 70 degrees F, the face and bypass dampers shall modulate open to the face and close to the bypass. On a further drop the dampers shall modulate to their respective full open and full closed positions. On a rise in discharge temperature, the face damper shall modulate toward the closed position and shall be fully closed at 70 degrees F discharge air temperature, and the bypass damper shall modulate toward the open position and be fully open at 70 degrees F discharge air temperature.
- D. If the air temperature as measured by the non-averaging freezestat located directly after the heating coil falls below 45 degrees F, the fan shall be shutoff, the outside air damper shall close, the hot water valve shall open fully, and the face and bypass damper shall close fully to the coil face.
- E. Discharge air temperature setting shall be remote controlled from control panel.

PEAKS ISLAND V.O.A

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this section, carefully inspect the installed work of the 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.

AUTOMATIC TEMPERATURE CONTROLS 15900-11

PEAKS ISLAND V.O.A

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 SMOKE DETECTORS

- A. The Fire Alarm Contractor shall furnish smoke detectors under this section; installation shall be accomplished by the ductwork contractor and wired by the Fire Alarm Contractor.

3.5 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 two-hour working session.

3.6 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.

PEAKS ISLAND V.O.A

- B. 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

AUTOMATIC TEMPERATURE CONTROLS

15900-13

PEAKS ISLAND V.O.A

SECTION 15990 - TESTING AND BALANCING

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 functional testing, capacity testing, and balancing the air and water systems.

1.2 RELATED DOCUMENTS

- A. The drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of 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: Standardized 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 for submission and review. This data shall 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. Qualification Data:

Testing Agency - Membership/Certification/Technical Standards
Testing Agency Personnel - Resumes Professional Engineers -
Certificate of Registration Instrument Calibration - Records

PEAKS ISLAND V.O.A

B. Reports:

Preliminary Report
Air System Test and Balance Results
Water System Test and Balance Results

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 Mechanical Engineer. 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: 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, and domestic hot 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.

PEAKS ISLAND V.O.A

Correct air and water system performance deficiencies disclosed by the test before balancing the systems.

- B. Capacity Test Duration: Capacity tests of 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. Each test instrument shall be calibrated by a reviewed laboratory or by the manufacturer. The mechanical engineer has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is deemed 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: Air filter resistance during tests, artificially imposed if necessary, shall be 80 percent of final values.
 - 1. Exhaust Fans: Minus 0 percent to plus 10 percent.
 - 2. Individual Room Air Outlets and Inlets, and Air Flow Rates Not mentioned Above: Minus 10 percent to plus 10 percent.
 - 3. Ventilation Air Handler Coils GPM: Minus 5 percent to plus 10 percent.

PEAKS ISLAND V.O.A

PART 2 - PRODUCTS NOT USED 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 pilot tube traverses of each duct to measure airflow 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 airflow in the duct by totaling volume of individual terminals served, measured as described herein.

PEAKS ISLAND V.O.A

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 proportioning airflow through terminal devices.
- H. Testing and balancing of air systems which utilizes door undercuts as an integral part of the flow path shall be balanced and adjusted with the doors closed to simulate normal conditions.

3.2 WATER SYSTEM PROCEDURES

- A. Adjustment: Adjust heating, chilled water, and domestic hot 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. Do not use service valves for adjustment.
- 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 copies of the reports described herein, covering air and water system performance.

PEAKS ISLAND V.O.A

- B. Instrument Records: Include types, serial numbers, calibration records of instruments.
- C. Reports: Reports shall identify conspicuously items not conforming to contract requirements.
- 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 central 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)

PEAKS ISLAND V.O.A

- 2) Number of Pilot-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)

PEAKS ISLAND V.O.A

- 5) No-Load Amps. (where possible)
- 6) Full-Flow Amps
- 7) No-Flow Amps

2. Air Heating 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. Domestic Hot Water Recirculation Systems

a. Design Data

- 1) GPM

b. Recorded Data

- 1) GPM

3.6 FINAL TESTS, INSPECTION, 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 inspection, recheck, in the presence of the Architect, random selections of water quantities and air quantities recorded in the certified report.
- C. Points and Areas for Recheck: As selected by the Mechanical Engineer.

PEAKS ISLAND V.O.A

- 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 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.
- H. Provide final copies of the Testing and Balancing Report to be included in the operations and maintenance manuals.

END OF SECTION

TESTING AND BALANCING 15990-9

SECTION 15500

**SPRINKLERS
PEAKS ISLAND - VOA**

PART I – GENERAL

1.01 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 requires to design, install and test a pressurized, fully supervised, wet pipe fire protection system for full building protection in accordance with NFPA, BOCA, and the Owner's insurance underwriter.
- B. The sprinkler systems design shall be based on NFPA13R requirements.

1.02 QUALIFICATIONS

- A. The Fire Protection Work shall be preformed by a qualified Contractor primarily engaged in the design and installation of Fire Protection Systems.
- 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.

1.03 SUBMITTALS

- A. Items for which the submittal requirements of section 15000, Supplemental Mechanical General Requirements, apply are as Follows:
 - 1. System components
 - 2. Hydraulic calculations
 - 3. Piping layout
 - 4. Flushing and testing records
 - 5. Certificate of installation
 - 6. Copy of Fire Protection Contractors License
 - 7. Sprinkler heads
 - 8. Fire department connection(s)
 - 9. Firestopping materials and methods

Submit hydrant flow test, equipment descriptive data, hydraulic calculations and system layout to 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 coeds, standards and laws.

1.04 SPRINKLER COVERAGE

- A. Sprinkler head coverage shall conform with NFPA requirements for the use of the building. Coverage shall be increased accordingly where required by the Authority having jurisdiction.

PART 2 – PRODUCTS

2.01 SYSTEM COMPONENTS AND HARDWARE

- A. Pipe, Fittings, Joints, Hangers, Valves, Fire Department Connections, Alarms: Conform to NFPA-13, 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 ceilings.
 - 2. Provide a spare head cabinet with wrenches and six (6) heads of each orifice size, finish, temperature classification, pattern and length furnished in the project.
- C. Fire Department Connection: Provide (as verified with the local fire department) at a location coordinated with the local fire department and the Architect.

PART 3 – EXECUTION

3.01 PIPING LAYOUT AND DESIGN

- A. System requirements, installation requirements, design, plans, and calculations: Conform to NFPA-13, Installation of Sprinkler Systems.
- B. Sprinkler piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed.

Peaks Island-VOA

Sprinklers
Section 15500

525

- C. 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.

3.02 SYSTEM ACCEPTANCE

- A. Approval, flushing, hydrostatic testing, instructions, and certificates of installation: Conform to NFPA-13, Installation of Sprinkler Systems.
- B. Closing in Work:
 - 1. General: Cover up or enclose work after is has been properly and completely reviewed.
- C. 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.
- D. 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.

3.03 FIRESTOPPING

- A. Firestopping shall be preformed in accordance with Specification Section 07840 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

PEAKS ISLAND VOA

SECTION 16000- ELECTRICAL

PART 1 GENERAL

1.01 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. New underground services for power, telephone including pull wire in telephone conduit.
2. Secondary power distribution system including meter stack.
3. Lighting system - interior and exterior - exit and emergency lighting.
4. Fire alarm system.
5. Connections, disconnects and starters as shown for mechanical equipment.
6. Telephone conduits, boxes, backboard and empty conduits.
7. Data boxes and empty conduits.

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. Prior to any excavation for underground electric lines, notify the Dig Safe Center at 1 -800-225-4977.

1.02 RELATED DOCUMENTS

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work.

1.03 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.
1. The applicable requirements of the publications of the following organizations shall apply to the work under this section as if fully written herein:
 2. American National Standards Institute, Inc. (ANSI)
 3. National Electrical Manufacturers Associations (NEMA)

PEAKS ISLAND VOA

4. National Fire Codes (NFPA)
5. Underwriters Laboratories, Inc. (UL)
6. Federal, State and Municipal Building Codes, and all other Authorities having jurisdiction.
7. National Electrical Code (NEC)
8. Americans with Disabilities Act (ADA)
9. Occupational Safety and Health Administration (OSHA)

1.04 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.

1.05 SHOP DRAWINGS

- A. Submit to the Architect for approval not less than six (6) 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 facsimile, (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, and devices.
- 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.

1.06 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.

1.07 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).

PEAKS ISLAND VOA

- 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.

1.08 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 Construction Manager. Size of service shall be 200 amps, single phase, 120/240 volts, 3 wire minimum.

1.09 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's Representative.

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

PEAKS ISLAND VOA

- 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 OF OTHER SECTIONS

- A. Trenching and backfill
- B. Painting
- C. Cutting and patching
- D. Concrete bases for lighting standards and fixtures.

PART 2- PRODUCTS

2.01 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.

2.02 EQUIPMENT MOUNTING AND SUPPORTS

1. 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

PEAKS ISLAND VOA

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.

2.03 GROUNDING

- A. Furnish and install grounding system as required by the National Electrical Code (NEC).
- B. Grounding terminal on receptacles and switches shall be bonded to outlet box with grounding conductor to establish grounding continuity.
2. 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.

2.04 PANELBOARDS

- A. Panelboard cabinets shall be of the deadfront safety type, provided with the size and number of single, double, or triple pole branches as indicated in the schedules. 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 shall be mounted so that the distance from the floor to center of the top circuit breaker will not exceed 6'. 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.
- C. Branch circuit breakers installed in the panels shall have a minimum short circuit rating as indicated on the drawings.

2.05 RACEWAYS

- A. Install wiring in electric metallic tubing (EMT), and or schedule 40 PVC. Schedule 40 PVC may be used outside and under floor slab, 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.

2.06 CONDUCTORS - WIRE AND CABLE

- A. Branch circuit conductors installed in the building shall be type "MC" cable. Feeders shall be run in EMT, using single conductors, type THWN.
- B. Conductors shall be copper, or aluminum if sized for the load. Joints and splices shall be made in a manner equivalent electrically and mechanically to the conductor itself.
- C. Conductors shall be color coded as follows:

PEAKS ISLAND VOA

120/208 volts, 3. phase, 4 wire

Phase A - Black
Phase B - Red
Phase C - Blue
Neutral - White and gray
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.

2.07 WIRING DEVICES

- A. Switches, receptacles and other utilization devices shall be specification grade, grounding type.
- 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.
- D. Switch boxes and outlet boxes shall be of the sheet steel type.

2.08 WIRING DEVICE PLATES

- A. Provide device plates for devices, switches, receptacles, and miscellaneous outlets.
- B. Plates shall be Ivory plastic.

2.09 PULL BOXES-AND JUNCTION BOXES

- A. Pull boxes and junction boxes shall be of code gauge galvanized steel with screw covers to match, shall be as required and as shown on the Contract Drawings.

2.10 NAMEPLATES

- A. Provide nameplates for panelboards, tenant meters and circuit breakers, 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 inch 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.

PEAKS ISLAND VOA

2.12 LIGHTING FIXTURES AND LAMPS

- A. Fixtures shall be the manufacturers specified or approved equal.
- B. Energy Saving Ballasts for fluorescent fixtures shall be electronic ballast: 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 and shall be of the electronic type with total harmonic distortion of less than 20%.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.
- C. 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 per ADA, door holders heat detectors, and ceiling mounted and duct mounted smoke 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. The system shall be low voltage as manufactured by Notifier or approved equal.
- B. The system shall be complete with 60 hours of rechargeable pure lead battery standby, remote alarm and trouble indication, city connection and ground detection. The system shall be a closed circuit, non-coded, fully supervised fire alarm installed according to the drawings and specifications and in accordance with NFPA Codes 72A through 74 inclusive and local codes. 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 selection of the proper type and size of stand by batteries. The finishing 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. Instruction period shall be 4 hours minimum.
- E. Notify the Architect, Owner's Representative 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's Representative.
- F. Furnish and install a complete 24VAC, closed circuit, electrically supervised, zone annunciated fire alarm system as specified herein and indicated on the drawings. The system shall include but not be limited to all control equipment, power supplies, signal initiating devices, audible and visual alarm

PEAKS ISLAND VOA

devices, conduit, wire, fittings and other accessories required to provide a complete and operable system. The system shall operate as a zoned, non-coded, continuous sounding system which shall have multiple or zoned audible alarm circuits as specified and indicated on the drawings.

- 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 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 KG. carrying conductors will be allowed in the same raceway with the D.C. fire alarm detection and signaling conductors. Fire alarm cable not run in raceways shall be Type MC with red trace on armor.
- 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 The Simplex Time Recorder Company. 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 from the manufacturer are as follows:
 - 1. A riser diagram of the complete fire alarm system, (Typical riser diagrams are not acceptable).
 - 2. A complete point by point installation diagram. (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.
 - 5. The operation of any manual station or automatic activation of any smoke or heat detector, waterflow device or the activation of the kitchen hood fire suppression system shall cause:
 - 1. Fire alarm horns to sound in the building.
 - 2. Evacuation strobes to flash in the building.
 - 3. Automatically shut down fans and/or close doors to prevent the recalculation of smoke.
 - 4. Indicate the zone in alarm on the remote LED annunciation and the fire alarm panel.
 - 5. Closure of the sprinkler valve tamper switch shall result in a zone identified "trouble" condition on the fire alarm panel and the graphic annunciator.
 - 6. Recall the elevator to the First Floor (egress level).
- 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 strobes to be supervised.

PEAKS ISLAND VOA

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 piezo tone signal but will not interfere with the proper operations of any circuit which does not have a fault condition.

O. Lightning protection shall be a standard feature of the fire alarm control panel.

P. The control unit shall be flush mounted in a textured finish, 316 gauge steel cabinet equipped with hinged door, and secured by a lock keyed common to the manual stations. Reset switches, silence switches, fuses, etc., shall be clearly marked and shall be behind the locked door to prevent unauthorized entry. Opening of the main door shall expose all components for inspection of adjustment without further dismantling of the cabinet, control unit or wiring.

Q. The installer shall coordinate the installation of the fire alarm equipment with the manufacturer. Conductors and wiring shall be installed per the manufacturers recommendations. It shall be the installers 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.

Guarantee equipment and wiring free from inherent mechanical and electrical defects for a period of two years 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 contractors job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate the building annunciators 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 contractors 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.

S. Detection and signaling circuits shall be run separate from all other conductors. Wiring shall be number 14 solid.

2.14 MECHANICAL SYSTEM CONNECTIONS

Connect mechanical equipment as shown on the drawings. Control wiring shall be furnished and installed by the Mechanical Contractor.

2.15 NEW ELECTRIC SERVICE

- A. A new underground electric service shall be provided for this facility as indicated on the drawings.
- B. Provide and install secondary conduits secondary connections and cables.
- C. Closely coordinate work with CMP Co. to ensure complete compliance with CMP Co. requirements

PEAKS ISLAND VOA

and standards.

PART 3 - EXECUTION

3.01 LICENSE

A. Electrical work shall be installed by persons duly licensed by the Electricians Board of the State of Maine.

3.02 COORDINATION

A. It shall be the responsibility of this contractor to coordinate his work with the Construction Manager to insure that his work is terminated in a satisfactory manner.

3.03 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.

3.04 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 Subcontractor which may be necessary to facilitate work and the completion of the whole project.

3.05 GIVING INFORMATION

1. 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 Construction Manager 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.

3.06 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

PEAKS ISLAND VOA

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.

2. 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.

3.07 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.
2. 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. Threaded studs driven in by a powder charge and provided with lock washers and nuts are acceptable in lieu of wood screw, expansion shields or machine screws if permitted by local authorities.

3.08 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.

3.09 WIRING DEVICES

- A. Switches and convenience outlets shall have a rating as indicated on the drawings. 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

PEAKS ISLAND VOA

connected to concealed cable and conduits shall be as noted in the specifications.

3.10 INTENT OF DRAWING

- 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, two (2) sets 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, to the Owner's representative. The manufacturer's field technicians shall be present at this demonstration. Duration of instruction period shall be a minimum of four (4) hours.
- 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

539