Project Manual

MILLBURY MEMORIAL JUNIOR/SENIOR HIGH SCHOOL

12 Martin Street
Millbury, Massachusetts 01527

MILLBURY HIGH SCHOOL
FOODS PROGRAM ROOM RENOVATIONS

February 6, 2023 - Bid #0186-2302

Awarding Authority: The **TOWN OF MILLBURY, MASSACHUSETTS**
acting by and through its

MILLBURY PUBLIC SCHOOLS
OFFICE OF THE SUPERINTENDENT
12 Martin Street
Millbury, Massachusetts 01527

Architect: **DIXON SALO ARCHITECTS, INC.**
300 Main Street, 1st Floor
Worcester, Massachusetts 01608-1505

PROJECT MANUAL

PROJECT:	MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS Millbury Memorial Junior/Senior High School 12 Martin Street Millbury, Massachusetts 01527
BID NO.	0186-2302
AWARDING AUTHORITY / OWNER:	MILLBURY PUBLIC SCHOOLS 12 Martin Street Millbury, Massachusetts 01527 Telephone: 508-865-9501 Contact: Richard G. Bedard, Jr. Assistant Superintendent for Finance and Operations rbedard@millburyschools.org
ARCHITECT:	DIXON SALO ARCHITECTS, INC. 300 Main Street, 1st Floor Worcester, Massachusetts 01608-1505 Contact: Jesse Hilgenberg, President jhilgenberg@dixonsaloarchitects.com

ARCHITECT and ARCHITECT'S CONSULTANTS

ARCHITECTURE:

DIXON SALO ARCHITECTS, INC.
300 Main Street, 1st Floor
Worcester, Massachusetts 01608-1505
Telephone: 508-755-0533

Contact: Jesse Hilgenberg, President
jhilgenberg@dixonsaloarchitects.com

MECHANICAL ENGINEER:

AKAL ENGINEERING, INC.
44 Central Street
Berlin, Massachusetts 01503
Telephone: 508-869-0403

Contact: Anthony Gray
anthony@akalengineering.com

ELECTRICAL ENGINEER

SHEPHERD ENGINEERING, INC.
1308 Grafton Street
Worcester, Massachusetts 01604
Telephone: 508-757-7793

Contact: John Shepherd, Principal
jshepherd@shepherdengineering.com

SPECIFICATIONS CONSULTANT:

PAUL DIBONA SPECIFICATIONS LLC
108 Hayden Rowe Street
Hopkinton, Massachusetts 01748-2508
Telephone: 508-625-1098

Contact: Paul L. DiBona, Owner
paul@pdspecs.com

DOCUMENT 00010

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

DOCUMENT 00010

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

DOCUMENT 00015

LIST OF DRAWINGS

PART 1 - GENERAL

1.01 DRAWING LIST

A. The List of Drawings for MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS at Millbury Memorial Junior/Senior High School, 12 Martin Street, Milllbury, Massachusetts 01527 for Millbury Public Schools; Bid #0186-2302, is as follows:

Drawing No.	Date of Issue	Rev. No.	Rev. Date	Drawing Title
GENERAL				
T-1.0	02/06/23	-	-	TITLE SHEET
T-1.1	02/06/23	-	-	GENERAL NOTES
DEMOLITION				
D-1.1	[Not Used]			
D-1.2	02/06/23	-	-	FOODS PROGRAM ROOM DEMOLITION PLANS
ARCHITECTURAL				
A-1.1	[Not Used]			
A-1.2	02/06/23	-	-	PROPOSED FOODS PROGRAM ROOM PLANS
A-2.1	[Not Used]			
A-2.2	02/06/23	-	-	PROPOSED FOODS PROGRAM ROOM FURNITURE AND FINISH PLANS
A-3.1	02/06/23	-	-	INTERIOR ELEVATIONS
A-4.1	02/06/23	-	-	TYPICAL DETAILS

Drawing No.	Date of Issue	Rev. No.	Rev. Date	Drawing Title
HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)				
H-0.0	02/06/23	-	-	HVAC - LEGEND AND NOTES
H-1.1	02/06/23	-	-	HVAC - PROPOSED DUCTWORK PLAN
H-2.1	02/06/23	-	-	HVAC - DETAILS, CONTROL DIAGRAMS AND SCHEDULES
PLUMBING				
P-0.1	02/06/23	-	-	PLUMBING - LEGEND, NOTES AND SCHEDULES
P-0.2	02/06/23	-	-	PLUMBING - DETAILS
P-1.1	02/06/23	-	-	PLUMBING - DEMOLITION AND PROPOSED PLANS
ELECTRICAL				
ED.1	02/06/23	-	-	PARTIAL FLOOR PLANS - ELECTRICAL DEMOLITION
E1.1	02/06/23	-	-	PARTIAL FLOOR PLANS - LIGHTING AND POWER

PART 2 – PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF DOCUMENT

SECTION I

INVITATION FOR BIDS

SECTION I - INVITATION FOR BIDS

MILLBURY PUBLIC SCHOOLS

INVITATION FOR BIDS

MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS

Millbury Memorial Junior/Senior High School
12 Martin Street
Millbury, Massachusetts 01527

Millbury Public Schools is accepting bids for **MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS** at Millbury Memorial Junior/Senior High School located at 12 Martin Street, Millbury, Massachusetts 01527.

All General Bids are due by **Tuesday, April 4, 2023 at 2:00 P.M**. in the Superintendent's Office, 12 Martin Street, Millbury, Massachusetts 01527.

All Filed Sub-bids are due by **Tuesday, March 21, 2023 at 2:00 P.M.** in the Superintendent's Office, 12 Martin Street, Millbury, Massachusetts 01527.

There is a Pre-bid Conference (optional) scheduled for **Tuesday, March 14, 2023 at 2:30 P.M.** at Millbury High School; Telephone number 508-865-9501.

Copies of the bid documents may be obtained from Millbury Public Schools, Superintendent's Office, c/o Richard G. Bedard, Jr., Assistant Superintendent for Finance and Operations. 12 Martin Street, Millbury, Massachusetts 01527 during regular business hours of Monday through Friday 8:00 A.M. to 3:00 P.M.

Work under this contract requires a contractor to furnish all labor, materials, tools, equipment and supervision necessary to accomplish the work described herein, accordance with all specifications and requirements.

All bids are subject to the provisions of M.G.L. Chapter 149. Wages are subject to minimum wage rates determined by the Massachusetts Dept. of Labor and Industries pursuant to M.G.L. Chapter 149, Section 26 and 27.

END OF DOCUMENT

SECTION II

SCOPE OF SERVICES

SECTION II – SCOPE OF SERVICES

The Contractor agrees to perform the following services to renovate the Millbury High School – Foods Program Room Renovation at Millbury Memorial Junior/Senior High School, 12 Martin Street, Millbury, Massachusetts 01527.

All prospective bidders are required to visit the site to inspect the work.

The project shall be undertaken on-site completed within the Summer Break 2023; the period available for work on-site is Tuesday, June 20, 2023 through Wednesday, August 16, 2023.

It is anticipated that Award of Contract will be on or after April 25 , 2023.

Following Award of Contract the successful Contractor shall schedule any off-site work to proceed with any advanced work to allow completion of work within the specified time period. This work shall include any 'front end' work including obtaining permits, submitting shop drawings and product data for review by Architect, and any other work that can be performed off-site.

On-site mobilization at the High School may begin on June 20, 2023.

GENERAL SPECIFICATIONS

- All work shall be completed in a manner that will minimize disruption to school related activities and personnel.
- Secure work area.
- Contractor shall be responsible for all Federal, State and Local permits.
- All work shall comply with Massachusetts State Building Code and applicable trade codes including plumbing and electrical.
- All work shall comply with industry standards.
- Clean up and remove all debris from site as needed daily and at the end of the Project.
- Prevailing wages apply; rate sheet included.

WORK SPECIFICATIONS

- All work is at Millbury Memorial Junior/Senior High School, primarily the Millbury High School – Foods Program Room.
- Remove and dispose of all waste.
- Remove all debris from the work site.
- Work shall be a lump sum contract under MGL Chapter 149 with General Bid and Filed Sub-bids listed below.
- Work shall included required Filed Sub-bids for the following trades: Resilient Flooring, Acoustical Tile Ceilings, Painting, Plumbing, HVAC, and Electrical.

It is the intent of these specifications to describe the renovation of the existing Foods Program Room at Millbury High School including removal and disposal of existing ceilings and flooring, providing new ACT ceiling, providing providing new resilient flooring including LVT and vinyl base, patching of existing VCT floor in areas indicated, providing new threshold at door locations, painting of walls and ceiling structure, installation of new cabinetry and counters, modifications of existing sprinkler system and sprinkler heads, plumbing work, modifications and upgrades to existing HVAC system, electrical improvements including new lighting, and appliances and equipment as scheduled.

The work under this contract is to include the furnishing of all labor, materials necessary to complete this process. All contracts are awarded with the understanding that the Contractor and the subcontractors has acquainted himself with all the requirements of the contracts and specifications, the conditions of the site, and has obtained all the information necessary for the completion of this project. The Contractor shall not at any time, after the submission of his bid, make any claim whatsoever based on insufficient data or a misunderstanding of the requirements, nature, conditions or extent of the work under the Contract.

END OF DOCUMENT

SECTION III

INFORMATION / INSTRUCTIONS TO BIDDERS

SECTION III - INFORMATION / INSTRUCTIONS TO BIDDERS

Purchasing Entity:	Millbury Public Schools Superintendent's Office 12 Martin Street Millbury, MA 01527
Telephone:	508-865-9501
Fax:	508-865-0888
Bid Number:	0186-2302
Contact Person(s)	Richard G. Bedard, Jr., Assistant Superintendent for Finance and Operations

INSTRUCTIONS FOR SUBMISSION OF BIDS:

1. Bids [General Bids and Filed Sub-bids (Resilient Flooring, Acoustical Tile Ceilings, Painting, Plumbing, HVAC, and Electrical)] are to be submitted in a sealed envelope, clearly marked with **Bid No. 0186-2302** and **"FOODS PROGRAM ROOM RENOVATIONS – MILLBURY MEMORIAL JUNIOR / SENIOR HIGH SCHOOL".**

   Bids must be mailed or delivered to:

   Millbury Public Schools
   Superintendent's Office
   12 Martin Street
   Millbury, MA 01527

   An original plus one (1) copy of the bid are to be submitted. No facsimile copies of the bid will be accepted. Bids received after deadline will be returned unopened.

2. Bids must include the BID FORM and the following completed attachments, which are included in Section VI - BID FORMS AND ATTACHMENTS.

   a. Affidavit of Non-Collusion
   b. Tax Compliance Certification
   c. Certificate of Authority (if a Corporation)
   d. Statement of Qualifications/References
   e. OSHA-10 Certification (Chapter 306)
   f. Site Visit Confirmation Sheet

END OF DOCUMENT

SECTION IV

GENERAL SPECIFICATIONS

SECTION IV – GENERAL SPECIFICATIONS

A. Description

Work shall be performed in accordance with approved construction methods as specified in the Massachusetts Building Code, Massachusetts Plumbing Code, Massachusetts Electrical Code, and the Contract Documents dated February 6, 2023.

B. Insurance Requirements

The Contractor shall evidence the ability to insure the Millbury Public Schools against general, automobile, and workers' compensation liabilities. Contractors must meet the minimum insurance limits outlined below. The Contractor shall provide proof of insurance naming the Millbury Public Schools as an additional insured for the project.

General Liability	$1,000,000 per occurrence; $3,000,000 aggregate
Automobile Liability	$1,000,000 Combined Single Limit (C.S.L.)
Workers' Compensation	Per statutory limits
Excess Liability Umbrella	$1,000,000 C.S.L.

C. Contractor's Indemnification

Contractor shall, to the maximum extent permitted by law, indemnify and save harmless the Millbury Public Schools, its officers, agents and employees from and against any and all damages, liabilities, action, suits, proceedings, claims, demands, losses, costs and expenses (including reasonable attorney's fees) that may arise out of or in connection with the work being performed or to be performed by the Contractor, his employees, agents, subcontractors or materialmen. The existence of insurance shall in no way limit the scope of this indemnification. The Contractor further agrees to reimburse the Millbury Public Schools for damage to its property cause by the Contractor, his employees agents, subcontractors or materialmen, including damages caused by his, its or their use of faulty, defective or unsuitable material or equipment, unless the damage is cause by the Millbury Public Schools' gross negligence or willful misconduct.

D. Contractor's /Subcontractor's Licenses/Certification

The Contractor and Subcointractors shall possess all necessary licenses and certifications to complete the work.

General Bidder shall be DCAMM certified as a 'Prime Contractor' or a 'Small Prime Contractor' in the following category: 'General Building Construction'.

Fild Sub-bidders shall be DCAMM certified for the stipulated trade: 'Resilient Floors', 'Acoustical Tile Ceilings', 'Painting', 'Plumbing', 'HVAC', and 'Electrical Work'.

E. Inspection of Job Site

Bidders must visit the sites and take such other steps as may be necessary to ascertain the nature and location of the work and the general location conditions which can affect the work or the cost thereof. Failure to do so will result in automatic bid rejection.

A Pre-Bid Conference (optional) is scheduled for 2:30 PM on Tuesday, March 14, 2023.

All potential bidders may visit the sites during the pre-bid conference or schedule time with the School Business Manager.

F. Payment Bond

A Payment Bond in the amount of one hundred percent (100%) of the total cost of the project, issued by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, must be furnished within ten (10) days of Notice of Award of Contract.

G. Performance Bond

A Performance Bond in the amount of one hundred percent (100%) of the total cost of the project, issued by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, must be furnished within ten (10) days of Notice of Award of Contract.

H. Bid Bond

A Bid Bond in the amount of five percent (5%) is required shall be submitted with bid. The bid bond is considered five percent (5%) of the Contract Price.

I. Construction Period Milestones

The proposed schedule for Construction of MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS Contract (Bid No. 0186-2302) is as follows:

- Award of Contract: On or about April 25, 2023.
- Pre-Construction (Off-site) for Shop Drawing review, Cabinet Fabrication, and Related Work: Approximately 7 weeks May 1, 2023 through June 19, 2023).
- Start of Construction On-Site: Construction Period - June 20, 2023 through August 16, 2023.

END OF DOCUMENT

SECTION V

AWARDING OF CONTRACT

SECTION V - AWARDING OF CONTRACT

The Millbury Public Schools intends to award this Contract to the lowest eligible responsible and eligible bidder.

The Superintendent shall consider the following criteria in making that determination.

- Price.
- Budget. The budget for this project is $350,000 to $400,000.
- Compliance with requirements of this Invitation for Bids (IFB) and applicable laws.
- Ability of Bidder to undertake and complete the work of this contract in a timely fashion in strict compliance with Owner's schedule.
- General Contractor's and Filed Subcontractors' qualifications including DCAMM Certification.

The Contract will be awarded no later than thirty (30) days after bid opening, during which period bids may not be withdrawn.

END OF DOCUMENT

SECTION VI

BID FORMS AND ATTACHMENTS

BID FORMS

- FORM FOR GENERAL BID
- FORM FOR SUB-BID

ATTACHMENTS:

- CERTIFICATE (AFFIDAVIT) OF NON-COLLUSION
- TAX COMPLIANCE CERTIFICATION
- CERTIFICATE OF AUTHORITY (IF A CORPORATION)
- STATEMENT OF QUALIFICATIONS / REFERENCES
- OSHA-10 CERTIFICATION (CHAPTER 306 OF THE ACTS OF 2004)
- SITE VISIT CONFIRMATION SHEET

MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS

BID NO. 0186-2302

FORM FOR GENERAL BID

TO: **MILLBURY PUBLIC SCHOOLS** (hereinafter called "Awarding Authority" or "Owner")
c/o SUPERINTENDENT'S OFFICE
12 Martin Street
Millbury, Massachusetts 01527

Attn: **Richard G. Bedard, Jr., Assistant Superintendent for Finances and Operations**

A. The Undersigned (hereinafter referred as "Bidder"), proposes to furnish all labor and materials required for construction of:

MILLBURY PUBLIC SCHOOLS

MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS

BID NO. 0186-2302

Millbury High School
12 Martin Street
Millbury, Massachusetts 01527

in accordance with the accompanying Bidding and Contract Documents (Plans and Specifications) prepared by the Architect, DIXON SALO ARCHITECTS, INC. for the Base Bid Contract Price specified below, subject to additions and deductions according to the terms of the specifications.

B. ADDENDA: This Bid includes Addenda numbered _____

C. BASE BID CONTRACT PRICE: The proposed Base Bid Contract Price is _____

_____

Dollars ($ _____).

D. ALTERNATES (None):

E. SUBDIVISION OF CONTRACT PRICE: The subdivision of the proposed Contract Price is as follows:

1. ITEM NO. 1: The work of the General Contractor, being all work other than that covered under

Item No. 2: _____.

2. ITEM NO. 2 - SUB-BIDS AS FOLLOWS:

Sub Trade / Section No.	Name of Sub-Bidder	Amount	Undersigned Requires Performance Bond/ Payment Bond
ACOUSTICAL TILE CEILINGS Section 09510, ACOUSTICAL TILE CEILINGS	_____	_____	_____
RESILIENT FLOORING Section 09650, RESILIENT FLOORING	_____	_____	_____
PAINTING Section 09900, PAINTING	_____	_____	_____
PLUMBING Section 15401, PLUMBING	_____	_____	_____
HVAC Section 15601, HEATING, VENTILATING AND AIR CONDITIONING (HVAC)	_____	_____	_____
ELECTRICAL WORK Section 16101, ELECTRICAL WORK	_____	_____	_____

TOTAL OF ITEM NO. 2: $ _____

F. SUB-BIDS: The undersigned agrees that each of the above-named Sub-bidders will be used for the work indicated at the amount stated, unless a substitution is made. The undersigned further agrees to pay the premiums for the Performance Bond and Payment Bond furnished by Sub-bidders as requested herein and that all of the cost of all such premiums is included in the amount set forth in Item No. 1 of this Bid.

1. The undersigned agrees that if he is selected as General Contractor, he will promptly confer with the Awarding Authority on the question of sub-bidders; and that the Awarding Authority may substitute for any sub-bid listed above a sub-bid filed with the Awarding Authority by another sub-bidder for the sub-trade against whose standing and ability the undersigned makes no objection; and that the undersigned will use all such finally selected sub-bidders at the amounts named in their respective sub-bids and be in every way responsible for them and their work as if they had been originally named in this General Bid, the total Contract Price being adjusted to conform thereto.

G. COMMENCEMENT OF WORK, AND DATES FOR SUBSTANTIAL AND FINAL COMPLETION:

1. Commencement of Work: The Bidder hereby agrees to commence work under this Contract on or before a date to be specified in written "Notice to Proceed" issued by the Owner, and to thereafter diligently and continuously carry on the Work in accordance with the following:

   - Award of Contract: On or after April 25, 2023.
   - Pre-Construction (Off-site) for Shop Drawing review and Related Work: Approximately seven (7) weeks (May 1, 2023 through June 19, 2023).
   - Start of Construction On-Site: June 20, 2023).

2. Substantial Completion Date: The undersigned agrees to a date of Substantial Completion on or before August 9, 2023.

3. Final Completion Date: The undersigned agrees to a Final Completion of the Contract Work on or before August 16, 2023.

H. Liquidated Damages: (Not Applicable).

I. The undersigned agrees that, if he is selected as General Contractor, he will within five days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this Bid and furnish a performance bond and also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of the Contract Price, the premiums for which are to be paid by the General Contractor and are included in the Contract Price.

J. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to section forty-four A.

K. The undersigned bidder hereby certifies, under the pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety. The undersigned bidder agrees to indemnify the awarding authority for, from and against any loss, expense, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates or (2) the failure of the bidder, if selected as the contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

L. The undersigned further certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the Commonwealth of Massachusetts General Laws or any rule or regulations promulgated thereunder.

M. The undersigned further certifies that all employees to be employed at the work site have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least ten (10) hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and that he will comply fully with all laws and regulations applicable to award of contracts subject to MGL Section 44F.

N. Attached to this BID FORM are the following:

- Certificate (Affidavit) of Non-Collusion
- Tax Compliance Certification
- Certificate of Authority (if a Corporation)
- Statement of Qualifications / References
- OSHA - 10 Certification (Chapter 306 of the Acts of 2004)

O. Pursuant to M.G.L. CH. 62C, Sec 49A, I certify under the penalties of perjury that I have filed all state tax returns and paid all State Taxes required under law.

Date: _____ By: _____
(Signature)

(SEAL - if bid is by a corporation)

_____
(Name of Bidder)

_____
(Title)

_____
(Business Address)

_____
(City and State)

_____
(Telephone No. and Fax No.)

END OF FORM FOR GENERAL BID

MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS

BID NO. 0186-2302

FORM FOR SUB-BID

To all General Bidders Except Those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completion in accordance with the Contract Documents dated _____ , together with all Addenda issued and received prior to closing time for receipt of Bids, of all the work specified in Section(s) _____ of the Specifications and in any Drawings specified in these Sections, prepared by:

DIXON SALO ARCHITECTS, INC.
300 Main Street, 1st Floor
Worcester, Massachusetts 01608-1505

for construction of:

MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS

BID NO. 0186-2302

Millbury High School
12 Martin Street
Millbury, Massachusetts 01527

for the Contract Sum of: _____

_____ Dollars ($ _____)

B. Alternates: Not Applicble.

C. This sub-bid includes the following addenda:

Addendum No. ___ , ___ , ___ , ___, ___ , ___, ___ .

D. This Sub-bid:

[ ] may be used by any General Bidder except**:** _____

_____

_____

_____

CERTIFICATE (AFFIDAVIT) OF NON-COLLUSION

The undersigned certifies under penalty of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity, or group of individuals.

_____
Signature of individual submitting bid or proposal

_____
Name of Business

END OF DOCUMENT

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c 62C, Sec. 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____
Signature of person submitting bid or proposal

_____
Name of Business

_____
Date

END OF DOCUMENT

CERTIFICATE OF AUTHORITY
(IF A CORPORATION)

At a duly authorized meeting of the Board of Directors of the _____
(name of corporation)

_____ , held on _____ at which all the Directors
(date)

were present or waived notice, it was voted that _____ , of the
(officer and title)
the company be and is hereby authorized to execute contracts and bonds in the name and on behalf of said company, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this company's name on its

behalf of such _____ under the seal of the company, shall be valid and
(officer)
binding upon this company.

A TRUE COPY,
Attest: _____

Place of Business: _____

_____

I hereby certify that I am the (title) _____ of the

(name of corporation) _____ and that

(name of officer) _____ is the duly elected

(title) _____ of said company, and the above vote has not been amended or rescinded and remains in full force and effect as of the date of this contract.

Signature: _____

Date: _____

Name/Title: _____

COMMONWEALTH OF MASSACHUSETTS (Corporate Seal)
Worcester County, S. S.

On this _____ day of _____ , of the year

_____ , then personally appeared the above-named

_____ , and acknowledged the foregoing instrument to be his/her free act and deed before me.

Notary Public _____

My commission expires: _____

END OF DOCUMENT

MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS

BID NO. 0186-2302

STATEMENT OF QUALIFICATIONS AND REFERENCES

All questions must be answered, and the data given must be clear and comprehensive. Please type or print legibly. Add additional sheets, if necessary. The information will be utilized by the Millbury Public Schools for purposes of determining bidder responsiveness and responsibility with regard to the requirement and specifications of the Contract.

Company Name: _____

When Organized: _____

Incorporated? (Yes or No): _____

If incorporated, date and state of incorporation: _____

Have you ever failed to complete a contract awarded to you? (Yes or No): _____

If yes, where and why?

_____

_____

_____

Have you ever defaulted on a contract? (Yes or No): _____

If yes, provide details?

_____

_____

_____

Primary Foreman for this project? _____

Number of years the Primary Foreman has been doing similar work: _____

Number of years the Primary Foreman has held licenses: _____

STATEMENT OF QUALIFICATIONS AND REFERENCES (continued)

In the spaces following, provide information regarding contracts completed by your firm similar in nature to the project being bid. A minimum of three (3) contracts should be listed. Publicly bid contracts are preferred, but not mandatory.

Project Name: ______________________________

Owner: ______________________________

City/State: ______________________________

Dollar Amount: $______________________ Date Completed: __________

Publicly Bid? (Yes or No) ____________________

Type of Work: ______________________________

Owner's Contact Person: ____________________

Owner's Contact Person's Telephone Number: ____________________

Owner's Contact Person's Relation to the Project? ____________________
(i.e., contract manager, purchasing agent etc.)

****

Project Name: ______________________________

Owner: ______________________________

City/State: ______________________________

Dollar Amount: $______________________ Date Completed: __________

Publicly Bid? (Yes or No) ____________________

Type of Work: ______________________________

Owner's Contact Person: ____________________

Owner's Contact Person's Telephone Number: ____________________

Owner's Contact Person's Relation to the Project? ____________________
(i.e., contract manager, purchasing agent etc.)

****

Project Name: ______________________________

Owner: ______________________________

City/State: ______________________________

Dollar Amount: $______________________ Date Completed: __________

Publicly Bid? (Yes or No) ____________________

Type of Work: ______________________________

Owner's Contact Person: ____________________

Owner's Contact Person's Telephone Number: ____________________

Owner's Contact Person's Relation to the Project? ____________________
(i.e., contract manager, purchasing agent etc.)

****

The undersigned certifies that the information contained herein is complete and accurate and hereby authorizes and requests any person, firm or corporation to furnish any information requested by the Millbury Public Schools in verification of the recitals comprising this statement of Bidder's qualifications and experience.

Company Name: _____

Signature: _____ Date: _____

Printed Name: _____

END OF DOCUMENT

OSHA-10 CERTIFICATION

(CHAPTER 306 OF THE ACTS OF 2004)

Chapter 30: Section 39S. Contracts for construction; requirements

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins to works and who shall furnish documentation of the successful completion of said course with the first certified payroll report for each employee.

Any employee found on a worksite subject to this section without documentation of successful completion of a course in safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration shall be subject to immediate removal.

Date: _____

Company Name: _____

Company Address: _____

Authorized Signature: _____

Print Name & Title: _____

END OF DOCUMENT

SECTION VII

SAMPLE CONTRACT

SAMPLE

CONTRACT

MILLBURY PUBLIC SCHOOLS

Bid Number: 0186-2302

MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS
Millbury Memorial Junior/Senior High School
12 Martin Street
Millbury, Massachusetts 01527

This Contract is executed this _____ day of _____ by and between:

_____)_____ hereinafter referred to as the 'Contractor" and the Millbury Public Schools, c/o Millbury Public Schools, a municipal corporation duly organized under the laws of the Commonwealth of Massachusetts, with a principal place of business at 12 Martin Street, Millbury, MA 01527, hereinafter referred to as the "School."

The School and the Contractor agree to the terms and conditions contained in this Contract. The Contractor agrees to perform the following services at the price indicated in its proposal dated _____

MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS

CONTRACTOR SERVICES, LICENSES AND PERMITS

The Contractor shall furnish all labor, materials and equipment to complete the MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS Project as prescribed in the Scope of Services attached to this Contract. The Contractor shall conform to applicable federal, state, and local laws, regulations and building codes. The Contractor shall obtain municipal building permits required to complete the project.

PREVAILING WAGES

This contract is subject to the Commonwealth's Prevailing Wage Law. Attached is the Massachusetts Division of Occupational Safety Prevailing Wage Rate schedule covering this project.

PAYMENT TERMS

The Contractor shall provide the services for the price submitted on their proposal dated _____ , unless otherwise mutually agreed in writing. The School shall not loan or advance any funds to the Contractor for any purposes.

INSURANCE REQUIREMENTS

The Contractor shall secure and maintain for the duration of this project and at no cost to the School, with respect to the services related to this Contract, insurance coverages as stipulated in Section III. B. of the Bid Specifications. The Contractor shall be required to provide proof of insurance naming the Millbury Public Schools as an additional insured for the project. The Certificate Holder shall be identified as the "Superintendent", 12 Martin Street, Millbury, Massachusetts 01527.

PAYMENT BOND

A Payment Bond in the amount of one hundred percent (100%) of the total cost of the project, issued by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, must be furnished within ten (10) days of notice of award of contract.

PERFORMANCE BOND

A Performance Bond in the amount of one hundred percent (100%) of the total cost of the project, issued by a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the Awarding Authority, must be furnished within ten (10) days of notice of award of contract.

CONTRACTOR'S INDEMNIFICATION

The Contractor shall, to the maximum extent permitted by law, indemnify and save harmless the Millbury Public Schools, its officers, agents and employees from and against any and all damages, liabilities, actions, suits, proceedings, claims, demands, losses, costs and expenses (including reasonable attorney's fees) that am arise out of or in connection with the work being performed or to be performed by the Contractor, his employees, agents, subcontractors or materialmen. The existence of insurance shall in no way limit the scope of this indemnification. The Contractor further agrees to reimburse the Millbury Public Schools for damage to its property caused by the Contractor, his employees, agents, subcontractors or materialmen, including damages caused by his, its or their use of faulty, defective or unsuitable material or equipment, unless the damage is caused by the Millbury Public Schools's gross negligence or willful misconduct.

TERMINATION

If the work to be done under this Contract shall be abandoned, or if this Contract or any part thereof shall be assigned or transferred, without the previous written consent of the School, or if the Contract or any claim hereunder shall be assigned by the Contractor otherwise than as herein specified, or if at any time the School determines that the conditions herein specified as to the rate of progress are not fulfilled, or that the work or any part thereof, is unnecessarily or unreasonably delayed, or that the Contractor has violated any of the provisions of this Contract, the School may terminate this Contract and/or notify the Contractor or discontinue such work or such part thereof as the School may designate, and the School may thereupon by agreement or otherwise, as it may determine, complete the work, or any part thereof; and for such completion the School for itself or for its Contractor may take possession of and use or cause to be used in the completion of the work thereof any of such materials, apparatus, machinery, implements, and tools of every description as may be found upon said work. Termination pursuant to this paragraph shall not entitle the Contractor to any claim for damages on account thereof, nor shall it relieve the Contractor of any liability under this Contract.

This contract shall not be altered in any way without the consent of all parties to this contract. All alterations to this contract must be in writing and authorized as such by the Superintendent for the Contractor.

This contract shall be deemed to be a Massachusetts contract and its interpretation and construction shall be governed by the laws of Massachusetts and the Charter and Bylaws of the Millbury Public Schools.

This contract shall become effective when signed by both the Contractor and the Superintendent.

IN WITNESS WHEREOF, this Agreement has been executed, in duplicate, on the date first above written for the Millbury Public Schools by Gregory B. Myers, Superintendent, and for the said Contractor by its owner, or duly authorized officer or agent. This instrument shall take effect as a sealed instrument.

MILLBURY PUBLIC SCHOOLS:	**CONTRACTOR:**
Gregory B. Myers, Superintendent	Vendor Name.
Approved as to Appropriation:	Authorized Signature
Jennifer Barrett, Town Finance Director	Print Name and Title

Contract Price: $

Internal Use:
MPS BudgetSense Acct. No.:
School Hall Acct. No.:

END OF DOCUMENT

SECTION VIII

PREVAILING WAGE RATES

SECTION VIII - PREVAILING WAGE RATES

1.01 WAGE RATE DETERMINATION SCHEDULE

MASSACHUSETTS PREVAILING WAGE LAW (MGL. c149, §§26-27H) - AN IMPORTANT GUIDE FOR CONTRACTORS DOING PUBLIC WORKS PROJECTS IN MASSACHUSETTS

A. Prevailing Wage Schedules

1. Every contractor should obtain a schedule of prevailing wage rates for every public works project from the Awarding Authority (city, town, county, district, state agency or authority). It is the Awarding Authority's responsibility to ensure that a copy of the wage schedule is provided to all contractors from whom estimates or bids are solicited for all projects. The Commonwealth of Massachusetts Division of Occupational Safety (DOS), Department of Labor and Workforce Development will not issue wage schedules directly to contractors or employees.
2. Once a wage schedule has been issued for a project by DOS, it will remain in effect for the entire project. Appeals of wage determinations or classifications of employment may be made to the DOS Commissioner.
3. A copy of the wage schedule is required to be posted at the work site.
4. A wage schedule issued for a project may not be used on any other project. If, by chance, an Awarding Authority fails to provide you with a wage schedule to use when figuring your bid, do not use one you may have from another project. In this case, you should contact DOS immediately and urge the Awarding Authority to contact DOS to correct the oversight.
5. The failure of an Awarding Authority to provide a wage schedule does not excuse a contractor from paying the prevailing rate.

B. Bidding

1. The Attorney General's Division of Fair Labor and Business Practices enforces the prevailing wage law. All bids must reflect prevailing wage rates. Contractors may be required by an Awarding Authority to "demonstrate how (they) could complete the project and comply with Mass. Gen. Laws." The Division issued an "Advisory" discussing these and other points. For a copy, please contact the Attorney General's Office.

C. Paying Employees

1. Prevailing wages must be paid to all employees on public works projects regardless of whether they are employed by the general contractor, a filed sub-bidder or any sub-contractor. The prevailing wage applies equally to unionized and non-unionized workers.
2. All employees who perform work on a public works project must be paid hourly according to the wage schedule issued for the particular project.
3. The wage schedule issued for each project is in effect for the duration of that project. All wage increases listed on the schedule must be paid on the specified dates.
4. Employers are limited in the deductions that can be made from the hourly rate (represented as the "total rate" on the wage schedules). Only contributions to the following plans may be deducted:

    - Health and Welfare
    - Pension
    - Supplementary Unemployment

5. All contributions must be made to bona fide plans.
6. If an employer contributes to any, or all, of the above plans, it may deduct the hourly amount contributed from the "total rate." lf the employer does not contribute to any of the benefit plans listed above, then the employee's hourly rate of pay will be the "total rate" from the wage schedule.
7. All other deductions, including but not limited to the following, may not be subtracted from the employee's hourly prevailing wage rate:

    - Vacation Time
    - Sick Time
    - Training Funds
    - Charitable Contributions
    - Worker's Compensation
    - Unemployment Insurance
    - Uniforms

8. Overtime, which must be paid to all employees who work more than 40 hours per week, shall be at least time-and-one-half the base rate ("total rate" less benefits, if any).
9. Any "separate check" given to an employee as the "benefit portion" of the prevailing wage may not be treated differently than the check for "base wages." All "separate checks" are considered wages and subject to state and federal taxes, unemployment insurance and worker's compensation requirements.

D. Payroll Records

1. Employers are required to submit weekly certified payroll reports to the Awarding Authority and keep them on file for three (3) years. A reporting form is sent along with each wage schedule that may be used. Each report must contain at least: the employee's name, address, occupational classification, hours worked and wages paid. Do not submit weekly payroll reports to DOS.
2. After each contractor completes its portion of the public works project, the contractor must submit a Statement of Compliance to DOS. A Statement of Compliance form is also sent along with each wage schedule issued.

E. Apprentices

1. If your company employs apprentices, they must be registered with the Division of Apprentice Training (DAT). All persons not registered with DAT must be paid the "total rate" listed on the wage schedule. An apprentice sheet showing percentages based on the apprentice steps is included with all wage schedules.

F. Penalties

1. Failure to pay the prevailing wage subjects the contractor to potential civil and criminal liability.

G. Wage schedules are issued by:

Massachusetts Department of Labor and Workforce Development
Division of Occupational Safety
19 Staniford Street
Boston, Massachusetts 02108
Telephone 617-727-3492

H. Enforcement is carried out by:

Office of the Attorney General
Fair Labor and Business Practices Division
200 Portland Street
Boston, Massachusetts 02114
Telephone 617-727-3465

1.02 WAGE RATES

A. Classifications and wage rates as established by the Commonwealth of Massachusetts Division of Occupational Safety (DOS), Department of Labor and Workforce Development under the provisions of MGL Chapter 149, Section 26 [Wage Request Number 20230208-062; Issue Date – 02/09/2023, (42 pages)] immediately follows this Document.

1. The rate per hour of the wages to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the work shall not be less than the rate of wages included under “Minimum Wage Rates”.
2. The Contractor shall keep posted on the site a legible copy of said schedule. The Contractor shall also keep on file the wage rates and classifications of labor employed on this work in order that they may be available for inspection by the Awarding Authority, Administrator, or the Architect.
3. Apprentices employed pursuant to this determination of wage rates must be registered and approved by the State Apprenticeship Council. Wherever rates for journeymen or apprentices are not listed, and if any other labor is not included in this list, the Contract shall insert the rates of all those employed on the work.
4. The Contractor shall pay to any reserve police officers employed on the work the prevailing rate of wages paid to regular police officers as required by MGL Chapter 149 Section 34b, as amended. Such police officers shall be covered by Workmen's Compensation Insurance and Employer's Liability Insurance by the Contractor.

END OF DOCUMENT

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Millbury Public Schools

Contract Number: 0186-2302 **City/Town:** MILLBURY

Description of Work: Renovations of Foods Room at Millbury Jr./Sr. High School.

Job Location: 12 Martin Street, Millbury, MA 01527

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor.** For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The annual update requirement is not applicable to 27F "rental of equipment" contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 02/09/2023 **Wage Request Number:** 20230208-062

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.95	$13.41	$16.01	$0.00	$65.37
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.02	$13.41	$16.01	$0.00	$65.44
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.14	$13.41	$16.01	$0.00	$65.56
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	12/01/2020	$38.10	$12.80	$9.45	$0.00	$60.35
ASPHALT RAKER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2023	$47.37	$7.07	$20.31	$0.00	$74.75
	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$30.79	$7.07	$13.22	$0.00	$51.08
2	65	$30.79	$7.07	$13.22	$0.00	$51.08
3	70	$33.16	$7.07	$14.23	$0.00	$54.46
4	75	$35.53	$7.07	$15.24	$0.00	$57.84
5	80	$37.90	$7.07	$16.25	$0.00	$61.22
6	85	$40.26	$7.07	$17.28	$0.00	$64.61
7	90	$42.63	$7.07	$18.28	$0.00	$67.98
8	95	$45.00	$7.07	$19.32	$0.00	$71.39

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$31.28	$7.07	$13.22	$0.00	$51.57
2	65	$31.28	$7.07	$13.22	$0.00	$51.57
3	70	$33.68	$7.07	$14.23	$0.00	$54.98
4	75	$36.09	$7.07	$15.24	$0.00	$58.40
5	80	$38.50	$7.07	$16.25	$0.00	$61.82
6	85	$40.90	$7.07	$17.28	$0.00	$65.25
7	90	$43.31	$7.07	$18.28	$0.00	$68.66
8	95	$45.71	$7.07	$19.32	$0.00	$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (WORCESTER)*	02/01/2023	$58.21	$11.49	$21.65	$0.00	$91.35
	08/01/2023	$60.26	$11.49	$21.65	$0.00	$93.40
	02/01/2024	$61.51	$11.49	$21.65	$0.00	$94.65
	08/01/2024	$63.61	$11.49	$21.65	$0.00	$96.75
	02/01/2025	$64.91	$11.49	$21.65	$0.00	$98.05
	08/01/2025	$67.06	$11.49	$21.65	$0.00	$100.20
	02/01/2026	$68.41	$11.49	$21.65	$0.00	$101.55
	08/01/2026	$70.61	$11.49	$21.65	$0.00	$103.75
	02/01/2027	$72.01	$11.49	$21.65	$0.00	$105.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Worcester*

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.11	$11.49	$21.65	$0.00	$62.25
2	60	$34.93	$11.49	$21.65	$0.00	$68.07
3	70	$40.75	$11.49	$21.65	$0.00	$73.89
4	80	$46.57	$11.49	$21.65	$0.00	$79.71
5	90	$52.39	$11.49	$21.65	$0.00	$85.53

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.13	$11.49	$21.65	$0.00	$63.27
2	60	$36.16	$11.49	$21.65	$0.00	$69.30
3	70	$42.18	$11.49	$21.65	$0.00	$75.32
4	80	$48.21	$11.49	$21.65	$0.00	$81.35
5	90	$54.23	$11.49	$21.65	$0.00	$87.37

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$43.73	$9.35	$17.97	$0.00	$71.05
	06/01/2023	$44.73	$9.35	$17.97	$0.00	$72.05
	12/01/2023	$45.98	$9.35	$17.97	$0.00	$73.30
	06/01/2024	$47.46	$9.35	$17.97	$0.00	$74.78
	12/01/2024	$48.93	$9.35	$17.97	$0.00	$76.25
	06/01/2025	$50.43	$9.35	$17.97	$0.00	$77.75
	12/01/2025	$51.93	$9.35	$17.97	$0.00	$79.25
	06/01/2026	$53.48	$9.35	$17.97	$0.00	$80.80
	12/01/2026	$54.98	$9.35	$17.97	$0.00	$82.30

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS -ZONE 2 (Eastern Massachusetts)*	09/01/2022	$45.18	$8.68	$19.97	$0.00	$73.83
	03/01/2023	$45.78	$8.68	$19.97	$0.00	$74.43

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER - Zone 2 Eastern MA*

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.59	$8.68	$1.73	$0.00	$33.00
2	60	$27.11	$8.68	$1.73	$0.00	$37.52
3	70	$31.63	$8.68	$14.78	$0.00	$55.09
4	75	$33.89	$8.68	$14.78	$0.00	$57.35
5	80	$36.14	$8.68	$16.51	$0.00	$61.33
6	80	$36.14	$8.68	$16.51	$0.00	$61.33
7	90	$40.66	$8.68	$18.24	$0.00	$67.58
8	90	$40.66	$8.68	$18.24	$0.00	$67.58

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.89	$8.68	$1.73	$0.00	$33.30
2	60	$27.47	$8.68	$1.73	$0.00	$37.88
3	70	$32.05	$8.68	$14.78	$0.00	$55.51
4	75	$34.34	$8.68	$14.78	$0.00	$57.80
5	80	$36.62	$8.68	$16.51	$0.00	$61.81
6	80	$36.62	$8.68	$16.51	$0.00	$61.81
7	90	$41.20	$8.68	$18.24	$0.00	$68.12
8	90	$41.20	$8.68	$18.24	$0.00	$68.12

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $30.71/ 3&4 $36.93/ 5&6 $56.82/ 7&8 $63.06

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	04/01/2022	$23.66	$7.21	$4.80	$0.00	$35.67
	04/01/2023	$24.16	$7.21	$4.80	$0.00	$36.17

All Aspects of New Wood Frame Work

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 04/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.20	$7.21	$0.00	$0.00	$21.41
2	60	$14.20	$7.21	$0.00	$0.00	$21.41
3	65	$15.38	$7.21	$0.00	$0.00	$22.59
4	70	$16.56	$7.21	$0.00	$0.00	$23.77
5	75	$17.75	$7.21	$3.80	$0.00	$28.76
6	80	$18.93	$7.21	$3.80	$0.00	$29.94
7	85	$20.11	$7.21	$3.80	$0.00	$31.12
8	90	$21.29	$7.21	$3.80	$0.00	$32.30

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$14.50	$7.21	$0.00	$0.00	$21.71
2	60	$14.50	$7.21	$0.00	$0.00	$21.71
3	65	$15.70	$7.21	$0.00	$0.00	$22.91
4	70	$16.91	$7.21	$0.00	$0.00	$24.12
5	75	$18.12	$7.21	$3.80	$0.00	$29.13
6	80	$19.33	$7.21	$3.80	$0.00	$30.34
7	85	$20.54	$7.21	$3.80	$0.00	$31.55
8	90	$21.74	$7.21	$3.80	$0.00	$32.75

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80
Step 1&2 $17.86/ 3&4 $20.22/ 5&6 $27.57/ 7&8 $29.94

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (WORCESTER)*	01/01/2023	$49.45	$12.75	$22.74	$0.87	$85.81
	07/01/2023	$50.59	$12.75	$22.74	$0.87	$86.95
	01/01/2024	$51.73	$12.75	$22.74	$0.87	$88.09

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *CEMENT MASONRY/PLASTERING - Worcester*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.73	$12.75	$15.49	$0.00	$52.97
2	60	$29.67	$12.75	$22.74	$0.87	$66.03
3	65	$32.14	$12.75	$22.74	$0.87	$68.50
4	70	$34.62	$12.75	$22.74	$0.87	$70.98
5	75	$37.09	$12.75	$22.74	$0.87	$73.45
6	80	$39.56	$12.75	$22.74	$0.87	$75.92
7	90	$44.51	$12.75	$22.74	$0.87	$80.87

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.30	$15.49	$0.00	$0.00	$40.79
2	60	$30.35	$15.49	$8.12	$0.00	$53.96
3	65	$32.88	$15.49	$8.12	$0.00	$56.49
4	70	$35.41	$15.49	$8.12	$0.00	$59.02
5	75	$37.94	$15.49	$8.12	$0.00	$61.55
6	80	$40.47	$15.49	$8.12	$0.00	$64.08
7	90	$45.53	$15.49	$8.12	$0.00	$69.14

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$54.68	$14.25	$16.05	$0.00	$84.98
	06/01/2023	$55.95	$14.25	$16.05	$0.00	$86.25
	12/01/2023	$57.23	$14.25	$16.05	$0.00	$87.53
	06/01/2024	$58.55	$14.25	$16.05	$0.00	$88.85
	12/01/2024	$60.03	$14.25	$16.05	$0.00	$90.33
	06/01/2025	$61.36	$14.25	$16.05	$0.00	$91.66
	12/01/2025	$62.83	$14.25	$16.05	$0.00	$93.13
	06/01/2026	$64.16	$14.25	$16.05	$0.00	$94.46
	12/01/2026	$65.64	$14.25	$16.05	$0.00	$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.03	$8.65	$0.00	$0.00	$36.68
2	55	$30.83	$8.65	$6.27	$0.00	$45.75
3	60	$33.64	$8.65	$6.84	$0.00	$49.13
4	65	$36.44	$8.65	$7.41	$0.00	$52.50
5	70	$39.24	$8.65	$19.63	$0.00	$67.52
6	75	$42.05	$8.65	$20.20	$0.00	$70.90
7	80	$44.85	$8.65	$20.77	$0.00	$74.27
8	90	$50.45	$8.65	$21.91	$0.00	$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$8.65	$0.00	$0.00	$37.28
2	55	$31.49	$8.65	$6.27	$0.00	$46.41
3	60	$34.36	$8.65	$6.84	$0.00	$49.85
4	65	$37.22	$8.65	$7.41	$0.00	$53.28
5	70	$40.08	$8.65	$19.63	$0.00	$68.36
6	75	$42.95	$8.65	$20.20	$0.00	$71.80
7	80	$45.81	$8.65	$20.77	$0.00	$75.23
8	90	$51.53	$8.65	$21.91	$0.00	$82.09

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN *LABORERS - ZONE 2*	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS *LABORERS - ZONE 2*	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 2*	12/01/2022	$44.33	$9.10	$17.57	$0.00	$71.00
	06/01/2023	$45.33	$9.10	$17.57	$0.00	$72.00
	12/01/2023	$46.58	$9.10	$17.57	$0.00	$73.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 2*	12/01/2022	$44.08	$9.10	$17.57	$0.00	$70.75
	06/01/2023	$45.08	$9.10	$17.57	$0.00	$71.75
	12/01/2023	$46.33	$9.10	$17.57	$0.00	$73.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER *LABORERS - ZONE 2*	12/01/2022	$43.33	$9.10	$17.57	$0.00	$70.00
	06/01/2023	$44.33	$9.10	$17.57	$0.00	$71.00
	12/01/2023	$45.58	$9.10	$17.57	$0.00	$72.25
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELECTRICIAN - Local 96*

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$18.24	$12.20	$0.55	$0.00	$30.99
2	43	$19.60	$12.20	$0.59	$0.00	$32.39
3	48	$21.88	$12.20	$14.18	$0.00	$48.26
4	55	$25.07	$12.20	$14.63	$0.00	$51.90
5	65	$29.63	$12.20	$15.27	$0.00	$57.10
6	80	$36.47	$12.20	$16.22	$0.00	$64.89

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2022	$58.62	$16.03	$20.21	$0.00	$94.86

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.31	$16.03	$0.00	$0.00	$45.34
2	55	$32.24	$16.03	$20.21	$0.00	$68.48
3	65	$38.10	$16.03	$20.21	$0.00	$74.34
4	70	$41.03	$16.03	$20.21	$0.00	$77.27
5	80	$46.90	$16.03	$20.21	$0.00	$83.14

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2022	$41.03	$16.03	$20.21	$0.00	$77.27

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/05/2022	$48.67	$14.25	$16.05	$0.00	$78.97
	05/01/2023	$49.91	$14.25	$16.05	$0.00	$80.21
	11/01/2023	$51.15	$14.25	$16.05	$0.00	$81.45
	05/01/2024	$52.39	$14.25	$16.05	$0.00	$82.69
	11/01/2024	$53.68	$14.25	$16.05	$0.00	$83.98
	05/01/2025	$55.12	$14.25	$16.05	$0.00	$85.42
	11/01/2025	$56.41	$14.25	$16.05	$0.00	$86.71
	05/01/2026	$57.85	$14.25	$16.05	$0.00	$88.15
	11/01/2026	$59.14	$14.25	$16.05	$0.00	$89.44
	05/01/2027	$60.57	$14.25	$16.05	$0.00	$90.87
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2022	$50.22	$14.25	$16.05	$0.00	$80.52
	05/01/2023	$51.47	$14.25	$16.05	$0.00	$81.77
	11/01/2023	$52.72	$14.25	$16.05	$0.00	$83.02
	05/01/2024	$53.97	$14.25	$16.05	$0.00	$84.27
	11/01/2024	$55.27	$14.25	$16.05	$0.00	$85.57
	05/01/2025	$56.72	$14.25	$16.05	$0.00	$87.02
	11/01/2025	$58.02	$14.25	$16.05	$0.00	$88.32
	05/01/2026	$59.47	$14.25	$16.05	$0.00	$89.77
	11/01/2026	$60.77	$14.25	$16.05	$0.00	$91.07
	05/01/2027	$62.22	$14.25	$16.05	$0.00	$92.52
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 4*	11/01/2022	$24.31	$14.25	$16.05	$0.00	$54.61
	05/01/2023	$25.05	$14.25	$16.05	$0.00	$55.35
	11/01/2023	$25.78	$14.25	$16.05	$0.00	$56.08
	05/01/2024	$26.51	$14.25	$16.05	$0.00	$56.81
	11/01/2024	$27.27	$14.25	$16.05	$0.00	$57.57
	05/01/2025	$28.12	$14.25	$16.05	$0.00	$58.42
	11/01/2025	$28.88	$14.25	$16.05	$0.00	$59.18
	05/01/2026	$29.73	$14.25	$16.05	$0.00	$60.03
	11/01/2026	$30.49	$14.25	$16.05	$0.00	$60.79
	05/01/2027	$31.34	$14.25	$16.05	$0.00	$61.64
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIREMAN (ASST. ENGINEER) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$43.54	$14.25	$16.05	$0.00	$73.84
	06/01/2023	$44.56	$14.25	$16.05	$0.00	$74.86
	12/01/2023	$45.57	$14.25	$16.05	$0.00	$75.87
	06/01/2024	$46.63	$14.25	$16.05	$0.00	$76.93
	12/01/2024	$47.81	$14.25	$16.05	$0.00	$78.11
	06/01/2025	$48.87	$14.25	$16.05	$0.00	$79.17
	12/01/2025	$50.04	$14.25	$16.05	$0.00	$80.34
	06/01/2026	$51.10	$14.25	$16.05	$0.00	$81.40
	12/01/2026	$52.28	$14.25	$16.05	$0.00	$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$25.23	$9.35	$16.89	$0.00	$51.47
	06/01/2023	$25.98	$9.35	$16.89	$0.00	$52.22
	12/01/2023	$25.98	$9.35	$16.89	$0.00	$52.22
	06/01/2024	$27.01	$9.35	$16.89	$0.00	$53.25
	12/01/2024	$27.01	$9.35	$16.89	$0.00	$53.25
	06/01/2025	$28.09	$9.35	$16.89	$0.00	$54.33
	12/01/2025	$28.09	$9.35	$16.89	$0.00	$54.33
	06/01/2026	$29.21	$9.35	$16.89	$0.00	$55.45
	12/01/2026	$29.21	$9.35	$16.89	$0.00	$55.45
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE II*	03/01/2022	$47.62	$8.68	$20.27	$0.00	$76.57

Apprentice - *FLOORCOVERER - Local 2168 Zone II*

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.81	$8.68	$1.79	$0.00	$34.28
2	55	$26.19	$8.68	$1.79	$0.00	$36.66
3	60	$28.57	$8.68	$14.90	$0.00	$52.15
4	65	$30.95	$8.68	$14.90	$0.00	$54.53
5	70	$33.33	$8.68	$16.69	$0.00	$58.70
6	75	$35.72	$8.68	$16.69	$0.00	$61.09
7	80	$38.10	$8.68	$18.48	$0.00	$65.26
8	85	$40.48	$8.68	$18.48	$0.00	$67.64

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $31.90/ 3&4 $38.39/ 5&6 $58.70/ 7&8 $65.26

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FORK LIFT/CHERRY PICKER *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GENERATOR/LIGHTING PLANT/HEATERS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 35 (ZONE 2)*	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *GLAZIER - Local 35 Zone 2*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.78	$8.65	$0.00	$0.00	$31.43
2	55	$25.06	$8.65	$6.27	$0.00	$39.98
3	60	$27.34	$8.65	$6.84	$0.00	$42.83
4	65	$29.61	$8.65	$7.41	$0.00	$45.67
5	70	$31.89	$8.65	$19.63	$0.00	$60.17
6	75	$34.17	$8.65	$20.20	$0.00	$63.02
7	80	$36.45	$8.65	$20.77	$0.00	$65.87
8	90	$41.00	$8.65	$21.91	$0.00	$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$8.65	$0.00	$0.00	$32.03
2	55	$25.72	$8.65	$6.27	$0.00	$40.64
3	60	$28.06	$8.65	$6.84	$0.00	$43.55
4	65	$30.39	$8.65	$7.41	$0.00	$46.45
5	70	$32.73	$8.65	$19.63	$0.00	$61.01
6	75	$35.07	$8.65	$20.20	$0.00	$63.92
7	80	$37.41	$8.65	$20.77	$0.00	$66.83
8	90	$42.08	$8.65	$21.91	$0.00	$72.64

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *OPERATING ENGINEERS - Local 4*

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$29.50	$14.25	$0.00	$0.00	$43.75
2	60	$32.18	$14.25	$16.05	$0.00	$62.48
3	65	$34.86	$14.25	$16.05	$0.00	$65.16
4	70	$37.54	$14.25	$16.05	$0.00	$67.84
5	75	$40.22	$14.25	$16.05	$0.00	$70.52
6	80	$42.90	$14.25	$16.05	$0.00	$73.20
7	85	$45.59	$14.25	$16.05	$0.00	$75.89
8	90	$48.27	$14.25	$16.05	$0.00	$78.57

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$30.18	$14.25	$0.00	$0.00	$44.43
2	60	$32.93	$14.25	$16.05	$0.00	$63.23
3	65	$35.67	$14.25	$16.05	$0.00	$65.97
4	70	$38.42	$14.25	$16.05	$0.00	$68.72
5	75	$41.16	$14.25	$16.05	$0.00	$71.46
6	80	$43.90	$14.25	$16.05	$0.00	$74.20
7	85	$46.65	$14.25	$16.05	$0.00	$76.95
8	90	$49.39	$14.25	$16.05	$0.00	$79.69

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 96*	09/04/2022	$45.59	$12.20	$17.50	$0.00	$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS LOCAL 4*	09/01/2022	$50.50	$9.80	$17.02	$0.00	$77.32
	03/01/2023	$51.90	$9.80	$17.02	$0.00	$78.72
	09/01/2023	$53.30	$9.80	$17.02	$0.00	$80.12
	03/01/2024	$54.70	$9.80	$17.02	$0.00	$81.52
	09/01/2024	$56.10	$9.80	$17.02	$0.00	$82.92
	03/01/2025	$57.50	$9.80	$17.02	$0.00	$84.32
	09/01/2025	$58.90	$9.80	$17.02	$0.00	$85.72
	03/01/2026	$60.30	$9.80	$17.02	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS LOCAL 4*	09/01/2022	$50.50	$9.80	$17.02	$0.00	$77.32
	03/01/2023	$51.90	$9.80	$17.02	$0.00	$78.72
	09/01/2023	$53.30	$9.80	$17.02	$0.00	$80.12
	03/01/2024	$54.70	$9.80	$17.02	$0.00	$81.52
	09/01/2024	$56.10	$9.80	$17.02	$0.00	$82.92
	03/01/2025	$57.50	$9.80	$17.02	$0.00	$84.32
	09/01/2025	$58.90	$9.80	$17.02	$0.00	$85.72
	03/01/2026	$60.30	$9.80	$17.02	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS *LABORERS - ZONE 2*	12/01/2022	$37.91	$9.10	$16.64	$0.00	$63.65
	06/01/2023	$38.81	$9.10	$16.64	$0.00	$64.55
	12/01/2023	$39.71	$9.10	$16.64	$0.00	$65.45
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.31	$9.35	$16.89	$0.00	$63.55
	06/01/2023	$38.21	$9.35	$16.89	$0.00	$64.45
	12/01/2023	$39.11	$9.35	$16.89	$0.00	$65.35
	06/01/2024	$40.44	$9.35	$16.89	$0.00	$66.68
	12/01/2024	$41.77	$9.35	$16.89	$0.00	$68.01
	06/01/2025	$43.16	$9.35	$16.89	$0.00	$69.40
	12/01/2025	$44.54	$9.35	$16.89	$0.00	$70.78
	06/01/2026	$45.98	$9.35	$16.89	$0.00	$72.22
	12/01/2026	$47.42	$9.35	$16.89	$0.00	$73.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)*	09/01/2022	$48.95	$13.80	$17.14	$0.00	$79.89

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Worcester*

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.48	$13.80	$12.42	$0.00	$50.70
2	60	$29.37	$13.80	$13.36	$0.00	$56.53
3	70	$34.27	$13.80	$14.31	$0.00	$62.38
4	80	$39.16	$13.80	$15.25	$0.00	$68.21

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER *IRONWORKERS LOCAL 7 (WORCESTER AREA)*	09/16/2022	$51.29	$8.25	$26.70	$0.00	$86.24

Apprentice - *IRONWORKER - Local 7 Worcester*

Effective Date - 09/16/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$30.77	$8.25	$26.70	$0.00	$65.72
2	70	$35.90	$8.25	$26.70	$0.00	$70.85
3	75	$38.47	$8.25	$26.70	$0.00	$73.42
4	80	$41.03	$8.25	$26.70	$0.00	$75.98
5	85	$43.60	$8.25	$26.70	$0.00	$78.55
6	90	$46.16	$8.25	$26.70	$0.00	$81.11

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER - Zone 2*

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.30	$9.10	$16.64	$0.00	$48.04
2	70	$26.01	$9.10	$16.64	$0.00	$51.75
3	80	$29.73	$9.10	$16.64	$0.00	$55.47
4	90	$33.44	$9.10	$16.64	$0.00	$59.18

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.84	$9.10	$16.64	$0.00	$48.58
2	70	$26.64	$9.10	$16.64	$0.00	$52.38
3	80	$30.45	$9.10	$16.64	$0.00	$56.19
4	90	$34.25	$9.10	$16.64	$0.00	$59.99

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.56	$9.35	$16.89	$0.00	$62.80
	06/01/2023	$37.46	$9.35	$16.89	$0.00	$63.70
	12/01/2023	$38.36	$9.35	$16.89	$0.00	$64.60
	06/01/2024	$39.69	$9.35	$16.89	$0.00	$65.93
	12/01/2024	$41.02	$9.35	$16.89	$0.00	$67.26
	06/01/2025	$42.41	$9.35	$16.89	$0.00	$68.65
	12/01/2025	$43.79	$9.35	$16.89	$0.00	$70.03
	06/01/2026	$45.23	$9.35	$16.89	$0.00	$71.47
	12/01/2026	$46.67	$9.35	$16.89	$0.00	$72.91

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *LABORER (Heavy & Highway) - Zone 2*

Effective Date - 12/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$21.94	$9.35	$16.89	$0.00	$48.18
2	70	$25.59	$9.35	$16.89	$0.00	$51.83
3	80	$29.25	$9.35	$16.89	$0.00	$55.49
4	90	$32.90	$9.35	$16.89	$0.00	$59.14

Effective Date - 06/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$22.48	$9.35	$16.89	$0.00	$48.72
2	70	$26.22	$9.35	$16.89	$0.00	$52.46
3	80	$29.97	$9.35	$16.89	$0.00	$56.21
4	90	$33.71	$9.35	$16.89	$0.00	$59.95

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 2*	12/01/2022	$37.25	$9.10	$16.70	$0.00	$63.05
	06/01/2023	$38.15	$9.10	$16.70	$0.00	$63.95
	12/01/2023	$39.05	$9.10	$16.70	$0.00	$64.85
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 2*	12/01/2022	$37.16	$9.10	$16.64	$0.00	$62.90
	06/01/2023	$38.06	$9.10	$16.64	$0.00	$63.80
	12/01/2023	$38.96	$9.10	$16.64	$0.00	$64.70
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2023	$46.25	$11.49	$20.37	$0.00	$78.11
	08/01/2023	$47.89	$11.49	$20.37	$0.00	$79.75
	02/01/2024	$48.89	$11.49	$20.37	$0.00	$80.75
	08/01/2024	$50.57	$11.49	$20.37	$0.00	$82.43
	02/01/2025	$51.61	$11.49	$20.37	$0.00	$83.47
	08/01/2025	$53.33	$11.49	$20.37	$0.00	$85.19
	02/01/2026	$54.41	$11.49	$20.37	$0.00	$86.27
	08/01/2026	$56.17	$11.49	$20.37	$0.00	$88.03
	02/01/2027	$57.29	$11.49	$20.37	$0.00	$89.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE & TILE FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.13	$11.49	$20.37	$0.00	$54.99
2	60	$27.75	$11.49	$20.37	$0.00	$59.61
3	70	$32.38	$11.49	$20.37	$0.00	$64.24
4	80	$37.00	$11.49	$20.37	$0.00	$68.86
5	90	$41.63	$11.49	$20.37	$0.00	$73.49

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.95	$11.49	$20.37	$0.00	$55.81
2	60	$28.73	$11.49	$20.37	$0.00	$60.59
3	70	$33.52	$11.49	$20.37	$0.00	$65.38
4	80	$38.31	$11.49	$20.37	$0.00	$70.17
5	90	$43.10	$11.49	$20.37	$0.00	$74.96

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2023	$60.37	$11.49	$22.31	$0.00	$94.17
	08/01/2023	$62.42	$11.49	$22.31	$0.00	$96.22
	02/01/2024	$63.67	$11.49	$22.31	$0.00	$97.47
	08/01/2024	$65.77	$11.49	$22.31	$0.00	$99.57
	02/01/2025	$67.07	$11.49	$22.31	$0.00	$100.87
	08/01/2025	$69.22	$11.49	$22.31	$0.00	$103.02
	02/01/2026	$70.57	$11.49	$22.31	$0.00	$104.37
	08/01/2026	$72.77	$11.49	$22.31	$0.00	$106.57
	02/01/2027	$74.17	$11.49	$22.31	$0.00	$107.97

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile*

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.19	$11.49	$22.31	$0.00	$63.99
2	60	$36.22	$11.49	$22.31	$0.00	$70.02
3	70	$42.26	$11.49	$22.31	$0.00	$76.06
4	80	$48.30	$11.49	$22.31	$0.00	$82.10
5	90	$54.33	$11.49	$22.31	$0.00	$88.13

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.21	$11.49	$22.31	$0.00	$65.01
2	60	$37.45	$11.49	$22.31	$0.00	$71.25
3	70	$43.69	$11.49	$22.31	$0.00	$77.49
4	80	$49.94	$11.49	$22.31	$0.00	$83.74
5	90	$56.18	$11.49	$22.31	$0.00	$89.98

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 3) *MILLWRIGHTS LOCAL 1121 - Zone 3*	01/02/2023	$40.16	$8.58	$21.57	$0.00	$70.31

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *MILLWRIGHT - Local 1121 Zone 3*

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.09	$8.58	$5.72	$0.00	$36.39
2	65	$26.10	$8.58	$17.93	$0.00	$52.61
3	75	$30.12	$8.58	$18.98	$0.00	$57.68
4	85	$34.14	$8.58	$20.01	$0.00	$62.73

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
OILER (OTHER THAN TRUCK CRANES,GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$24.37	$14.25	$16.05	$0.00	$54.67
	06/01/2023	$24.94	$14.25	$16.05	$0.00	$55.24
	12/01/2023	$25.51	$14.25	$16.05	$0.00	$55.81
	06/01/2024	$26.11	$14.25	$16.05	$0.00	$56.41
	12/01/2024	$26.77	$14.25	$16.05	$0.00	$57.07
	06/01/2025	$27.37	$14.25	$16.05	$0.00	$57.67
	12/01/2025	$28.03	$14.25	$16.05	$0.00	$58.33
	06/01/2026	$28.62	$14.25	$16.05	$0.00	$58.92
	12/01/2026	$29.29	$14.25	$16.05	$0.00	$59.59
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$29.57	$14.25	$16.05	$0.00	$59.87
	06/01/2023	$30.27	$14.25	$16.05	$0.00	$60.57
	12/01/2023	$30.96	$14.25	$16.05	$0.00	$61.26
	06/01/2024	$31.68	$14.25	$16.05	$0.00	$61.98
	12/01/2024	$32.48	$14.25	$16.05	$0.00	$62.78
	06/01/2025	$33.20	$14.25	$16.05	$0.00	$63.50
	12/01/2025	$34.00	$14.25	$16.05	$0.00	$64.30
	06/01/2026	$34.72	$14.25	$16.05	$0.00	$65.02
	12/01/2026	$35.52	$14.25	$16.05	$0.00	$65.82
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS II *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$56.06	$8.65	$23.05	$0.00	$87.76
	07/01/2023	$57.26	$8.65	$23.05	$0.00	$88.96
	01/01/2024	$58.46	$8.65	$23.05	$0.00	$90.16
	07/01/2024	$59.66	$8.65	$23.05	$0.00	$91.36
	01/01/2025	$60.86	$8.65	$23.05	$0.00	$92.56

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.03	$8.65	$0.00	$0.00	$36.68
2	55	$30.83	$8.65	$6.27	$0.00	$45.75
3	60	$33.64	$8.65	$6.84	$0.00	$49.13
4	65	$36.44	$8.65	$7.41	$0.00	$52.50
5	70	$39.24	$8.65	$19.63	$0.00	$67.52
6	75	$42.05	$8.65	$20.20	$0.00	$70.90
7	80	$44.85	$8.65	$20.77	$0.00	$74.27
8	90	$50.45	$8.65	$21.91	$0.00	$81.01

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$8.65	$0.00	$0.00	$37.28
2	55	$31.49	$8.65	$6.27	$0.00	$46.41
3	60	$34.36	$8.65	$6.84	$0.00	$49.85
4	65	$37.22	$8.65	$7.41	$0.00	$53.28
5	70	$40.08	$8.65	$19.63	$0.00	$68.36
6	75	$42.95	$8.65	$20.20	$0.00	$71.80
7	80	$45.81	$8.65	$20.77	$0.00	$75.23
8	90	$51.53	$8.65	$21.91	$0.00	$82.09

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$46.96	$8.65	$23.05	$0.00	$78.66
	07/01/2023	$48.16	$8.65	$23.05	$0.00	$79.86
	01/01/2024	$49.36	$8.65	$23.05	$0.00	$81.06
	07/01/2024	$50.56	$8.65	$23.05	$0.00	$82.26
	01/01/2025	$51.76	$8.65	$23.05	$0.00	$83.46

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - New*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.48	$8.65	$0.00	$0.00	$32.13
2	55	$25.83	$8.65	$6.27	$0.00	$40.75
3	60	$28.18	$8.65	$6.84	$0.00	$43.67
4	65	$30.52	$8.65	$7.41	$0.00	$46.58
5	70	$32.87	$8.65	$19.63	$0.00	$61.15
6	75	$35.22	$8.65	$20.20	$0.00	$64.07
7	80	$37.57	$8.65	$20.77	$0.00	$66.99
8	90	$42.26	$8.65	$21.91	$0.00	$72.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.08	$8.65	$0.00	$0.00	$32.73
2	55	$26.49	$8.65	$6.27	$0.00	$41.41
3	60	$28.90	$8.65	$6.84	$0.00	$44.39
4	65	$31.30	$8.65	$7.41	$0.00	$47.36
5	70	$33.71	$8.65	$19.63	$0.00	$61.99
6	75	$36.12	$8.65	$20.20	$0.00	$64.97
7	80	$38.53	$8.65	$20.77	$0.00	$67.95
8	90	$43.34	$8.65	$21.91	$0.00	$73.90

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$45.02	$8.65	$23.05	$0.00	$76.72
	07/01/2023	$46.22	$8.65	$23.05	$0.00	$77.92
	01/01/2024	$47.42	$8.65	$23.05	$0.00	$79.12
	07/01/2024	$48.62	$8.65	$23.05	$0.00	$80.32
	01/01/2025	$49.82	$8.65	$23.05	$0.00	$81.52

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.51	$8.65	$0.00	$0.00	$31.16
2	55	$24.76	$8.65	$6.27	$0.00	$39.68
3	60	$27.01	$8.65	$6.84	$0.00	$42.50
4	65	$29.26	$8.65	$7.41	$0.00	$45.32
5	70	$31.51	$8.65	$19.63	$0.00	$59.79
6	75	$33.77	$8.65	$20.20	$0.00	$62.62
7	80	$36.02	$8.65	$20.77	$0.00	$65.44
8	90	$40.52	$8.65	$21.91	$0.00	$71.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.11	$8.65	$0.00	$0.00	$31.76
2	55	$25.42	$8.65	$6.27	$0.00	$40.34
3	60	$27.73	$8.65	$6.84	$0.00	$43.22
4	65	$30.04	$8.65	$19.06	$0.00	$57.75
5	70	$32.35	$8.65	$19.63	$0.00	$60.63
6	75	$34.67	$8.65	$20.20	$0.00	$63.52
7	80	$36.98	$8.65	$20.77	$0.00	$66.40
8	90	$41.60	$8.65	$21.91	$0.00	$72.16

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2023	$45.56	$8.65	$23.05	$0.00	$77.26
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 2*	07/01/2023	$46.76	$8.65	$23.05	$0.00	$78.46
	01/01/2024	$47.96	$8.65	$23.05	$0.00	$79.66
	07/01/2024	$49.16	$8.65	$23.05	$0.00	$80.86
	01/01/2025	$50.36	$8.65	$23.05	$0.00	$82.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER - Local 35 Zone 2 - BRUSH NEW*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.78	$8.65	$0.00	$0.00	$31.43
2	55	$25.06	$8.65	$6.27	$0.00	$39.98
3	60	$27.34	$8.65	$6.84	$0.00	$42.83
4	65	$29.61	$8.65	$7.41	$0.00	$45.67
5	70	$31.89	$8.65	$19.63	$0.00	$60.17
6	75	$34.17	$8.65	$20.20	$0.00	$63.02
7	80	$36.45	$8.65	$20.77	$0.00	$65.87
8	90	$41.00	$8.65	$21.91	$0.00	$71.56

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$23.38	$8.65	$0.00	$0.00	$32.03
2	55	$25.72	$8.65	$6.27	$0.00	$40.64
3	60	$28.06	$8.65	$6.84	$0.00	$43.55
4	65	$30.39	$8.65	$7.41	$0.00	$46.45
5	70	$32.73	$8.65	$19.63	$0.00	$61.01
6	75	$35.07	$8.65	$20.20	$0.00	$63.92
7	80	$37.41	$8.65	$20.77	$0.00	$66.83
8	90	$42.08	$8.65	$21.91	$0.00	$72.64

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 2*	01/01/2023	$43.62	$8.65	$23.05	$0.00	$75.32
	07/01/2023	$44.82	$8.65	$23.05	$0.00	$76.52
	01/01/2024	$46.02	$8.65	$23.05	$0.00	$77.72
	07/01/2024	$47.22	$8.65	$23.05	$0.00	$78.92
	01/01/2025	$48.42	$8.65	$23.05	$0.00	$80.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PAINTER Local 35 Zone 2 - BRUSH REPAINT*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.81	$8.65	$0.00	$0.00	$30.46
2	55	$23.99	$8.65	$6.27	$0.00	$38.91
3	60	$26.17	$8.65	$6.84	$0.00	$41.66
4	65	$28.35	$8.65	$7.41	$0.00	$44.41
5	70	$30.53	$8.65	$19.63	$0.00	$58.81
6	75	$32.72	$8.65	$20.20	$0.00	$61.57
7	80	$34.90	$8.65	$20.77	$0.00	$64.32
8	90	$39.26	$8.65	$21.91	$0.00	$69.82

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.41	$8.65	$0.00	$0.00	$31.06
2	55	$24.65	$8.65	$6.27	$0.00	$39.57
3	60	$26.89	$8.65	$6.84	$0.00	$42.38
4	65	$29.13	$8.65	$7.41	$0.00	$45.19
5	70	$31.37	$8.65	$19.63	$0.00	$59.65
6	75	$33.62	$8.65	$20.20	$0.00	$62.47
7	80	$35.86	$8.65	$20.77	$0.00	$65.28
8	90	$40.34	$8.65	$21.91	$0.00	$70.90

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.56	$9.35	$16.89	$0.00	$62.80
	06/01/2023	$37.46	$9.35	$16.89	$0.00	$63.70
	12/01/2023	$38.36	$9.35	$16.89	$0.00	$64.60
	06/01/2024	$39.69	$9.35	$16.89	$0.00	$65.93
	12/01/2024	$41.02	$9.35	$16.89	$0.00	$67.26
	06/01/2025	$42.41	$9.35	$16.89	$0.00	$68.65
	12/01/2025	$43.79	$9.35	$16.89	$0.00	$70.03
	06/01/2026	$45.23	$9.35	$16.89	$0.00	$71.47
	12/01/2026	$46.67	$9.35	$16.89	$0.00	$72.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$35.78	$13.41	$16.01	$0.00	$65.20
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 2)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 2)*	08/01/2020	$46.11	$9.40	$23.12	$0.00	$78.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PILE DRIVER - Local 56 Zone 2*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER *PLUMBERS LOCAL 4*	09/01/2022	$50.50	$9.80	$17.02	$0.00	$77.32
	03/01/2023	$51.90	$9.80	$17.02	$0.00	$78.72
	09/01/2023	$53.30	$9.80	$17.02	$0.00	$80.12
	03/01/2024	$54.70	$9.80	$17.02	$0.00	$81.52
	09/01/2024	$56.10	$9.80	$17.02	$0.00	$82.92
	03/01/2025	$57.50	$9.80	$17.02	$0.00	$84.32
	09/01/2025	$58.90	$9.80	$17.02	$0.00	$85.72
	03/01/2026	$60.30	$9.80	$17.02	$0.00	$87.12

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *PLUMBER/PIPEFITTER - Local 4*

Effective Date - 09/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.20	$9.80	$0.00	$0.00	$30.00
2	50	$25.25	$9.80	$0.00	$0.00	$35.05
3	60	$30.30	$9.80	$0.00	$0.00	$40.10
4	70	$35.35	$9.80	$7.31	$0.00	$52.46
5	80	$40.40	$9.80	$7.31	$0.00	$57.51

Effective Date - 03/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.76	$9.80	$0.00	$0.00	$30.56
2	50	$25.95	$9.80	$0.00	$0.00	$35.75
3	60	$31.14	$9.80	$0.00	$0.00	$40.94
4	70	$36.33	$9.80	$7.31	$0.00	$53.44
5	80	$41.52	$9.80	$7.31	$0.00	$58.63

Notes:
Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%
Step 4 w/lic $52.59, Step 5 w/lic $57.44

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) *PLUMBERS LOCAL 4*	09/01/2022	$50.50	$9.80	$17.02	$0.00	$77.32
	03/01/2023	$51.90	$9.80	$17.02	$0.00	$78.72
	09/01/2023	$53.30	$9.80	$17.02	$0.00	$80.12
	03/01/2024	$54.70	$9.80	$17.02	$0.00	$81.52
	09/01/2024	$56.10	$9.80	$17.02	$0.00	$82.92
	03/01/2025	$57.50	$9.80	$17.02	$0.00	$84.32
	09/01/2025	$58.90	$9.80	$17.02	$0.00	$85.72
	03/01/2026	$60.30	$9.80	$17.02	$0.00	$87.12
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER *LABORERS - ZONE 2*	12/01/2022	$38.16	$9.10	$16.64	$0.00	$63.90
	06/01/2023	$39.06	$9.10	$16.64	$0.00	$64.80
	12/01/2023	$39.96	$9.10	$16.64	$0.00	$65.70
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$37.56	$9.35	$16.89	$0.00	$63.80
	06/01/2023	$38.46	$9.35	$16.89	$0.00	$64.70
	12/01/2023	$39.36	$9.35	$16.89	$0.00	$65.60
	06/01/2024	$40.69	$9.35	$16.89	$0.00	$66.93
	12/01/2024	$42.02	$9.35	$16.89	$0.00	$68.26
	06/01/2025	$43.41	$9.35	$16.89	$0.00	$69.65
	12/01/2025	$44.79	$9.35	$16.89	$0.00	$71.03
	06/01/2026	$46.23	$9.35	$16.89	$0.00	$72.47
	12/01/2026	$47.67	$9.35	$16.89	$0.00	$73.91
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$35.08	$14.25	$16.05	$0.00	$65.38
	06/01/2023	$35.90	$14.25	$16.05	$0.00	$66.20
	12/01/2023	$36.72	$14.25	$16.05	$0.00	$67.02
	06/01/2024	$37.57	$14.25	$16.05	$0.00	$67.87
	12/01/2024	$38.52	$14.25	$16.05	$0.00	$68.82
	06/01/2025	$39.37	$14.25	$16.05	$0.00	$69.67
	12/01/2025	$40.32	$14.25	$16.05	$0.00	$70.62
	06/01/2026	$41.18	$14.25	$16.05	$0.00	$71.48
	12/01/2026	$42.13	$14.25	$16.05	$0.00	$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
READY-MIX CONCRETE DRIVER *TEAMSTERS 170 - Dauphinais (Bellingham)*	01/01/2023	$26.40	$10.26	$4.75	$0.00	$41.41
	12/01/2023	$27.00	$10.76	$5.45	$0.00	$43.21
	01/01/2024	$27.00	$10.76	$5.45	$0.00	$43.21
	12/01/2024	$27.60	$11.26	$6.15	$0.00	$45.01
	01/01/2025	$27.60	$11.26	$6.15	$0.00	$45.01
RECLAIMERS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 33*	02/01/2023	$48.53	$12.78	$20.20	$0.00	$81.51
	08/01/2023	$50.03	$12.78	$20.20	$0.00	$83.01
	02/01/2024	$51.28	$12.78	$20.20	$0.00	$84.26
	08/01/2024	$52.78	$12.78	$20.20	$0.00	$85.76
	02/01/2025	$54.03	$12.78	$20.20	$0.00	$87.01
	08/01/2025	$55.53	$12.78	$20.20	$0.00	$88.51
	02/01/2026	$56.78	$12.78	$20.20	$0.00	$89.76

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ROOFER - Local 33*

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$24.27	$12.78	$5.59	$0.00	$42.64
2	60	$29.12	$12.78	$20.20	$0.00	$62.10
3	65	$31.54	$12.78	$20.20	$0.00	$64.52
4	75	$36.40	$12.78	$20.20	$0.00	$69.38
5	85	$41.25	$12.78	$20.20	$0.00	$74.23

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.02	$12.78	$5.59	$0.00	$43.39
2	60	$30.02	$12.78	$20.20	$0.00	$63.00
3	65	$32.52	$12.78	$20.20	$0.00	$65.50
4	75	$37.52	$12.78	$20.20	$0.00	$70.50
5	85	$42.53	$12.78	$20.20	$0.00	$75.51

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
(Hot Pitch Mechanics' receive $1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 33*	02/01/2023	$48.78	$12.78	$20.20	$0.00	$81.76
	08/01/2023	$50.28	$12.78	$20.20	$0.00	$83.26
	02/01/2024	$51.53	$12.78	$20.20	$0.00	$84.51
	08/01/2024	$53.03	$12.78	$20.20	$0.00	$86.01
	02/01/2025	$54.28	$12.78	$20.20	$0.00	$87.26
	08/01/2025	$55.78	$12.78	$20.20	$0.00	$88.76
	02/01/2026	$57.03	$12.78	$20.20	$0.00	$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 63*	01/01/2023	$41.30	$10.64	$17.54	$2.05	$71.53
	07/01/2023	$42.55	$10.64	$17.54	$2.05	$72.78
	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SHEET METAL WORKER - Local 63*

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.59	$4.79	$4.76	$0.92	$29.06
2	50	$20.65	$5.32	$5.29	$1.03	$32.29
3	55	$22.72	$5.85	$5.82	$1.13	$35.52
4	60	$24.78	$6.38	$6.35	$1.23	$38.74
5	65	$26.85	$6.92	$6.88	$1.33	$41.98
6	70	$28.91	$7.45	$7.41	$1.44	$45.21
7	75	$30.98	$7.98	$7.94	$1.54	$48.44
8	80	$33.04	$8.51	$15.42	$1.64	$58.61
9	85	$35.11	$9.04	$15.95	$1.74	$61.84
10	90	$37.17	$9.58	$16.48	$1.85	$65.08

Effective Date - 07/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.15	$4.79	$4.76	$0.92	$29.62
2	50	$21.28	$5.32	$5.29	$1.03	$32.92
3	55	$23.40	$5.85	$5.82	$1.13	$36.20
4	60	$25.53	$6.38	$6.35	$1.23	$39.49
5	65	$27.66	$6.92	$6.88	$1.33	$42.79
6	70	$29.79	$7.45	$7.41	$1.44	$46.09
7	75	$31.91	$7.98	$7.94	$1.54	$49.37
8	80	$34.04	$8.51	$15.42	$1.64	$59.61
9	85	$36.17	$9.04	$15.95	$1.74	$62.90
10	90	$38.30	$9.58	$16.48	$1.85	$66.21

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.53	$13.41	$16.01	$0.00	$65.95
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 669*	04/01/2021	$43.14	$10.55	$16.41	$0.00	$70.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.41	$7.75	$0.00	$0.00	$27.16
2	50	$21.57	$7.75	$0.00	$0.00	$29.32
3	55	$23.73	$10.55	$8.15	$0.00	$42.43
4	60	$25.88	$10.55	$8.15	$0.00	$44.58
5	65	$28.04	$10.55	$8.40	$0.00	$46.99
6	70	$30.20	$10.55	$8.40	$0.00	$49.15
7	75	$32.36	$10.55	$8.40	$0.00	$51.31
8	80	$34.51	$10.55	$8.40	$0.00	$53.46
9	85	$36.67	$10.55	$8.40	$0.00	$55.62
10	90	$38.83	$10.55	$8.40	$0.00	$57.78

Notes:

Apprentice to Journeyworker Ratio:1:1

STEAM BOILER OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 - MARBLE & TILE*	02/01/2023	$59.29	$11.49	$22.34	$0.00	$93.12
	08/01/2023	$61.34	$11.49	$22.34	$0.00	$95.17
	02/01/2024	$62.59	$11.49	$22.34	$0.00	$96.42
	08/01/2024	$64.69	$11.49	$22.34	$0.00	$98.52
	02/01/2025	$65.99	$11.49	$22.34	$0.00	$99.82
	08/01/2025	$68.14	$11.49	$22.34	$0.00	$101.97
	02/01/2026	$69.49	$11.49	$22.34	$0.00	$103.32
	08/01/2026	$71.69	$11.49	$22.34	$0.00	$105.52
	02/01/2027	$73.09	$11.49	$22.34	$0.00	$106.92

Apprentice - *TERRAZZO FINISHER - Local 3 Marble & Tile*

Effective Date - 02/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$29.65	$11.49	$22.34	$0.00	$63.48
2	60	$35.57	$11.49	$22.34	$0.00	$69.40
3	70	$41.50	$11.49	$22.34	$0.00	$75.33
4	80	$47.43	$11.49	$22.34	$0.00	$81.26
5	90	$53.36	$11.49	$22.34	$0.00	$87.19

Effective Date - 08/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.67	$11.49	$22.34	$0.00	$64.50
2	60	$36.80	$11.49	$22.34	$0.00	$70.63
3	70	$42.94	$11.49	$22.34	$0.00	$76.77
4	80	$49.07	$11.49	$22.34	$0.00	$82.90
5	90	$55.21	$11.49	$22.34	$0.00	$89.04

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$46.58	$9.35	$17.97	$0.00	$73.90
	06/01/2023	$47.58	$9.35	$17.97	$0.00	$74.90
	12/01/2023	$48.83	$9.35	$17.97	$0.00	$76.15
	06/01/2024	$50.31	$9.35	$17.97	$0.00	$77.63
	12/01/2024	$51.78	$9.35	$17.97	$0.00	$79.10
	06/01/2025	$53.28	$9.35	$17.97	$0.00	$80.60
	12/01/2025	$54.78	$9.35	$17.97	$0.00	$82.10
	06/01/2026	$56.33	$9.35	$17.97	$0.00	$83.65
	12/01/2026	$57.83	$9.35	$17.97	$0.00	$85.15

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.70	$9.35	$17.97	$0.00	$70.02
	06/01/2023	$43.70	$9.35	$17.97	$0.00	$71.02
	12/01/2023	$44.95	$9.35	$17.97	$0.00	$72.27
	06/01/2024	$46.43	$9.35	$17.97	$0.00	$73.75
	12/01/2024	$47.90	$9.35	$17.97	$0.00	$75.22
	06/01/2025	$49.40	$9.35	$17.97	$0.00	$76.72
	12/01/2025	$50.90	$9.35	$17.97	$0.00	$78.22
	06/01/2026	$52.45	$9.35	$17.97	$0.00	$79.77
	12/01/2026	$53.95	$9.35	$17.97	$0.00	$81.27
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2022	$42.58	$9.35	$17.97	$0.00	$69.90
	06/01/2023	$43.58	$9.35	$17.97	$0.00	$70.90
	12/01/2023	$44.83	$9.35	$17.97	$0.00	$72.15
	06/01/2024	$46.31	$9.35	$17.97	$0.00	$73.63
	12/01/2024	$47.78	$9.35	$17.97	$0.00	$75.10
	06/01/2025	$49.28	$9.35	$17.97	$0.00	$76.60
	12/01/2025	$50.78	$9.35	$17.97	$0.00	$78.10
	06/01/2026	$52.33	$9.35	$17.97	$0.00	$79.65
	12/01/2026	$53.83	$9.35	$17.97	$0.00	$81.15
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.05	$14.25	$16.05	$0.00	$83.35
	06/01/2023	$54.29	$14.25	$16.05	$0.00	$84.59
	12/01/2023	$55.53	$14.25	$16.05	$0.00	$85.83
	06/01/2024	$56.81	$14.25	$16.05	$0.00	$87.11
	12/01/2024	$58.25	$14.25	$16.05	$0.00	$88.55
	06/01/2025	$59.53	$14.25	$16.05	$0.00	$89.83
	12/01/2025	$60.97	$14.25	$16.05	$0.00	$91.27
	06/01/2026	$62.25	$14.25	$16.05	$0.00	$92.55
	12/01/2026	$63.69	$14.25	$16.05	$0.00	$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.82	$13.41	$16.01	$0.00	$66.24
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	12/01/2022	$54.81	$9.35	$18.42	$0.00	$82.58
	06/01/2023	$55.81	$9.35	$18.42	$0.00	$83.58
	12/01/2023	$57.06	$9.35	$18.42	$0.00	$84.83
	06/01/2024	$58.54	$9.35	$18.42	$0.00	$86.31
	12/01/2024	$60.01	$9.35	$18.42	$0.00	$87.78
	06/01/2025	$61.51	$9.35	$18.42	$0.00	$89.28
	12/01/2025	$63.01	$9.35	$18.42	$0.00	$90.78
	06/01/2026	$64.56	$9.35	$18.42	$0.00	$92.33
	12/01/2026	$66.06	$9.35	$18.42	$0.00	$93.83
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2022	$56.81	$9.35	$18.42	$0.00	$84.58
	06/01/2023	$57.81	$9.35	$18.42	$0.00	$85.58
	12/01/2023	$59.06	$9.35	$18.42	$0.00	$86.83
	06/01/2024	$60.54	$9.35	$18.42	$0.00	$88.31
	12/01/2024	$62.01	$9.35	$18.42	$0.00	$89.78
	06/01/2025	$63.51	$9.35	$18.42	$0.00	$91.28
	12/01/2025	$65.01	$9.35	$18.42	$0.00	$92.78
	06/01/2026	$66.56	$9.35	$18.42	$0.00	$94.33
	12/01/2026	$68.06	$9.35	$18.42	$0.00	$95.83
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2022	$46.88	$9.35	$18.42	$0.00	$74.65
	06/01/2023	$47.88	$9.35	$18.42	$0.00	$75.65
	12/01/2023	$49.13	$9.35	$18.42	$0.00	$76.90
	06/01/2024	$50.61	$9.35	$18.42	$0.00	$78.38
	12/01/2024	$52.08	$9.35	$18.42	$0.00	$79.85
	06/01/2025	$53.58	$9.35	$18.42	$0.00	$81.35
	12/01/2025	$55.08	$9.35	$18.42	$0.00	$82.85
	06/01/2026	$56.63	$9.35	$18.42	$0.00	$84.40
	12/01/2026	$58.13	$9.35	$18.42	$0.00	$85.90
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2022	$48.88	$9.35	$18.42	$0.00	$76.65
	06/01/2023	$49.88	$9.35	$18.42	$0.00	$77.65
	12/01/2023	$51.13	$9.35	$18.42	$0.00	$78.90
	06/01/2024	$52.61	$9.35	$18.42	$0.00	$80.38
	12/01/2024	$54.08	$9.35	$18.42	$0.00	$81.85
	06/01/2025	$55.58	$9.35	$18.42	$0.00	$83.35
	12/01/2025	$57.08	$9.35	$18.42	$0.00	$84.85
	06/01/2026	$58.63	$9.35	$18.42	$0.00	$86.40
	12/01/2026	$60.13	$9.35	$18.42	$0.00	$87.90
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	12/01/2021	$36.24	$13.41	$16.01	$0.00	$65.66
VOICE-DATA-VIDEO TECHNICIAN *ELECTRICIANS LOCAL 96*	09/04/2022	$34.19	$12.20	$15.91	$0.00	$62.30

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *VOICE-DATA-VIDEO TECHNICIAN - Local 96*

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.10	$12.20	$4.27	$0.00	$33.57
2	55	$18.80	$12.20	$4.32	$0.00	$35.32
3	60	$20.51	$12.20	$15.50	$0.00	$48.21
4	65	$22.22	$12.20	$15.55	$0.00	$49.97
5	70	$23.93	$12.20	$15.60	$0.00	$51.73
6	75	$25.64	$12.20	$15.65	$0.00	$53.49
7	80	$27.35	$12.20	$15.70	$0.00	$55.25
8	85	$29.06	$12.20	$15.75	$0.00	$57.01

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR *LABORERS - ZONE 2*	12/01/2022	$37.41	$9.10	$16.64	$0.00	$63.15
	06/01/2023	$38.31	$9.10	$16.64	$0.00	$64.05
	12/01/2023	$39.21	$9.10	$16.64	$0.00	$64.95
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 2 (HEAVY & HIGHWAY)*	12/01/2022	$36.81	$9.35	$16.89	$0.00	$63.05
	06/01/2023	$37.71	$9.35	$16.89	$0.00	$63.95
	12/01/2023	$38.61	$9.35	$16.89	$0.00	$64.85
	06/01/2024	$39.94	$9.35	$16.89	$0.00	$66.18
	12/01/2024	$41.27	$9.35	$16.89	$0.00	$67.51
	06/01/2025	$42.66	$9.35	$16.89	$0.00	$68.90
	12/01/2025	$44.04	$9.35	$16.89	$0.00	$70.28
	06/01/2026	$45.48	$9.35	$16.89	$0.00	$71.72
	12/01/2026	$46.92	$9.35	$16.89	$0.00	$73.16
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WASTE WATER PUMP OPERATOR *OPERATING ENGINEERS LOCAL 4*	12/01/2022	$53.63	$14.25	$16.05	$0.00	$83.93
	06/01/2023	$54.88	$14.25	$16.05	$0.00	$85.18
	12/01/2023	$56.13	$14.25	$16.05	$0.00	$86.43
	06/01/2024	$57.43	$14.25	$16.05	$0.00	$87.73
	12/01/2024	$58.88	$14.25	$16.05	$0.00	$89.18
	06/01/2025	$60.18	$14.25	$16.05	$0.00	$90.48
	12/01/2025	$61.63	$14.25	$16.05	$0.00	$91.93
	06/01/2026	$62.93	$14.25	$16.05	$0.00	$93.23
	12/01/2026	$64.38	$14.25	$16.05	$0.00	$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WATER METER INSTALLER *PLUMBERS LOCAL 4*	09/01/2022	$50.50	$9.80	$17.02	$0.00	$77.32
	03/01/2023	$51.90	$9.80	$17.02	$0.00	$78.72
	09/01/2023	$53.30	$9.80	$17.02	$0.00	$80.12
	03/01/2024	$54.70	$9.80	$17.02	$0.00	$81.52
	09/01/2024	$56.10	$9.80	$17.02	$0.00	$82.92
	03/01/2025	$57.50	$9.80	$17.02	$0.00	$84.32
	09/01/2025	$58.90	$9.80	$17.02	$0.00	$85.72
	03/01/2026	$60.30	$9.80	$17.02	$0.00	$87.12

For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

TECHNICAL SPECIFICATIONS

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.02 PROJECT IDENTIFICATION AND DESCRIPTION OF WORK

A. Project Identification: The name of the Project on Bidding and Contract Documents (Invitation to Bids) is MILLBURY HIGH SCHOOL – FOODS PROGRAM ROOM RENOVATIONS at Millbury Memorial Junior/Senior High School, 12 Martin Street, Millbury, Massachusetts 01527 for the Town of Millbury Public Schools, Bid #0186-2302.

B. Work of this Contract includes renovations and modifications of existing Foods Program Room at Millbury High School. The renovation work involves removal of ceilings, flooring. and finishes and replacement with new resilient flooring and base, acoustical tile ceilings, repainting of space including walls and overhead ceilings, sprinkler system modifications, plumbing work, HVAC modifications, and electrical work including new lighting, new cabinets and counters, plumbing fixtures and fittings, as per the Contract Documents.

C. All work shall be in accordance with the Bidding and Contract Documents prepared by Architect, DIXON SALO ARCHITECTS, INC., 300 Main Street, First Floor, Worcester, Massachusetts 01608 and their consultants.

D. Contract Drawings: Refer to Project Manual Document 00015, LIST OF DRAWINGS.

1.03 WORK OF FILED SUB-TRADES

A. Filed Sub-bids: Filed sub-bids are required for this Contract in the following categories:

1. Acoustical Tile Ceilings: Section 09510, ACOSTICAL TILE CEILINGS.
2. Resilient Floors: Section 09650, RESILIENT FLOORING.
3. Painting: Section 09900, PAINTING.
4. Plumbing: Section 15401, PLUMBING.
5. HVAC: Section 15601, HEATING, VENTILATING, AND AIR CONDITIONING (HVAC).
6. Electrical Work: Section 16101, ELECTRICAL WORK.

1.04 DCAMM CERTIFICATION

A. This Contract is subject to DCAMM Certification requirements for General Construction and for Filed Sub-bids.

1. General Bidder shall be DCAMM certified as a ‘Prime Contractor’ or a ‘Small Prime Contractor’ in the following category: ‘General Building Construction’.
2. Filed Sub-bidders shall be DCAMM-certified for the stipulated trade: ‘Acoustical Tile Ceilings’, ‘Resilient Floors’, ‘Painting’, ‘Plumbing’, ‘HVAC’, and ‘Electrical Work’.

1.05 CONDITIONS OF THE CONTRACT

A. Unless otherwise indicated, the Conditions of the Contract shall include the following:

1. GENERAL SPECIFICATIONS.
2. CONTRACT.

1.06 PERMIT AND INSPECTION FEES

A. All permits and inspection fees shall be paid for by the Contractor.

1.07 CONTRACTOR'S USE OF PREMISES

A. Contractor shall limit his use of the premises for Work and for storage, to allow for:

1. Work by other contractors.
2. Owner occupancy.
3. Public use.

B. Coordinate use of premises under direction of Owner.

1. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.
2. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate contractor.
3. Obtain and pay for the use of additional storage or work areas needed for operations.
4. Move any stored Products, under Contractor's control, which interfere with operations of the Owner or separate contractor.

C. Prior to beginning work of the Contract, the General Contractor shall meet with the Owner and the Architect to determine procedures regarding access to and use of site, staging, parking and storage areas, special site conditions and safety issues, and any other restrictions regarding the use of the site areas surrounding the construction.

1.08 EXAMINATION OF SITE AND PREBID CONFERENCE AND WALKTHROUGH

A. Prior to bidding, the General Contractor and each Subcontractors shall carefully examine the site and the Contract Documents to ensure their knowledge of conditions and requirements affecting the work. No claim for extra compensation or extension of time will be allowed for General Contractor's or Subcontractor's failure to comply with this requirement nor will any condition at the site, whether or not in agreement with conditions shown or called for on the Contract Documents, be allowed as a basis or such claims, except as otherwise specifically provided for.

B. Refer to SECTION I - INVITATION FOR BIDS for pre-bid conference.

1.09 ACCEPTABLE WORK HOURS AND COMMENCEMENT AND COMPLETION OF WORK

A. Work Hours: Work hours shall be 6:30 AM to 3:00 P.M, Monday through Friday in particular over School Breaks (Holiday Vacation Period) except for holidays unless approved by Owner.

B. Commencement of Work and Construction Time Frame: The proposed schedule for construction of MILLBURY HIGH SCHOOL - FOODS PROGRAM ROOM RENOVATIONS Project Contract (Bid #0186-2302) is as follows:

1. Award of Contract: On or about April 25, 2023.

2. Pre-Construction (off-site) for Shop Drawing review: May 1, 2023 to June 19, 2023.

3. Construction Period On-site: June 20, 2023 through Friday, August 16, 2023.

4. Final Completion Date: August 16, 2023.

1.10 LIQUIDATED DAMAGES

A. Liquidated Damages for Failure to Complete Work: Refer to CONTRACT.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01035

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements required for handling modifications to the Contract Documents, including, but not limited to:

1. Preliminary procedures.
2. Documentation of proposals and claims.
3. Architect's Supplemental Instructions (ASI).
4. Proposal Request (PR).
5. Construction Change Directive (CCD).
6. Change Order (CO).
7. Request for Information (RFI).

1.02 RELATED REQUIREMENTS

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. CONTRACT and SPECIFICATIONS; Methods of determining cost or credit to Owner resulting from changes in Work made on a time and material basis, and Contractor's claims for additional costs.
2. Section 01300, SUBMITTALS.
3. Section 01700, CONTRACT CLOSEOUT.

1.03 DEFINITIONS

A. Change Order (CO):

1. Definition: See CONTRACT.
2. Form: AIA Document G701, Change Order.

B. Construction Change Directive (CCD):

1. Definition: A written order to the Contractor, signed by Owner and Architect which amends the Contract Documents as described, and authorizes Contractor to proceed with a change which affects the Contract Sum or the Contract Time, for inclusion in a subsequent Change Order.
2. Form: AIA Document G714, Construction Change Directive.

C. Architect's Supplemental Instructions (ASI):

1. Definition: A written order, instructions, or interpretations, signed by Architect making minor changes in the Work not involving a change in Contract Sum or Contract Time.
2. Form: AIA Document G710, Architect's Supplemental Instructions.

D. Proposal Request (PR):

1. Definition: A request to the Contractor, signed by the Architect, for submission of an itemized quotation for changes in the Contract Sum or Contract Time. This is not a Change Order or a direction to proceed with the Work.
2. Form: AIA Document G709, Work Changes Proposal Request.

E. Request for Information (RFI):

1. Definition: A request from the Contractor to the Architect soliciting additional information regarding the Contract Documents.
2. Form: AIA Document G716, Request for Information (RFI).

1.04 PRELIMINARY PROCEDURES

A. Architect may initiate change by submitting a Work Changes Proposal Request (PR) to Contractor. Request will include:

1. Detailed description of the Change, Products, and location of the change in the Project.
2. Supplementary or revised Drawings and Specifications.
3. The projected time span for making the change and a specific statement as to whether overtime work is, or is not, authorized.
4. A specific period of time during which the requested price will be considered valid.
5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.

B. Contractor may initiate changes by submitting a written notice to Architect, containing:

1. Description of the proposed changes.
2. Statement of the reason for making the changes.
3. State of the effect on the Contract Sum and the Contract Time.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.05 CONSTRUCTION CHANGE AUTHORIZATION

A. In lieu of Proposal Request, Architect may issue a Construction Change Directive utilizing form for Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. Directive will describe change in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.

C. Architect will sign and date the Construction Change Directive and send it to the Owner for authorization for the Contractor to proceed with the changes.

D. Once authorized by the Owner, the Architect will send the Construction Change Directive to the Contractor. Contractor shall sign and date the Construction Change Directive to indicate agreement with the terms therein.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Architect to evaluate the quotation.

B. On request provide additional data to support time and cost computations including, but not limited to:

1. Labor required.
2. Equipment required.
3. Products required.
    a. Recommended source of purchase and unit cost.
    b. Quantities required.
4. Taxes, insurance, and bonds.
5. Credit for work deleted from Contract, similarly documented.
6. Overhead and profit.
7. Justification for any change in Contract Time.

C. Support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information:

1. Name of the Owner's authorized agent who ordered the work, and date of the order.
2. Dates and times work was performed, and by whom.
3. Time record, summary of hours worked, and hourly rates paid.
4. Receipts and invoices for:
    a. Equipment used, listing dates and times of use.
    b. Products used, listing quantities.
    c. Subcontracts.

D. Document requests for substitutions for Products as specified in Section 01600, MATERIAL AND EQUIPMENT.

1.07 PREPARATION OF CHANGE ORDERS

A. Unless otherwise indicated, Architect will prepare each Change Order.

B. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

1.08 LUMP-SUM/FIXED PRICE CHANGE ORDER

A. Content of the Change Orders will be based on either:

1. Architect's Proposal Request and Contractor's responsive Proposal as mutually agreed between Owner and Contractor.
2. Contractor's Proposal for a change, as recommended by Architect.

B. Owner and Architect will sign and date the Change Order as authorization for the Contractor to proceed with the changes.

C. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

1.09 UNIT PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:

1. Architect's definition of the scope of the required changes.
2. Contractor's Proposal for a change, as recommended by Architect.
3. Survey of completed Work.

B. The amounts of the unit prices to be:

1. Those stated in the Agreement.
2. Those mutually agreed upon between Owner and Contractor.

C. When quantities of each of the items affected by the Change Order can be determined prior to start of the Work:

1. Owner and Architect will sign and date the Change Order as authorization for Contractor to proceed with the changes.
2. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

D. When quantities of the items cannot be determined prior to start of the Work:

1. Architect and Owner will issue a Construction Change Directive directing Contractor to proceed with the change on the basis of unit prices and will cite the applicable unit prices.
2. At completion of the change, Architect will determine the cost of such work based on the unit prices and quantities used.

    a. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.

3. Architect will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
4. Owner and Contractor will sign and date the Change Order to indicate their agreement with the terms therein.

1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE DIRECTIVE

A. Architect and Owner will issue a Construction Change Directive directing Contractor to proceed with the changes.

B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

C. Architect will determine the allowable cost of such work, as provided in CONTRACT and SPECIFICATIONS.

D. Architect will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.

E. Owner and Contractor will sign and date the Change Order to indicate their agreement therewith.

1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Progress Schedule to reflect each change in Contract Time.

1. Revise subschedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies supervisory and administrative requirements for coordination of Work, including, but not limited to:

1. Coordination of work of employees and subcontractors.
2. Expedition of Work to assure compliance with schedules.
3. Coordination of Work with that of other contractors and work by Owner.
4. Compliance with orders and instructions of Architect or Owner.

1.02 RELATED REQUIREMENTS

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. CONTRACT and SPECIFICATIONS; Authority and Responsibilities of the Contractor.
2. Section 01045, CUTTING AND PATCHING.
3. Section 01200, PROJECT MEETINGS.
4. Section 01300, SUBMITTALS.
5. Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.
6. Section 01700, CONTRACT CLOSEOUT.

1.03 COORDINATION BY CONTRACTOR

A. Coordinate the Work of the Contract, including mechanical and electrical work, and other subcontractors. Anticipate areas where work will be restricted, congested, or difficult. Consult various affected subcontractors.

1. All work associated with this Contract shall be fully coordinated with the Owner.
2. Coordinate and comply with requirements regarding use of the building, access, dumpster locations, utilities, and related facilities, as agreed to between the Owner and Contractor.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting, fitting, and patching work, including attendant excavation and backfill, required to complete the Work or to:

1. Make its several parts fit together properly.
2. Uncover portions of the Work to provide for installations of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to requirements of Contract Documents.
5. Remove samples of installed work as specified for testing.

1.02 RELATED REQUIREMENTS

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 01010, SUMMARY OF WORK; Description of Project.

1.03 QUALITY ASSURANCE

A. Permission to patch any items of work does not imply a waiver of the Architect's right to require complete removal and replacement in said areas and of said items if, in Architect's opinion, patching does not satisfactorily restore quality and appearance of work.

B. Requirements for Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.

C. Operational and Safety Limitations: Do not cut-and-patch operational elements and safety-related components in a manner resulting in a reduction of capacities to perform in the manner intended or resulting in decreased operational life, increased maintenance, or decreased safety.

D. Visual Requirements: Do not cut-and-patch work that is exposed on exterior or in occupied spaces of building, in a manner resulting in reduction of visual qualities or resulting in substantial evidence of cut-and-patch work, both as judged solely by the Architect. Remove and replace work judged by the Architect to be visually unsatisfactory.

1.04 SUBMITTALS

A. Submit a written request to Architect well in advance of executing any cutting or alteration which affects:

1. Work of Owner or separate contractor.
2. Structural value or integrity of any element of the Project.
3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
4. Efficiency, operational life, maintenance, or safety of operational elements.
5. Visual qualities of sight-exposed elements.

B. Request shall include:

1. Identification of the Project.
2. Description of affected work.
3. The necessity for cutting, alteration, or excavation.
4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.
5. Description of proposed work:

    a. Description of why cutting-and-patching cannot (reasonably) be avoided.
    b. Scope of cutting, patching, alteration, or excavation.
    c. How it will be performed.
    d. How structural elements (if any) will be reinforced.
    e. Trades who will execute the work.
    f. Products proposed to be used.
    g. Extent of refinishing to be done.
    h. Approximate dates of the work, and anticipated results in terms of variations from the work as originally completed (structural, operational, visual, and other qualities of significance).

6. Alternatives to cutting and patching.
7. Cost proposal, when applicable.
8. Written permission of any separate contractor whose work will be affected.

C. Submit written notice to Architect designating date and time the work will be uncovered.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Except as otherwise indicated or authorized by the Architect, provide materials for cutting-and-patching which will result in equal-or-better work than the work being cut-and-patched, in terms of performance characteristics and including visual effect where applicable. Comply with the requirements and use materials identical with the original materials where feasible and where recognized that satisfactory results can be produced thereby.

B. Comply with specifications and standards for each specific product involved.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.

C. Report unsatisfactory or questionable conditions to Architect and Owner in writing; do not proceed with work until Architect and Owner (as applicable) has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.

B. Provide devices and methods to protect other portions of Project from damage.

C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

1. In general, where mechanical cutting is required, cut work with sawing and grinding tools, not with hammering and chopping tools. Core drill openings through concrete.

B. Employ original installer or fabricator to perform cutting and patching for:

1. Weather-exposed or moisture-resistant elements.
2. Sight-exposed finished surfaces.

C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

D. Restore work which has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.

E. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

F. Restore exposed finishes of patched areas; and, where necessary extend finish restoration onto retained work adjoining, in a manner which will eliminate evidence of patching.

1. Where patch occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch.

G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to nearest intersection.
2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01120

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 REQUIREMENTS INCLUDED

A. Coordinate Work and schedule elements of alterations and renovation work by procedures and methods that expedite completion of the Work.

B. In addition to demolition specified in Section 02070, SELECTIVE DEMOLITION, and indicated on Drawings, cut, move and remove miscellaneous existing work as necessary to provide access and to allow alterations and new work to proceed. Include but do not limit work to:

1. Repair and removal of hazardous and unsanitary conditions and materials.
2. Removal of abandoned items and items that serve no useful purpose, such as abandoned piping, conduit and wiring.
3. Removal of unsuitable and extraneous materials not marked for salvage, such as abandoned equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
4. Cleaning of surfaces, and removal of surface finishes as needed to install new work and finishes.

C. Patching, repair, and refinishing existing work intended for reuse, to specified condition for each material, with suitable transition to adjacent new items of construction.

1.02 ALTERATIONS, CUTTING, AND PROTECTION

A. Ensure that work is performed by workers qualified for each condition and material encountered.

B. Cutting of existing construction required to install equipment under various Sections shall be done by coring or sawing method under Section appropriate to materials and construction.

C. Cut and remove minimum materials necessary and avoid damage to adjacent work intended for reuse.

D. Cut finish surfaces such as masonry, tile, plaster and metals by methods that terminate surfaces in a straight line at natural points of division.

E. Cutting and patching work shall comply with requirements of Section 01045, CUTTING AND PATCHING.

F. Protect existing finishes, equipment, and adjacent work scheduled to remain from damage from weather and extremes of temperature.

1. Maintain existing interior work above 60^{o}F.

PART 2 - PRODUCTS

2.01 SALVAGED MATERIALS FOR REUSE

A. Salvage sufficient quantities of cut and removed materials to replace damaged work of existing construction when material is not readily obtainable on current markets.

1. Store salvaged items in dry, secure place on site.
2. Items not required for use in repair of existing work shall remain Owner’s property.
3. Do not incorporate salvaged or used materials in new construction without Architect's approval and approval of Owner.

2.02 PATCHING, EXTENDING, AND MATCHING

A. Provide same products or types of construction as those in existing structure, as needed to patch, extend, and match existing work.

B. Generally, Contract Documents do not define products or standards of workmanship present in existing construction; determine products and workmanship by inspection and testing. Architect will judge workmanship and materials against existing as a sample of comparison.

C. Provide products, finishes, and types of construction for patching, extending and matching shall be performed as necessary to make work complete and consistent to identical standards of quality.

PART 3 - EXECUTION

3.01 PERFORMANCE

A. Patching of existing construction to accommodate work of various Sections shall be performed under Sections that specify methods and materials similar to adjacent existing construction, in the following areas:

1. Holes adjacent to penetrations for conduit, pipes and ductwork where exposed to view.
2. Holes adjacent to penetrations through fire walls for conduit, pipes and ductwork through fire walls as required by code.
3. Areas adjacent to installation of new doors and windows and other framed wall and partition penetrations.
4. Removal and patching of damaged material where indicated.

B. Patch areas exposed to view after removal of existing construction such as chair rails, base, cove and intersecting walls as indicated.

C. Patch and extend existing work using skilled workers who are capable of matching existing quality of workmanship. Quality of patched or extended work shall be equal to that specified for new work.

3.02 ADJUSTMENTS

A. Where partitions are removed, patch floors, walls, and ceilings, with finish materials to match existing.

1. Where removal of partitions results in adjacent spaces becoming one, rework floors and ceilings to provide smooth planes without breaks, steps, or bulkheads. Where extreme change of plane of two inches or more occurs, request instructions from Architect as to method of making transition.

3.03 DAMAGED SURFACES

A. Patch and replace parts of existing finished surfaces which are found to be damaged, lifted, discolored, or otherwise imperfect, with matching materials.

1. Provide adequate support of substrate before patching finish.
2. Refinish patched portions of painted and coated surfaces to produce uniform color and texture over entire surface.
3. When existing surface finish cannot be matched, refinish entire surface to nearest intersections.

3.04 TRANSITION FROM EXISTING TO NEW WORK

A. When new work abuts or finishes flush with existing work, make smooth transition. Patched work shall match existing adjacent work in texture and appearance so that patch or transition is not visible from 5 ft. away.

B. When finished surfaces are cut so that smooth transition with new work is not possible, terminate existing surface in a neat manner along straight line at natural line of division. Provide trim appropriate to finished surface.

3.05 CLEANING

A. Perform periodic and final cleaning as specified in Section 01700, CONTRACT CLOSEOUT.

B. At completion of work of each Section, clean area and prepare surfaces for work of other Sections.

C. At completion of alterations work in each area, provide final cleaning and return space to condition suitable for use by Owner.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including but not limited to:

1. Pre-Construction Meeting.
2. Pre-Installation Conference.
3. Progress Meetings.
4. Coordination Meetings.
5. Special Meetings.

B. Representatives of contractors, subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and construction schedules.

D. NOTE: The requirements of Project Meetings will be established following award of Contract and will be consistent with the requirements of a Contract of this duration.

1.02 RELATED REQUIREMENTS

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 01300, SUBMITTALS.
2. Section 01700, CONTRACT CLOSEOUT.

1.03 PROJECT MEETINGS, GENERAL

A. Agendas: Prepare agendas for Project Meetings. Distribute copies to parties in attendance.

B. Meeting Notices: Prepare and distribute written notices of Project Meetings four working days in advance of each meeting.

C. Arrangements: Make physical arrangements for Project Meetings, including but not limited to:

1. Arranging space and seating.

D. Preside at Project Meetings.

E. Minutes: Record minutes of Project Meetings, including significant procedures and decisions.

F. Distribution of Minutes: Reproduce and distribute copies of Project Meeting minutes within three working days after each meeting to participants of meeting, to parties affected by decisions made at meetings, and to Architect.

1.04 PRE-CONSTRUCTION MEETING

A. Schedule within seven (7) days after date of Notice to Proceed.

B. Location: A central site, convenient for all parties, designated by Contractor.

C. Attendance: Require and notify the following to attend

1. Owner's Representative.
2. Architect and his Professional Consultants.
3. Clerk of the Works.
4. Contractor's Superintendent.
5. Major subcontractors.
6. Major suppliers.
7. Others as appropriate.

D. Suggested Agenda:

1. Discussion of major subcontractors and suppliers.
2. Projected Construction Progress Schedules.
3. Critical work sequencing.
4. Major equipment deliveries and priorities.
5. Project Coordination, including designation of responsible personnel.
6. Procedures and processing of:

    a. Field decisions.
    b. Proposal Requests.
    c. Submittals.
    d. Change Orders.
    e. Application for Payment.

7. Adequacy of distribution of Contract Documents.
8. Procedures for maintaining Record Documents.
9. Use of premises:

    a. Office, work, and storage areas.
    b. Owner's requirements.
    c. Maintenance of access and use of existing fire department operations.

10. Communications protocol.
11. Construction facilities, controls, and construction aids.
12. Temporary utilities including interruptions of existing utilities.
13. Safety and first-aid procedures.
14. Security procedures.
15. Housekeeping procedures.
16. Demolition coordination.

1.05 PRE-INSTALLATION CONFERENCES

A. Conduct pre-installation conferences at site prior to construction activities which require coordination. Installers, manufacturer's representatives, and fabricators of materials or systems affected shall be required to attend. Advise Architect of scheduled meeting dates.

B. Do not allow affected work to proceed if the conference cannot be successfully concluded. Initiate actions necessary to resolve impediments to performance of the work and reconvene the conference at the earliest feasible date.

1.06 PROGRESS MEETINGS

A. Schedule regular weekly progress meetings or as otherwise directed.

B. Hold called meetings as required by progress of the Work.

C. Location of the meetings: Project field office of Contractor.

D. Attendance: Require and notify the following to attend:

1. Architect and his professional consultants, as needed.
2. Subcontractors, as appropriate to the agenda.
3. Suppliers, as appropriate to the agenda.
4. Others.

E. Suggested Agenda:

1. Review and approval of minutes of previous meeting.
2. Review of Work progress since previous meeting.
3. Field observations, problems, and conflicts.
4. Problems which impede Construction Progress Schedule.
5. Review of off-site fabrication and delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Progress Schedule.
8. Progress schedule during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:

    a. Effect on Construction Progress Schedule and on completion date.
    b. Effect on other contracts of the Project.

14. Other business.

1.07 COORDINATION MEETINGS

A. Conduct Coordination Meetings as necessary to properly coordinate the trades. Require representation of parties involved in coordination or planning of activities involved.

1.08 SPECIAL MEETINGS

A. Conduct Special Meetings as required throughout the course of the Work. Special meeting issues may include, but are not limited to:

1. Safety issues.
2. Labor issues.
3. Special schedule issues.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of Work, including:

1. Progress schedules.
2. Submittal schedule.
3. Shop drawings.
4. Product data.
5. Samples.
6. Progress reports.
7. Schedule of values.

B. Administrative Submittals: Refer to requirements specified in other Division 1 Specification Sections, and other Contract Documents, for administrative submittals, including:

1. Permits.
2. Applications for payment.
3. Performance and payment bonds (where required).
4. Insurance certificates.
5. List of subcontractors.

1.02 RELATED REQUIREMENTS

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 01010, SUMMARY OF WORK.
2. Section 01040, COORDINATION.
3. Section 01700, CONTRACT CLOSEOUT; Closeout submittals.

1.03 SUBMITTAL PROCEDURES

A. Coordination of Submittals: Coordinate timing of submittals with construction activities. Transmit submittals well enough in advance of performance of Work to avoid delays. Coordinate submittals of related elements of Work.

B. Processing of Submittals: Allow sufficient review time to ensure installation will not be delayed because of time required to process submittals. Minimum processing times are as follows:

1. Review by Architect's Office Only: Allow five (5) business days for review and processing.
2. Reprocessing of Submittals: For submittals not approved initially, allow ten (10) business days for review and reprocessing of submittals by Architect, and an additional five (5) business days for review by each consultant.
3. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.
4. Review of submittals shall include the Architect's Action Stamp where only Architect's review is required. On submittals where Consultants' review is required, submittal should have both the Architect's review (action) Stamp and the Consultant's review (action) Stamp.

C. Contractor's Preparation of Submittals: Place permanent label or title block on each submittal for identification. Indicate Project Name, Architect's Project Number, Specification Section number and title, date of submittal, name and address of Architect, name and Address of Contractor, name and address of subcontractor and/or supplier, name of manufacturer, Drawing number and detail reference.

1. Contractor's Review and Action Stamp: Provide suitable space on label or title block for Contractor's review and action stamp. Stamp and sign each submittal to show Contractor's review and approval prior to transmittal to Architect. Submittals not signed and stamped by Contractor will be returned without action.
2. Architect's Review and Action Stamp: Provide minimum 4 in. x 4 in. space on label or title block for Architect's review and action stamp. Deliver submittals to Architect at address listed on cover of Project Manual.
3. Architect's Consultants Review and Action Stamp: Provide minimum 4 in. x 4 in. space on label or title block for Architect's consultants review and action stamp. Deliver submittals to consultant at address listed on cover of Project Manual.
4. Modify and customize submittals as required to show interface with adjacent work and attachment to building.

D. Transmittal of Submittals: Transmit each item with Architect-accepted transmittal form. Submittals requiring only review and approval by Architect shall be transmitted directly to the Architect for review and approval by the Architect. Where submittals require primary review and approval by Architect's consultant (such as electrical equipment submittal requiring primary review by Electrical Engineer), submittal should be transmitted directly to that consultant, with copy of transmittal sent and (1) copy of submittal simultaneously to the Architect.

1. Each submittal shall identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate, on transmittal form.
2. Source: Submittals received from sources other than Contractor will be returned without action.
3. Deviations from Contract Documents: When products, materials, or systems submitted deviate from Contract Documents, record deviations clearly on transmittal form, or separate attached sheet.

E. Comply with progress schedule for submittals related to Work progress.

F. Each submittal shall be reviewed by the appropriate parties. Submittals requiring only Architect's review will be marked with Architect's Action Review Stamp; on submittals requiring Architect's Consultant review, the submittal should contain the Action Stamp of Architect's Consultant.

1. On submittals requiring Consultant's review, Consultant will review submittal and forward reviewed submittal, containing Consultant's review action stamp to Architect. Architect will then review submittal.

2. After Architect and/or Architect's Consultant (as appropriate) reviews submittal, reviewed submittal will be copied by the Architect with sufficient copies made for all parties. The Architect will then forward the reviewed submittal to Contractor.
3. The Contractor shall revise and resubmit as required. Identify changes made since previous submittal.

G. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report inability to comply with provisions.

1.04 PROGRESS SCHEDULE

A. Timing: Submit progress schedule within two calendar days of Award of Contract.

B. Preparation of Progress Schedule: Prepare horizontal bar type schedule or CPM Schedule.

C. Format of Listings: Order chronologically by start of each unit of Work. List units of Work by Specification Section title.

D. Content of Progress Schedule: Show complete sequence of construction by activity. Show dates of beginning and completion of each major element of construction.

E. Distribution: Print and distribute progress schedule to Architect, Owner, subcontractors, and other parties affected. Post copies in field office. Instruct recipients to report promptly to Contractor in writing problems apparent from projections shown on schedule.

F. Revisions: Update and reissue progress schedule monthly in conjunction with Application for Payment.

1.05 SUBMITTAL SCHEDULE

A. Timing: Prepare and issue complete Submittal Schedule no later than ten working days after Architect accepts Progress Schedule.

B. Preparation: Coordinate Submittal Schedule with Progress Schedule, and Schedule of Values.

C. Content of Submittal Schedule: Prepare schedule in order by Specification Section. Provide the following information for each submittal:

1. Scheduled date of initial submittal.
2. Specification Section number.
3. Submittal type.
4. Name of subcontractor or supplier.

D. Distribution: Print and distribute Submittal Schedule to Architect, Owner, subcontractors, and other parties affected. Post copies in field office.

E. Revisions: Update and reissue Submittal Schedule monthly in conjunction with Application for Payment.

1.06 SHOP DRAWINGS

A. Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project on reproducible sheets. Show adjacent conditions and related work. Show accurate field dimensions where appropriate. Identify materials and products shown. Note special coordination required. Standard information prepared without specific reference to Project is not considered shop drawings.

B. Shop drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings.

C. Show every component of fabricated item, notes regarding manufacturing process, coatings and finishes, identifying numbers conforming to Contract Documents, (i.e. stair numbers, door numbers, etc.) dimensions, and appropriate trade names. Show anchorage and fastening details, including type, size and spacing. Show material gage and thickness. Indicate welding details and joint types.

D. Shop Drawing Sheet Size: Except for templates, patterns, and other full-size drawings, submit shop drawings on sheets at least 8-1/2 in. x 11 in., but no larger than 24 in. x 36 in.

E. Submittal Quantities: Submit shop drawings in following quantities:

1. Submit one (1) reproducible and three (3) blackline prints of each sheet.

1.07 PRODUCT DATA

A. Definition: Product data includes manufacturer's standard published literature, such as installation instructions, catalog cuts, color charts, rough-in diagrams and wiring diagrams. When product data must be prepared specifically because standard published data is not suitable for use, submit as shop drawing.

B. Preparation: Mark each copy of product data to show applicable choices and options. Where published product data includes information on several products and choices, mark copies to clearly indicate information applicable to this Project.

C. Do not submit product data until compliance with requirements of Contract Documents has been confirmed.

D. Submittal Quantities: Submit product data in following quantities:

1. Submit number of copies required by Contractor, plus additional one (1) copy to be retained by Architect.

E. Installer Copy: Verify that installer of Work possesses a current copy of Architect-approved product data prior to installation.

1.08 SAMPLES

A. Submit samples identical with materials and products to be installed. Where indicated, prepare samples to match Owner's sample. Label sample with description, source, manufacturer's name, and catalog number. Submit samples along with certifications that products comply with referenced standards.

B. Architect Review: Architect will review samples for confirmation of visual intent, color, pattern, texture, and type. Architect will not test samples for compliance with other specified requirements, which shall remain exclusive responsibility of Contractor.

C. Submittal Quantities: When variation in color, pattern, or texture can be expected in finish work, submit multiple samples (minimum of three) to show approximate limits of variations. Submit samples in following quantities:

1. Initial Selection: For initial selection of color, texture, and pattern, submit one full set of manufacturer's available samples.
2. Verification Samples: Submit three sets of samples selected. One set will be returned to Contractor for use at Project Site for quality control comparisons.

D. Distribution: Distribute additional sets of approved samples to subcontractors, suppliers, installers, and others required for proper performance of Work. Indicate distribution on transmittal forms.

1.09 DAILY PROGRESS REPORTS

A. Prepare daily construction Progress Reports. Record following information concerning events on Project Site:

1. List of subcontractors at site.
2. Accidents and unusual events.
3. Meetings and significant decisions.
4. Orders and requests by governing authorities.
5. Change orders received.
6. Equipment or system tests and start-ups.
7. Partial completions and occupancies.
8. Authorized substantial completions.

B. Distribution: Distribute copies to Architect weekly.

1.10 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.

f. Change Orders (numbers) that affect value.
g. Dollar value.

1). Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.

6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.11 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor’s approval stamp and will return the submittal without action.

B. Architect’s Review: Architect will review submittals, stamp and indicate action, and return to Contractor. Architect will review submittals for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Architect's review and approval of submittals shall be held to limitations stated in the CONTRACT and SPECIFICATIONS. In no case shall approval or acceptance by Architect be interpreted as release of Contractor of responsibility to fulfill requirements of Contract Documents. No acceptance or approval of submittals, nor any indication or note marked by Architect on submittals, shall constitute authorization for increase in Contract Sum.

C. Action Stamp: Architect will stamp each submittal with an action stamp. Stamp will indicate action taken as follows:

1. REVIEWED: No notations.

2. REVIEWED AS NOTED: Resubmission not required. Minor notations; items may be fabricated without corrections of original drawings; review is complete, and all notations are deemed obvious without ambiguity.

3. REVISE AND RESUBMIT: Resubmission required. Minor notations; no items should be fabricated without further corrections of original drawings; review is not complete; details of items noted by checker must be clarified further before full review can be completed. Submit new transparencies.

4. REJECTED: Drawing is rejected as not in accord with the Contract; too many notations, or other justifiable reason. When returning drawings, Architect will state reasons for rejection. Revise and resubmit. Do not fabricate.

D. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return if it does not comply with requirements. Architect will forward each submittal to appropriate party.

E. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

F. Required Resubmittals: Make corrections or changes to submittals required by Architect and resubmit until approved. Revise initial shop drawings or product data, and resubmit as specified for initial submittal. Indicate changes made other than those requested by Architect. Submit new samples as required for initial submittal.

1.12 DISTRIBUTION BY CONTRACTOR

A. Distribution: When submittal is marked "REVIEWED" or "REVIEWED AS NOTED", make prints and copies and distribute to Owner, subcontractors, suppliers, fabricators, and other parties requiring information from submittal for proper coordination and performance of Work. Print copies of shop drawings from approved reproducible only.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies construction facilities and temporary controls required throughout construction period.

1.02 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect the Work of this Section. Other Specification Sections that directly relate to Work of this Section include, but are not limited to:

1. CONTRACT and SPECIFICATIONS; Conditions of the Contract.
2. Section 01010, SUMMARY OF WORK; Description of work and work of separate contracts.

1.03 SUBMITTALS

A. Schedule: Submit a schedule indicating implementation and termination of each temporary utility within fifteen days of date established for Commencement of the Work.

1.04 QUALITY ASSURANCE

A. Comply with requirements of authorities having jurisdiction, codes, utility companies, OSHA, and industry standards including, but not limited to:

1. NFPA 241.
2. NFPA 70.
3. ANSI A10.
4. NECA NJG-6.

1.05 PROJECT CONDITIONS

A. Temporary Utilities: Existing building services may be used as source for temporary power for proposed renovation work including the following: electric power and water service. The Owner will permit tie into these services at locations authorized by the Owner. The Owner reserves the right to limit services should the temporary utilities interrupt Owner’s existing uses at the school building or when in the opinion of the Owner there is evidence of waste or abuse.

B. Conditions of Use: Maintain temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload temporary facilities. Do not allow hazardous, dangerous, or unsanitary conditions to develop on site.

C. Comply with requirements of the Owner.

1.06 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with silencers, and power equipment with mufflers.
2. Manage vehicular traffic and scheduling to reduce noise.
3. No heavy equipment may be started or idled before 7:00 A.M.

1.07 ACCEPTABLE HOURS OF OPERATION

A. Contractor shall conduct construction in compliance with applicable Town of Millbury ordinances or bylaws relative to acceptable hours of operation.

1. Except where approved by the Owner, no work shall occur prior to 7:00 AM, Monday through Friday.
2. Where required to meet project schedule, the Owner may permit Contractor to work on Saturdays or may extend Contractor's work hours if permitted by local authorities having jurisdiction.

PART 2 - PRODUCTS

2.02 TEMPORARY UTILITIES

A. Scope: Temporary utility work includes, but is not limited to:

1. Water service and distribution.
2. Electric power and light.

B. Temporary Water Service and Distribution: Water service is available at the building. Install water service and distribution piping in sizes and pressures adequate for construction.

1. Provide water for construction purposes, including water for drinking and fire protection.
2. Pay costs for installation, maintenance, removal, and service charges for water used. Install branch piping with taps located so water is available through hoses throughout construction.
3. Protect piping and fittings against freezing.
4. The Owner will pay costs for water used.

C. Electric Power Service: Electrical service is available at the building. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Pay costs to bring extend service to project site, including service charges, installation, maintenance, and removal of this temporary electric service.

1. Provide circuit and branch wiring, with area distribution boxes located so power and lighting is available throughout construction by use of construction-type power cords.
2. Provide adequate artificial lighting where natural light is not adequate for work, and for areas accessible to public.
3. Work shall meet applicable requirements of NFPA 70.
4. Cost of electricity will be borne by the Owner.

5. The electrical power supply at the site is single phase, 110/120 volt. All other power requirements including 208 volt service or 3-phase service for tools and equipment necessary to perform the work shall be the responsibility of the Contractor.
6. All power cords for electrical power shall be furnished by the Contractor.

2.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES

A. Scope: Temporary construction and support facilities include, without limitation:

1. Sanitary facilities.
2. Temporary enclosures.
3. Construction aids.
4. Waste disposal services.
5. Water control.
6. Pollution and dust control.
7. Temporary ventilation.

B. Sanitary Facilities: Provide and maintain clean portable toilet facilities. Do not use permanent facilities within the building unless permitted by Owner in writing.

1. If use of permanent facilities is permitted, maintain washrooms in clean and sanitary condition and supply exhaustible materials such as soap, hand towels, and toilet tissue.

C. Temporary Enclosures: Provide temporary enclosures to separate work areas from occupied school areas. Design and construct temporary enclosures to provide acceptable working conditions, to allow effective temporary ventilation, and to prevent entry of unauthorized persons.

1. Provide temporary exterior doors with self-closing hardware and padlocks.
2. Design enclosures to be removable to allow handling of materials.

D. Construction Aids: Provide construction aids and equipment required by personnel to facilitate execution of the Work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.

1. Refer to respective sections for particular requirements for each trade.

E. Waste Disposal: Maintain all areas under Contractor's control free of extraneous debris. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.

1. Provide containers for deposit of debris.
2. Provide periodic inspection of traffic areas to enforce requirements.
3. Schedule daily collection and disposal of debris within building.
4. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation of debris on-site.
5. Coordinate dumpster locations with Owner.

F. Pollution Control: Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.

1. Take special measures to prevent harmful substances from entering public waters.

2. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
3. Provide systems for control of atmospheric pollutants.
4. Prevent toxic concentrations of chemicals.
5. Prevent harmful dispersal of pollutants to atmosphere.

G. Dust Control: Provide positive methods and apply dust control materials to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into the atmosphere.

2.04 TEMPORARY SIGNAGE

A. Scope: Temporary signage includes, but is not limited to:

1. Informational signs.

B. Informational Signs: Provide painted signs with painted lettering, or standard products. Erect at appropriate locations to provide required information.

1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
2. Colors: as required by regulatory agencies, otherwise of uniform color throughout Project.

2.05 SECURITY AND PROTECTION FACILITIES

A. Scope: Security and protection facilities includes but is not limited to:

1. Temporary fire protection.
2. Barricades, warning signs, lights.
3. Security procedures.

B. Temporary Fire Protection: Provide and maintain suitable fire protection equipment and services. Establish procedures for fire protection for welding and other potentially hazardous construction operations. Ascertain and comply with requirements of Project insurance carrier, Millbury Fire Department and the Commonwealth of Massachusetts State Fire Marshal. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.

1. Coordinate fire protection program with Owner and Millbury Fire Department.
2. Locate temporary portable fire extinguishers in convenient locations, not less than one extinguisher per floor.
3. Store combustible materials in containers in fire-safe locations.
4. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes.

C. Barricades, Warning Signs, and Lights: Provide and maintain barricades, warning signs, warning lights, railings, walkways, and the like. Paint signs and barricades with appropriate colors, graphics, and warnings to inform public and job-site personnel of hazards.

D. Construction Parking: Per General Contractor plan, subject to review and approval by the Owner.

E. Security Procedures: Secure project against unauthorized entry at all times. Provide secure, locked, temporary entrances to prevent vandalism, theft, and similar violations of security.

1. Storage: Provide secure, locked facilities for areas where materials and equipment are stored.
2. Comply with Owner's security program and requirements.

PART 3 - EXECUTION

3.01 MAINTENANCE, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit waste and abuse.

B. Maintenance: Maintain temporary facilities in operating condition; repair damages immediately upon discovery. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour per day basis.

C. Termination and Removal: Unless otherwise requested by Owner or Architect, remove each temporary facility when no longer useful, or when replaced by permanent facility.

D. Final Cleaning: Provide final cleaning of building per Contract Documents.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for materials and equipment used for the Project.

1.02 RELATED REQUIREMENTS

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. CONTRACT; Conditions of the Contract.
2. Section 01010, SUMMARY OF WORK.
3. Section 01300, SUBMITTALS.
4. Section 01700, CONTRACT CLOSEOUT.

1.03 PRODUCTS

A. Products include material, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification Section shall be the same and shall be interchangeable.

D. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.

E. In the case of an inconsistency between Drawings and the Project Manual, or within either document which is not clarified by addendum, the product of greater quality or greater quantity of work shall be provided in accordance with the Architect’s interpretation.

1.04 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURERS' INSTRUCTIONS

A. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300, SUBMITTALS, distribute copies to persons involved, and maintain one set in field office.

B. Perform work in accordance with details of instructions and specified requirements.

1.06 TRANSPORTATION AND HANDLING

A. Refer to CONTRACT and Specifications Sections for requirements pertaining to transportation and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.07 STORAGE AND PROTECTION

A. Refer to CONTRACT and SPECIFICATIONS and Technical Specifications Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged and are maintained under required conditions.

E. General Contractor shall protect all loose and installed materials from damage until final acceptance of the Project.

1.08 PRODUCT STANDARDS

A. Any product specified by reference to the number, symbol, or title of a standard, such as Commercial Standard, a Federal Specification, an ASTM Standard, an ANSI Standard, a trade association standard, or other similar standard, shall comply with the requirements of the latest issue of such standard or revision thereof, including any amendment or supplement thereto, as listed in the latest official index in effect as of the bid date.

B. The standards referred to, except as modified in the Specifications, shall have full force and effect as though printed in the Specifications. The Architect will furnish, upon request, information as to how copies of the standards referred to may be obtained.

C. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned, in accordance with the manufacturer’s printed instructions, unless otherwise specified.

1.09 SUBSTITUTIONS OF SPECIFIED PRODUCTS AND SYSTEMS

A. Substitutions of specified products and systems shall comply with requirements of Chapter 30, Section 39M of General Laws, and additional requirements and procedures specified herein.

B. The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The Architect will judge the design, functionality, and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve, as equal to materials specified, proposed substitutes which, in the Architect's opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Work. With respect to interior or exterior finishes value or effect, the Architect may not approve as equal any proposed substitute which, in the Architect's sole opinion, would not produce the same artistic or aesthetic value or effect. In order to permit coordinated design of color and finishes the General Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the Owner.

C. Specific reference in the Specification to any product, material, or process by name, make, or catalog number shall be interpreted as establishing a standard of quality. An item will be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength and design; (2) it will performs at least equally the function imposed by the general design for the work; and (3) it conforms substantially, even with deviations to the detailed requirements for the item in the Specification. [M.G.L. Chapter 30, Section 39M (b).)] The Architect shall be the sole judge of whether and proposed substitute product, material, process, or method is equal to that specified according to this standard, and his decision shall be final and binding on the General Contractor and any Subcontractor or Sub-Subcontractor.

D. If the General Contractor proposes to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the General Contractor shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval and shall request written approval of the deviation from the requirements of the Contract Documents.

E. In requesting approval of deviations of substitutions, the General Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality or result at least equal to that otherwise attainable. If in the opinion of the Architect, the evidence presented by the General Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

F. Any additional cost, loss, or damage arising from the substitution of any material or any method for those originally specified shall be borne by the General Contractor, notwithstanding approval or acceptance of such substitution by Owner or the Architect, unless such substitution was made at the written request or direction of Owner or the Architect.

1.10 IDENTIFICATION OF EQUIPMENT

A. All electrical equipment shall be properly identified including manufacturer's nameplate, serial number, model, capacity, size, etc., as appropriate for the equipment. In addition, furnish the manufacturer's operating instructions and preventative maintenance manual and recommendations. Refer to Section 01700, CONTRACT CLOSEOUT for submittal requirements.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 FINAL CLEANING

A. Unless otherwise specified under the various Sections of the Specifications, the General Contractor shall perform final cleaning operations as herein specified prior to final inspection.

B. Maintain project site free from accumulations of waste, debris, and rubbish, caused by operations. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

C. Cleaning shall include all surfaces, interior and exterior in which the General Contractor has had access whether existing or new and in the areas used by the Contractor in conducting the improvements required of this Contract.

D. Refer to Sections of the Specifications for cleaning of specific products or work.

E. Use only those materials which will not create hazards to health or property, and which will not damage surfaces.

F. Use only those cleaning materials and methods that are recommended by the manufacturer of surface material to be cleaned.

G. Employ experienced workmen or professional cleaners for final cleaning operations.

H. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

I. Glass and plastic surfaces within the project area shall be thoroughly cleaned and washed by qualified window cleaners at the expense of the General Contractor just prior to acceptance of the Work.

J. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

K. Polish glossy surfaces to a clear shine and provide wax where necessary.

L. Ventilating Systems: Clean permanent filters and replace disposable filters if units were operated during construction. Clean ducts, blowers, and coils if units were operated without filters during construction.

M. Broom clean exterior paved surfaces and rake clean other surfaces of the grounds.

O. At the end of the project, General Contractor and each Subcontractor shall remove all his tools, equipment, machinery, and surplus materials from the job site. The General Contractor shall remove all waste materials and rubbish from the project at this time. All temporary structures shall be removed and the project shall be left clean.

1.02 RECORD DRAWINGS

A. Record Drawings shall consist of all the Contract Drawings.

B. The General Contractor and all Subcontractors shall be required to maintain one set of Record Drawings, as the work relates to their Sections of the Specifications, at the site.

C. The Record Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The Record Drawings shall be maintained in a clean, dry and legible condition and shall not be used for construction purposes.

D. Record Drawings, as submitted by the General Contractor shall be verified in the field by the Architect or his Consultants. Verification by the Architect shall occur during the construction process and prior to the related work being completed and covered up.

E. The Record Drawings shall be available at all times for inspection by the Owner or Architect. All deficiencies noted shall be promptly corrected.

F. The following information shall be indicated on the Record Drawings:

1. Record all changes, including change orders, in the location, size, number and type both horizontally and vertically of all elements of the project which deviate from those indicated on all the Contract Drawings.

1.03 PUNCH LIST

A. The Contractor shall supervise and direct the work, using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the work under Contract.

B. The Contractor shall carefully check his own work and that of subcontractors as the work is being performed. Unsatisfactory work shall be corrected immediately.

C. During the finishing stages of the project, the Contractor shall make frequent inspections with subcontractors so as to progressively check for and correct faulty work.

D. When the Contractor determines that he is substantially complete, that is, less than one percent of his contract remaining to be completed, he shall prepare for submission to the Architect a “punch list” which includes a list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.

E. Upon receipt of the Contractor's list of items to be completed or corrected, the Architect will promptly make a thorough inspection to verify the "punch list", setting forth in accurate detail any items on the Contractor's list and additional items that are not acceptable.

F. When the "punch list" has been reviewed, the Architect will arrange a meeting with the Contractor and Subcontractors to identify and explain all "punch list" items, and answer questions on the work which must be done before final acceptance.

G. When the Contractor gives notice that the punch list has been completed, the Architect will inspect that portion of the work and, if the items are found to be satisfactorily completed, advise the Contractor accordingly.

H. The General Contractor shall correct all "punch list" items or shall cause the correction of the "punch list" items within a time frame to be established when the "punch list" is made. The time frame for the completion of "punch list" shall not exceed the completion date of the Contract. Should the "punch list" not be completed within the specified time frame, the Owner may invoke the rights given under General Conditions.

1.04 CLOSEOUT REQUIREMENTS AND SUBMITTALS

A. Final Inspection: The General Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents and has satisfied the local authorities having jurisdiction.
2. Project is completed, and ready for final inspection.

B. Closeout Documents Required: The General Contractor shall provide all required documents as part of the Record Documents including but not limited to the following:

1. All permit inspection records.
2. All warranties required by the Contract Documents.
3. Certificate of Occupancy from authorities having jurisdiction.
4. Equipment test reports.
5. Operation and Maintenance Manuals including Spare Parts list and related items.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 02070

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Selectively demolish and remove materials, systems, equipment, and structures indicated on the Drawings and specified herein as required to construct work indicated.

B. Selective demolition shall include, but not be limited to the following:

1. Selective demolition including removal of ceilings, flooring. and finishes and selective demolition work associated with renovation work as per the Contract Documents.
2. Selective demolition including removal and salvaging of existing ceiling hung projector associated with renovation work as per the Contract Documents. Projector will be relocated following renovation work; coordinate electrical power supply with Electrical Trade.
3. Selective demolition associated with sprinkler system modifications, plumbing modifications, HVAC modifications, and electrical modifications as per the Contract Documents; coordinate disconnecting of equipment with the work of Division 15 - MECHANICAL and Division 16 - ELECTRICAL.
4. All other selective demolition work required to construct the work.

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 01045, CUTTING AND PATCHING.
2. Division 15 – MECHANICAL; Make safe mechanical equipment to be removed or relocated.
3. Division 16 – ELECTRICAL; Make safe electrical equipment to be removed or relocated.

1.03 SUBMITTALS

A. The following shall be submitted:

1. Permit for transport and legal disposal off-site of demolition material and debris.
2. Selective demolition procedures and operational sequence for review and acceptance by the Owner and Architect.

1.04 JOB CONDITIONS

A. Occupancy: Areas adjacent to where selective demolition occurs will be occupied prior to and following commencement of demolition. Comply with Owner requirements regarding maintenance of existing facilities and working conditions. Provide barriers that will minimize the spread of dust, debris, and other materials and as necessary to prevent damage to adjacent areas of the building. Provide for the safe passage of School and Town employees and visitors. Where existing finishes are to remain, provide adequate protection to prevent damage.

B. Condition of Items and Structures: The Owner assumes no responsibility for the actual condition of items and structures to be demolished.

C. Partial Demolition and Removal: Items indicated to be removed but having salvage value to the Owner may be removed from the building as work progresses. Transport items from site as they are removed. Sale or storage of items by the Contractor at the site will not be permitted.

1.05 PROTECTION

A. Do not interfere with use of adjacent occupied spaces. Maintain free and safe passage to and from. Provide safe passage for all users of building. Specific requirements regarding work areas and maintenance of egress will be of primary importance.

B. Prevent movement or settlement of adjacent structures. Provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for such movement, settlement, damage, or injury.

C. Cease operations and notify Owner and Architect immediately if safety of adjacent facilities or structures appears to be endangered. Take precautions to properly support structures. Do not resume operations until safety is restored.

D. Temporary Protections: Provide temporary barricades and other forms of protection as required to for protection of personnel from injury due to selective demolition operations.

1. Protect existing finish work that is to remain from damage from demolition operations.
2. Construct temporary dustproof and insulated partitions where required to separate areas where noisy and dusty operations are performed.
3. Remove temporary protections at completion of the work.
4. Comply with applicable requirements specified in Section 01500, CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

E. Utility Services: Maintain existing utilities serving occupied or used facilities and other areas occupied by the Owner. Any interruptions to service shall be coordinated with the Owner so as to minimize disruption of building services, Owner’s daily operations, and related services.

PART 2 - PRODUCTS

2.01 SALVAGING

A. Materials indicated on the Drawings or designated in the field by the Owner to be salvaged shall be carefully removed and delivered to the Owner at locations determined by Owner.

B. Mechanical and electrical items to be salvaged shall be protected from the weather.

C. Salvaged items shall include the following:

1. Ceiling hung projector including supports.
2. Equipment in Foods Program Room as scheduled.
3. All other materials and equipment indicated.

PART 3 - EXECUTION

3.01 INSPECTION

A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Note or photograph existing conditions which could be misconstrued as damaged resulting from selective demolition work.

3.02 PREPARATION

A. Cover and protect existing finishes, fixtures, and equipment to remain. Protect from soiling, dust, or damage during demolition work.

B. Erect and maintain dust and noise proof partitions as required to separate occupied areas from work areas.

C. Locate, identify, stub-off, and disconnect utility services that are indicated not to remain. Provide by-pass services as necessary to maintain continuity of service to occupied areas.

3.03 SELECTIVE DEMOLITION

A. Perform selective demolition work in a systematic manner. Items indicated to be removed shall be completely removed.

B. Remove debris from site and dispose of legally.

3.04 SALVAGE MATERIALS

A. Where items are indicated to be salvaged, carefully remove indicated items, clean items, and deliver to storage area designated by the Owner.

B. The Owner reserves the right to identify salvage of materials which are removed should the Owner wish to retain these removed items for Owner’s use.

3.05 DISPOSAL OF MATERIALS

A. Material resulting from selective demolition and not identified for salvaging shall become the property of the Contractor and shall be legally transported and disposed of off-site.

B. Disposal shall be performed as promptly as possible and not left until the final clean up.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes. Work shall include all work associated with the following:

1. Concrete fill for trenched areas and cutouts at slab on grade.
2. All other concrete work indicated on the Drawings.

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 03910, CONCRETE REPAIR.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.04 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Curing materials.

F. Minutes of preinstallation conference.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Except as otherwise indicated, all concrete testing will be provided by the General Contractor per the CONDITIONS OF THE CONTRACT.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

F. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01040, COORDINATION.

1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Concrete subcontractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Avoid damaging coatings on steel reinforcement.
2. Repair damaged epoxy coatings on steel reinforcement according to ASTM D 3963.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1, or better.
b. Medium-density overlay, Class 1, or better, mill-release agent treated and edge sealed.
c. Structural 1, B-B, or better, mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

A. Steel Bar Mats: ASTM A 184, assembled with clips.

B. Steel Reinforcement: ASTM A 615, Grade 60 (Grade 420), deformed bars.

C. Deformed-Steel Wire: ASTM A 496.

D. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

2.03 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

2.04 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II.

B. Blended Hydraulic Cement: ASTM C 595, Type IP, Portland-pozzolan cement.

C. Silica Fume: ASTM C 1240, amorphous silica.

D. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 3M.
2. Nominal Maximum Aggregate Size: 3/4 inch (19 mm).
3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3-mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3 mm).

E. Water: Potable and complying with ASTM C 94.

2.05 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.06 READY-MIXED CONCRETE

A. Cement: Portland cement meeting ASTM C 150, Type I or II and ASTM C 94 supplied from an approved concrete plant.

1. Hand mixing shall not be allowed except as specifically authorized by the Architect.

B. Prepare design mixes for each type and strength of concrete as follows:

1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
2. Compressive Strength (28 days): 4,000 psi, minimum.
3. Maximum Slump: 4 inches.

C. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.0 percent, unless otherwise indicated:

1. Air Content: 5 percent for 3/4-inch- nominal maximum aggregate size.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.07 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.08 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.09 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116 and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3 mm).

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Chamfer exterior corners and edges of permanently exposed concrete. (Coordinate all locations with Architect.)

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

3.03 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. 28-day design compressive strength.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.05 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.

C. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.

D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

E. Deposit and consolidate concrete work in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed concrete surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 FINISHING

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with waterproofing.

C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor

D. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

E. Broom Finish: Apply a broom finish to exterior concrete platforms and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.07 MISCELLANEOUS CONCRETE ITEMS

A. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.08 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

3.09 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor to engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.6. Comprehensive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.

    a. Test two field-cured specimens at 7 days and two at 28 days.
    b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

H. Concrete Test Specimens Storage: Provide and maintain adequate facilities on-site for safe storage and initial curing of concrete test specimens per ASTM C 31 and ACI 301.

END OF SECTION

SECTION 03910

CONCRETE REPAIR

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. This Section includes the following:

1. Removal of deteriorated concrete and subsequent patching and rebuilding.
2. Patching of concrete surfaces where patching or repair is required as a result of renovations.

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 01045, CUTTING AND PATCHING.
2. Section 02070, SELECTIVE DEMOLITION.
3. Section 03920, SHOTBLASTING OF CONCRETE FLOORS.
4. Section 04520, MASONRY REPAIR.

1.03 SUBMITTALS

A. Product Data: Include material descriptions, chemical composition, physical properties, test data, and mixing and application instructions.

1. Include Material Safety Data Sheets, if applicable.

B. Samples: Cured samples of patching materials.

C. Product Certificates: Signed by manufacturers certifying that products furnished comply with requirements and are recommended by manufacturer for uses indicated.

D. Qualification Data: For installers to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of bonding agents with requirements indicated.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: In addition to other requirements in Division 1 Section "Quality Requirements," retain installers that employ workers trained and approved by manufacturer to apply concrete patching and rebuilding materials.

B. Manufacturer Qualifications: In addition to other requirements in Division 1 Section "Quality Requirements," manufacturers shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

C. Mockups: Build mockups for concrete removal and patching to demonstrate qualities of materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

C. Store cementitious materials off the ground, under cover, and in a dry location.

D. Store aggregates covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

1.06 PROJECT CONDITIONS

A. Cold-Weather Requirements for Cementitious Materials: Do not apply unless air temperature is between 40 and 90 deg F (5 and 32 deg C) and will remain so for at least 48 hours after completion of Work.

B. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of 90 deg F (32 deg C) and above.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Latex Bonding Agent, Type II:

a. Dayton Superior Corporation; Day-Chem Ad Bond (J-40).
b. Euclid Chemical Company; FLEX-CON.
c. Kaufman Products, Inc.; SureBond.
d. Sonneborn, Div. of ChemRex, Inc.; Acrylic Additive.

2. Cementitious Patching Mortar:

   a. Fosroc International Limited; Renderoc LA.
   b. Kaufman Products, Inc.; HiCap.
   c. Master Builders, Inc.; EMACO S66 CI, EMACO S77 CI, or EMACO S88 CI.
   d. Sika Corporation; SikaRepair 223 or SikaRepair SHB.

2.02 BONDING AGENTS

A. Latex Bonding Agent: ASTM C 1059, Type II at exterior locations and where indicated, Type I at other locations.

2.03 PATCHING MORTAR

A. Patching Mortar: Unless otherwise indicated, use one of the following:

1. Polymer-Modified, Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928, that contains a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.

2.04 MIXES

A. Mix products in clean containers according to manufacturer's written instructions.

1. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.
2. Do not add water, thinners, or additives unless recommended by manufacturer.
3. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
4. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Notify Architect seven (7) days in advance of dates when areas of delaminated concrete and reinforcing bars will be located.

B. Locate areas of delamination using hammer or chain drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries of delaminated areas as directed by Architect.

3.02 PREPARATION

A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.

1. Erect temporary protective covers over pedestrian walkways and at points of entrance and exit for people and vehicles that must remain in operation during course of concrete rehabilitation work. Construct covers of tightly fitted, 3/4-inch (19-mm) exterior-grade plywood supported at 16 inches (405 mm) o.c. and covered with asphalt roll roofing.

2. Protect adjacent equipment and surfaces by covering them with heavy polyethylene film and waterproof masking tape. If practical, remove items, store, and reinstall after potentially damaging operations are complete.

B. Concrete Removal: Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch (12.7 mm). Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcing. Remove loose and deteriorated concrete by breaking up and dislodging from reinforcing.

1. Remove concrete between cuts to a depth of at least 1/2 inch (12.7 mm).
2. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide at least a 3/4-inch (19-mm) clearance.
3. Test areas where concrete has been removed by tapping with hammer and remove additional concrete until unsound concrete is completely removed.
4. Provide fractured aggregate surfaces with a profile of at least 1/8 inch (3 mm) that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level.
5. Thoroughly clean removal areas of loose concrete, dust, and debris.

3.03 APPLICATION

A. Latex Bonding Agent, Type II: Mix with Portland cement and scrub into concrete surface according to manufacturer's written instructions. If bonding agent dries, recoat before placing patching mortar or concrete.

B. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar or concrete.

C. Mortar Scrub-Coat: Dampen repair area and surrounding concrete 6 inches (150 mm) beyond repair area. Remove standing water and apply scrub-coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub-coat dries, recoat before applying patching mortar or concrete.

D. Patching Mortar: Unless otherwise recommended by manufacturer, apply as follows:

1. Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
2. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
3. For vertical patching, place material in lifts of not more than 2 inches (50 mm) nor less than 1/4 inch (6 mm). Do not feather edge.
4. After each lift is placed, consolidate material and screed surface.
5. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
6. Allow surfaces of lifts that are to remain exposed to become firm and then finish to a smooth surface with a wood or sponge float.
7. Wet-cure cementitious patching materials, including polymer-modified, cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.

E. Concrete: Place concrete as follows:

1. Apply latex bonding agent to concrete substrate.

2. Use vibrators to consolidate concrete as it is placed.
3. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.
4. Where indicated place concrete by form and pump method.

    a. Design and construct forms to resist pumping pressure in addition to weight of wet concrete. Seal joints and seams in forms and junctions of forms with existing concrete.
    b. Pump concrete into place, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to 14 psi (96 kPa).

5. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
6. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to sample materials and perform tests specified as follows:

1. Patching Mortar, Packaged Mixes: Three (3) randomly selected samples tested according to ASTM C 928.
2. Patching Mortar, Field Mixed: Three (3) randomly selected samples tested for compressive strength according to ASTM C 109.

END OF SECTION

SECTION 03920

SHOTBLASTING OF CONCRETE FLOORS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Shotblasting of concrete floor as preparation for new resilient flooring.
2. Extent of shotblasting shall be the floor area which is scheduled to receive new flooring.

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 02070, SELECTIVE DEMOLITION.
2. Section 03300, CAST-IN-PLACE CONCRETE.
3. Section 03910, CONCRETE REPAIR.
4. Section 09650, RESILIENT FLOORING AND BASE; Resilient flooring.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete floor toppings.

D. Minutes of pre-installation conference.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

B. Preinstallation Conference: Conduct conference at Project site to comply with the requirements in Division 1.

C. Comply with specified ICRI Technical Guideline as specified below.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete floor topping performance.

B. Close areas to traffic during shotblasting of floors.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for conditions affecting performance of concrete floor preparation.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of 1/4 inch.

3.03 CONCRETE SURFACE PREPARATION GUIDELINES

A. The International Concrete Repair Institute (ICRI) has created a Technical Guideline #03732, “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.”

B. This guideline provides concrete surface profiles of CSP 3 through CSP 9 (CSP 3, CSP 4, CSP 5, CSP 6, CSP 7, CSP 8, and CSP 9) which are used under the following conditions.

1. For coating applications from 4–5 mils in thickness, the surface profile shall be a CSP 3. This is known as a light shotblast.
2. For coating applications from 15–50 mils in thickness, the surface profile shall be a CSP 4 or CSP 5. This is known as a medium shotblast.
3. For coating applications from 40 mils to 1⁄8 inch in thickness, the surface profile shall be a CSP 5 or CSP 6. This is known as a medium-heavy shotblast.
4. For topping applications from 1/4 inch to 1/2 inch, the surface profile shall be a CSP 6 or CSP 7. This is known as a heavy shotblast.
5. For concrete overlays greater than 1/2 inch, the surface profile shall be a CSP 8 or CSP 9. This is known as an extreme shotblast.

END OF SECTION

SECTION 04520

MASONRY REPAIR

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Provide all labor, materials, and equipment necessary to complete the masonry restoration work including, but not limited to the following:

1. Masonry work including rebuilding of masonry where indicated.
2. Masonry patching and masonry repointing as indicated or as required to construct the renovations.

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 01045, CUTTING AND PATCHING.
2. Section 02070, SELECTIVE DEMOLITION.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

B. Samples for Verification: Before erecting mockup, submit samples of the following:

1. Each type of masonry unit to be used for replacing existing units.
2. Each type of sand used for pointing mortar.
    a. For blended sands, provide samples of each component and blend.
    b. Identify sources, both supplier and quarry, of each type of sand.
3. Each type of pointing mortar in the form of sample mortar strips, 6 inches (150 mm) long by 1/2 inch (13 mm) wide, set in aluminum or plastic channels.
    a. Include with each sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
4. Each type of masonry patching compound in the form of briquettes, at least 3 inches (75 mm) long by 1-1/2 inches (38 mm) wide. Document each sample with manufacturer and stock number or other information necessary to order additional material.

C. Qualification Data: For masonry repair subcontractor.

1.04 QUALITY ASSURANCE

A. Source: For each type of material required by work of this section, provide primary materials which are products of a single manufacturer. Provide secondary materials which are acceptable to manufacturers of primary materials.

B. Codes: Comply with Massachusetts State Building Code and ACI 530 and ACI 530.1.

C. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

D. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.05 PROJECT CONDITIONS

A. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain splashed mud and mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

B. Loading: Do not apply loads until work has set and cured and is ready to accept loads.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered, stored, and handled fully protected from wetting, staining, chipping, and other damage. Store masonry materials on raised timber or platforms, above ground, under weathertight covers or indoors, and kept clean and dry.

B. Deliver and store cement, lime, and other perishable materials in their original containers, plainly marked with brand name and manufacturer's name, indoors or in weathertight sheds.

C. Protect metal accessories and reinforcement from elements. Immediately before placing, remove loose rust, dirt, and other foreign materials.

PART 2 - PRODUCTS

2.01 MASONRY MATERIALS

A. Masonry Units and Accessories: Provide masonry units and accessories where required to complete masonry repair work.

1. Provide units with colors, surface texture, size, and shape to match existing masonry work and with physical properties not less than those determined from preconstruction testing of selected existing units.

2.02 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144, unless otherwise indicated.

1. Color: Provide natural sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
2. For pointing mortar, provide sand with rounded edges.
3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands, if necessary, to achieve suitable match.

D. Water: Potable.

2.03 CLEANING MATERIALS

A. Water for Cleaning: Potable.

B. Hot Water: Heat water to a temperature of 140 to 160 deg F (60 to 71 deg C).

2.04 MISCELLANEOUS MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry, is vapor- and water permeable, exhibits low shrinkage, and develops high bond strength to all types of masonry.

1. Formulate patching compound used for patching masonry to match masonry being patched.

2.05 MORTAR MIXES

A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C 5 and manufacturer's written instructions.

B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

C. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

D. Rebuilding (Setting) Mortar: Same as repointing mortar.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.02 MASONRY CONSTRUCTION, GENERAL

A. Masonry work shall be done by skilled masons, fully instructed as to requirements of this specification, and adequately supervised during work.

B. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

C. Lay masonry plumb, true to line, and with level courses, with straight, clean, uniform joints, and true surfaces, and plumb corners. Maintain vertical alignment of joints as required by bond patterns indicated. Align horizontal joints with tops of openings, as indicated. Lay units in solid partitions to provide same evenness of surface on each side.

D. Adjust each masonry unit in final position while mortar is still soft and plastic. Remove units disturbed after mortar has stiffened and re-lay with fresh mortar.

E. Provide chases, slots, and recesses as required to accommodate work of other trades. Close only after such work has been installed, tested, and approved. As work progresses, set anchors, bolts, frames, and work of other Sections required to be built into masonry. No cutting and patching of completed masonry work will be permitted except as approved by Architect.

F. Maintain masonry clean as work progresses. Exercise extreme care at exposed work to prevent smearing or staining with mortar.

G. At completion of work cut out and repoint holes and defective joints, leaving entire work free of blemishes.

3.03 MASONRY WORK

A. Lay concrete masonry units in "Running Bond" pattern unless otherwise indicated. Finish height of each course of block (unit plus one joint) shall be 8 in. Construct concrete masonry unit work to conform to approved mock-up panels.

B. Use full mortar bedding when laying starting courses, courses in load-bearing walls, and courses of fire-resistive walls. Use face shell bedding when laying other courses. Fully butter shells of vertical joints. Fully mortar webs and face shells at masonry ties and anchors. Strike joints flush with exposed faces of block when units are laid, and then finish as specified below.

C. Cutting of exposed units shall be done with a dry, motor-driven carborundum blade to insure straight, even cut edges. Cutting by hand or wet cutting will not be permitted. Drill and cut holes, chases, notches, and other penetrations with power tools.

D. Where anchor plates, anchors, bolts, and other metal items are embedded in concrete unit masonry, provide screening in joint below to prevent mortar from dropping through voids.

E. When mortar at exposed joints of masonry units has become partially set and will make a thumb-print under pressure without displacement of mortar, tool joints to a glassy-hard, smooth, concave finish using 1 in. diameter stainless steel sled jointer.

1. At concealed work, strike joints flush and do not finish.

3.04 MASONRY PATCHING

A. Patch the following masonry units:

1. Units with holes.
2. Units with chipped edges or corners.
3. Units with small areas of deep deterioration.

B. Patching Masonry:

1. Remove loose material from surface. Remove additional material so patch will not have feathered edges and will be at least 1/4 inch (6 mm) thick, but not less than recommended by patching compound manufacturer.
2. Mask or remove surrounding mortar joints if patch will extend to edge of masonry unit.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 mm) thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surface plane of surrounding masonry. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry.
8. Keep each layer damp for 72 hours or until patching compound has set.

3.05 REPOINTING MASONRY

A. Rake out and repoint mortar joints to the following extent:

1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch (6 mm) by a knife blade 0.027 inch (0.7 mm) thick.
4. Joints where they sound hollow when tapped by metal object.
5. Joints where they are worn back 1/4 inch (6 mm) or more from surface.
6. Joints where they are deteriorated to point that mortar can be easily removed by hand.
7. Joints, other than those indicated as sealant-filled joints, where they have been filled with substances other than mortar.
8. Do not rake out and repoint joints where not required.

B. Rake out joints as follows:

1. Remove mortar from joints to depth of 2-1/2 times joint width, but not less than 1/2 inch (13 mm) or not less than that required to expose sound, unweathered mortar.

2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
4. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and mallet. Strictly adhere to written quality-control program. Quality-control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.
5. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

C. Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so that at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch (9 mm). Fully compact each layer and allow mortar to become thumbprint hard before applying next layer. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.

END OF SECTION

SECTION 05400

LIGHT GAGE STEEL FRAMING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. The work of this Section includes, but is not limited to, the following:

1. Engineering and providing complete light gage steel framing and support systems including, but not limited to, load bearing walls, posts, joists, beams, lintels, and bracing.
2. Engineering and providing all connections, anchors, bracing, and accessories to interconnect the light gage steel framing assemblies and to connect and attach light gage steel framing and support systems to other building structural systems.

1.02 RELATED WORK

A. Carefully examine all of the Contract Documents for requirements which affect the work of this Section. Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:

1. Section 05500, METAL FABRICATIONS.
2. Section 06100, ROUGH CARPENTRY.

1.03 INTENT

A. A major intent of this section is to provide a structural interior load-bearing framing system.

1.04 QUALITY ASSURANCE

A. Source: For each type of material required for the work of this Section, provide primary materials which are the products of one manufacturer. Provide secondary materials which are acceptable to the manufacturers of the primary materials.

B. Structural Performance Requirements: Structurally design, engineer, and provide a complete steel framing and support system with deflection limited as follows under the full inward and outward lateral loads and, for soffits and ceilings, the full upward and downward loads prescribed by Building Codes for this building location or for loads indicated in Contract Documents, whichever is greater. Engineer all connections between light gage framing components and between light gage framing assemblies and building structure.

1. Deflection Limit for Interior Loadbearing Framing: L/360.

C. Welding: For situations where welding is permitted, employ only experienced welders who are certified in compliance with AWS "Standard Qualification Procedures", latest edition. Weld in compliance with AWS "Structural Welding code, Sheet Steel", latest edition.

D. Engineering: Provide the services of a Professional Engineer, registered in Massachusetts to design, engineer, and assume professional responsibility for the complete light gage steel framing system, and to certify that the work of this Section meets or exceeds the performance requirements specified in this Section.

E. Reference Standard: Compute structural properties of framing members in compliance with AISI "Specifications for the Design of Cold-Formed Structural Members", latest edition.

F. Fire-Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance rating has been tested in compliance with ASTM E119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each system component. Provide certifications stating that materials comply with requirements.

B. Shop Drawings: Provide shop drawings for fabrication, installation and erection of all parts of the work and show spacing, size, gage and thickness of all system components. Provide elevations, sections, and details of deflection accommodation, supports, anchorages, connections, cross-bracing, bridging, kick-backs, additional framing at openings, and accessory items. Show size, type, and spacing of anchors, fasteners and connections between light gage framing assemblies and building structure. Show location, size, and type of each weld.

1. Professional Seal Required: Provide shop drawings professionally prepared, stamped, signed, and sealed by a Professional Engineer, registered in Massachusetts.
2. Calculations: Provide professionally prepared and sealed calculations and certification of the performance of this work. Show how design load requirements and other performance requirements have been satisfied.

1.06 TESTING AND INSPECTION

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 Owner and paid directly by the Owner. Structural tests and inspections shall be in accordance with Chapter 17 of the Massachusetts State Building Code, 9th edition.

B. However, such inspection, wherever conducted, shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract requirements, or shall inspector's acceptance of materials or workmanship prevent later rejection of same by the Owner or Architect if defects are discovered.

C. Inspection of welding work shall consist of non-destructive spot testing done by radiographic, magnetic, magnetic particle or ultrasonic method, whichever is most effective for joint to be tested.

D. The Contractor shall give proper notice to the Owner's inspectors and/or testing agencies and shall allow access and full facilities as required for this inspection.

E. Regardless of any testing done by the Owner, the Contractor is responsible for completing the metal decking work in complete compliance with these Specifications.

F. Report in writing to the Architect the results of the Contractor's inspection.

G. When the Contractor is satisfied that the work is satisfactorily completed, notify the Testing Engineer, who will be retained by the Owner, to verify that the work complies with these Specifications.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage. Sequence deliveries to avoid delays but minimize on-site storage.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS

A. Acceptable Manufacturers: Provide materials and products which meet or exceed the requirements of these specifications from one of the following manufacturers:

1. Marino/Ware Division, Ware Industries, Inc., South Plainfield, NJ, 800-627-4661.
2. Dietrich-Clark Steel Framing Systems, S.O.S., Inc., Cincinnati, OH, 800-543-7140.
3. Dale/Incor Industries, Dearborn, MI, 800-882-STUD, 313-846-9400.
4. Unimast Incorporated, Franklin Park, IL, 800-524-0712, 800-969-4110.

B. Light Gage Steel Framing and Supports: Provide studs, runners, special heavier gage and taller deflection runners, bracing, and all other framing members indicated and needed.

1. Steel Standard: ASTM A653, Structural Quality [formerly ASTM A446]. Fabricate members from minimum 50 ksi yield strength steel for framing members 16 gage and heavier and from minimum 33 ksi yield strength steel for 18 gage and lighter elements. Provide higher yield strength steel as required by engineering for this project.
2. Corrosion Protection: Provide hot-dip galvanized ASTM A924, G-60 [formerly ASTM A525].
3. Framing Member Depth: As indicated on the Drawings.
4. Framing Spacing: 16 inches on center maximum or as otherwise shown on the Drawings. Provide closer spacing if necessary to meet deflection constraint requirements.
5. Minimum Steel Gage: 16 U.S. Standard gage minimum or as otherwise shown on the Drawings. Provide heavier gage if necessary to meet deflection constraint requirements.

    a. This minimum gage is not only based on flexural performance of members, but also the minimum gage to accommodate masonry ties and other work.

6. Accessories: Provide light gage framing system manufacturer's standard components and accessories as needed for complete structural assemblies including, but not limited to, fasteners, clips, angles, anchors, shoes, ties, bracing, lintels, reinforcements, and other members and items. Provide ASTM A153 Class B2 or ASTM A924 G-90 hot-dip galvanized finish on all light gage accessories.
7. Angle Hangers: For suspending and bracing exterior ceilings and soffits, provide minimum 1-1/4 in. x 1-1/4 in. x 16 gage or heavier, hot-dip galvanized steel angles or other rigid hanger which can withstand compressive loads due to wind uplift.

C. Welding Electrodes: Comply with AWS D1.3.

D. Galvanized Touch-Up Paint: After fabrication, touch-up all galvanized surfaces with one of the following:

1. PPG Speedhide Galvanized Steel Paint.
2. ZRC Cold Galvanizing Compound.
3. Rust-Oleum Galvanized Metal Primer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pre-Installation Examination Required: The Installer shall examine previous work, related work, and conditions under which this work is to be performed and notify Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means Installer accepts substrates, previous work, and conditions.

B. Manufacturer's Instructions: Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

1. Welding: Do not weld any light gage framing member or component less than 16 gage. Use mechanical connections.

C. Framing Spanning Between Floors: Accurately align top and bottom runners and attach runners to building structure in strict compliance with manufacturer's recommendations and approved shop drawings. Space fasteners and connections into building structure at not over 16 in. on center at with fasteners at corners and ends, unless otherwise indicated on approved shop drawings. Accurately position, space, plumb, and anchor vertical framing [studs] to bottom runners by mechanically fastening with at least one low profile pan head screw in each stud flange [one each side of runner].

1. Openings: Frame wall openings with additional framing members at perimeter of openings as needed to meet structural performance requirements and to provide all framing members needed to support items such as windows, frames, and interior and exterior finishes. Always provide double studs and framing at entire perimeter of openings and penetrations.
2. Components and Accessories: Provide all components, connections and accessories needed to provide a complete structural system which meets specified performance requirements.
3. Coordination: Align factory provided holes in framing members or field punch framing members along the neutral axis to facilitate installation of electrical conduit, piping, and other work which must run through framing. Limit size and location of openings in framing members as recommended by framing system manufacturer and excellent engineering practice.
4. Horizontal Bracing: Provide continuous 1-1/2 in. deep 16 gage cold-rolled channel horizontal bracing within 12 in. of tops of vertical framing and 4 ft.-0 in. on centers (maximum) between. Connect bracing to each stud with mechanically fastened clip angles. Provide additional bridging and bracing as recommended by manufacturer, as necessary to meet performance requirements, and as indicated on approved shop drawings.
5. Perpendicular Bracing: Provide diagonal kick-back bracing perpendicular to plane of framing system and securely anchored to building structure as needed to create a complete structural system meeting specified performance requirements. Locate diagonal perpendicular bracing only where shown on approved shop drawings and coordination drawings; avoid conflicts with other systems including mechanical and electrical systems and interior finishes. Ensure that diagonal perpendicular bracing will be fully concealed by interior finishes.

D. Soffits and Ceilings: Suspend exterior ceilings and soffits with rigid steel studs or steel angle hangers spaced at not more than 4 feet on center in both directions and engineered to withstand all downward and upward loads. Space horizontal framing members supporting soffit finishes at not more than 16 in. on center. Design, connect and cross-brace system as necessary to withstand required uplift loading and all dead, live and seismic loads prescribed by codes.

E. Tolerances: The following allowable tolerances are allowable variations from locations and dimensions indicated by the Contract Documents and shall not be added to allowable tolerances indicated for other work.

1. Allowable Variation from True Plumb, Level & Line: ± 1/8" in 20'-0".
2. Allowable Variation from True Wall Thickness: ± 1/8" in 20'-0".
3. Allowable Variation from True Plane of Adjacent Surfaces: ± 1/8" in 10'-0".

F. Touch-Up: Touch-up accessible damaged steel coatings, including every screw penetration from sheathing attachment and from steel to steel attachment.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. The work of this Section includes, but is not limited to the following:

1. Counter supports.
2. Miscellaneous framing and supports for the following:
    a. Penetration framing.
    b. Framing, platforms, and supports for equipment.
3. Miscellaneous rough hardware.
4. All other metal fabrications indicated.

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 01045, CUTTING AND PATCHING.
2. Section 02070, SELECTIVE DEMOLITION.
3. Section 03300, CAST-IN-PLACE CONCRETE; Placing of inserts and anchors.
4. Section 04520, MASONRY REPAIR.
5. Section 05400, LIGHT GAGE STEEL FRAMING.
6. Section 06100, ROUGH CARPENTRY; Rough carpentry including wood framing, blocking, and hardware for rough carpentry work.
7. Section 09900, PAINTING; Field painting.
8. Division 15 - MECHANICAL and Division 16 - ELECTRICAL; Hangers, brackets, troughs, guards, and other steel items for support or protection of Mechanical and Electrical work.

1.03 SUBMITTALS

A. Shop Drawings: Submit shop drawings of work showing size and thickness of each member, type of material, method of connection and assembly. Show dimensions, clearances, anchorages, relationships to surrounding work, coatings, and other pertinent details of fabrication and installation.

1. Show profiles, reinforcing, fasteners, and any accessories.
2. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

B. Product Data: Provide manufacturer's product data, installation instructions, use limitations, and recommendations for each material used. Provide certifications that materials comply with requirements.

C. Calculations: Where installed metal fabrication work is indicated to comply with certain design loadings, provide professionally prepared calculations, material properties, certification, and other information required for structural analysis of performance of work.

D. Samples:

1. Provide samples of all finished metal fabrications. Samples shall be a minimum of 12 inch by 12 inch metal with the proposed final coating color.
2. Provide samples of all galvanized steel to be exposed to view. Samples shall demonstrate full range of densities for galvanized coating.

E. Mockups: After approval of shop drawings and before fabrication of metal fabrications, construct mockups as identified below to demonstrate aesthetic effects and qualities of materials and execution. Build mockup to comply with the following requirements, using materials indicated for the completed Work.

1. Locate on site in the location directed by the Architect.
2. Notify Architect 7 days in advance of the dates and times when mockup will be constructed.
3. Demonstrate all typical details.
4. Obtain Architect's approval of mockup before proceeding with fabrication of the remaining metal fabrications.
5. Maintain mockup during construction in an undisturbed condition as a standard for judging the completed Work.
6. When directed by the Architect, remove mockup from Project site.

1.04 QUALITY ASSURANCE

A. Engineering: Provide services of a professional engineer, registered in the State of Massachusetts to design and certify that work of this Section meets or exceeds performance requirements specified. Include design requirements for steel column supports, equipment supports, and all other items indicated.

B. Shop fabricate work to greatest extent possible. Label each piece in shop to facilitate field assembly.

C. Welding: Perform welding in conformance with AWS D1.1 and AWS D1.3, as applicable.

D. Exterior use and exterior applications, for the purposes of this Section, mean those materials or assemblies used in areas in exterior walls, roofs, foundations or exposed to weather. Interior use, for the purposes of this Section, means materials or assemblies in enclosed, conditioned spaces.

1.05 PRODUCT HANDLING AND STORAGE

A. Store work off ground and under cover. Protect from damage. Repair and clean work before erection.

1.06 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.07 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing metal fabrications to prevent buckling, opening of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

1. Provide products and materials of new stock, free from defects, and of best commercial quality for each intended purpose.

B. Steel Plates, Shapes, and Bars: ASTM A 36 or ASTM A 572.

C. Steel Tubing: ASTM A 500 or A 501, hot or cold rolled, as required for design loading.

D. Steel Pipe: ASTM A 53, schedule 40, Type S (seamless), black except where galvanized is indicated, Grade A for cold-bending.

E. Seamless Steel Pipe: ASTM A106B.

F. Steel Sheet: ASTM A 366, A 570, or A 611, grade required for design loading.

G. Iron Castings: ASTM A 47, or A 48, grade and class are manufacturer's options.

H. Bolts and Fasteners: ASTM A 307 and A 325.

I. Inserts: Threaded or wedge type, galvanized ferrous castings; either ASTM A 47 malleable iron, or ASTM A 27 cast steel. Provide threaded inserts and wedge inserts manufactured by one of the following or Architect approved equal:

1. Hohmann and Barnard.
2. Gateway Erections, Inc.
3. Richmond Screw Anchor Co.

J. Provide anchors, bolts, sockets, sleeves, and other parts required for securing each item of work to other construction. Furnish anchors, bolts, and other items required to be built-into masonry.

1. Anchor bolts, bolts smaller than 5/8 in., and fasteners shall be steel castings conforming to ASTM A 307. Bolts larger than 5/8 in. shall conform to ASTM A 325.

K. Provide exposed fastenings of same material and finish as metal to which applied, unless otherwise noted.

L. Welding Rods: Conform to AWS Standards and recommendations of welding rod manufacturer.

M. Grout for Interior Applications: Pre-mixed, non-staining, non-corrosive, non-shrink, non-metallic complying with CE CRD-C-621, Type D.

N. Grout for Exterior Applications: Provide Factory-packaged, non-shrink, non-staining, hydraulic controlled expansion cement formulation for mixing with water at project site. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating. Provide Super Por-Rok, Anchoring Cement, manufactured by CGM Building Products or equal as approved by Architect.

2.02 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electro-deposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Expansion Anchors: Anchor bolt and sleeve assembly of material shown below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2.03 FABRICATION - GENERAL

A. Fabricate work of this Section to be straight, plumb, level and square, and to sizes, shapes and profiles indicated on approved shop drawings. Ease exposed edges. Cut, reinforce, drill and tap metal work as required for proper assembly.

1. Fabricate miscellaneous supports, brackets, braces and the like required to fully complete the work.
2. Obtain loading requirements from suppliers of work to be supported. Design and support systems with a safety factor of at least 6 unless otherwise indicated.
3. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

    a. Temperature Change (Range): plus or minus 50 degrees F, total range 100 degrees F.

4. Shear and punch metals accurately. Remove burrs.
5. Ease exposed edges to a radius of approximately 1/32 in., unless indicated otherwise. Form bent corners to smallest radius possible without causing grain separation or impairing work.
6. Remove sharp or rough areas on exposed traffic surfaces.
7. Weld seams continuously. Spot welding is permitted for temporary welding only.
8. Weld corners and seams continuously to comply with the following:

    a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    b. Obtain fusion without undercut or overlap.

c. Remove welding flux immediately.
d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

B. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

C. Provide for anchorage of type shown; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support required loads.

D. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

E. Cut, reinforce, drill, and tap metal fabrications as shown to receive finish hardware, screws, and similar items.

F. Fabricate joints that will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

G. Work Exposed to View: For work exposed to view, select materials with special care. Provide materials which are smooth and free of blemishes such as pits, roller marks, trade names, scale and roughness. Fabricate work with uniform hairline joints. Form welded joints and seams continuously. Grind welds flush to be smooth after painting. For exposed fasteners, use hex head bolts or Phillips head machine screws.

H. Engineered Framing System: Provide Unistrut Channel and Tube Type Framing System, manufactured by Unistrut Corporation, or approved equal. Provide this system for various framing and support systems, as indicated.

I. Partition Support Fabrication: Fabricate support system to carry the entire load of the partition to the structure above. Do not transfer any loads to the ceiling systems.

J. Counter Supports: Raks premanufactured counter support brackets, manufactured by Rakks/Rangine Corporation, as indicated.

1. Type 1 - Raks Model EH-1818: For counter up to 25 in. deep, brackets should be screwed into blocking or studs at a maximum spacing of 48 inches. 2 in. wide mounting surface provides extra support where counter sections join.
2. Type 2 - Raks Model EH-1824: Used to support up to 30 in. deep counters. These lightweight and easy-to-ship brackets are manufactured from 2 in. x 3 in. ‘T’ to provide maximum stiffness. When the 24 in. leg is against the wall, this bracket can also be used to support 24 in. deep counters.

K. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

1. Extruded Structural Pipe: ASTM B 429, Alloy 6063-T6.
2. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
3. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.
4. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.

L. Miscellaneous Framing and Supports: Fabricate miscellaneous framing and supports to adequately support live and dead loads with a safety factor of 5. Provide necessary anchors, inserts, and fasteners. Fabricate support system to carry entire load of work being supported to structure above. Do not transfer any loads to ceiling systems.

1. Cut, drill, and tap units to receive hardware, hangers and similar items.
2. Coordinate loading and attachment requirements for miscellaneous framing and supports with manufacturers of items being supported.

2.04 FINISHING FERROUS METAL SURFACES

A. Shop Primer for Ferrous Metal Not Indicated to Be Galvanized: Fast-curing, lead- and chromate-free, zinc rich primer, Tnemec Zinc-Rich Primer 90-97 at 3.0 to 3.5 mils dry film thickness or equal, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems shown, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

1. Surface preparation for shop coating shall be SSPC SP 6.

B. Bituminous Paint: Bituminous-based paint for electrolytic isolation shall be cold applied black asphaltic mastic conforming to SSPC Paint 12, with no asbestos fibers.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorage devices, setting drawings, diagrams, templates, instructions, and directions for installation of concrete inserts, sleeves, anchor bolts, and miscellaneous items to be embedded or attached to concrete work, masonry work, or structural steel work.

3.02 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners necessary for securing work of this Section to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors required.

1. Number and sizes of washers at each bolted connection appearing in the finished work shall be subject to review and approval by Architect.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Erect work square, plumb and true, accurately fitted, and with tight joints and intersections. All anchors, inserts and other members to be set in concrete or masonry shall be furnished loose by this trade to be built-into concrete and masonry by those trades. Avoid field cutting or drilling to greatest extent possible.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
5. Needle gun surfaces of welded connections which will be painted to restore surface profile.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

H. Field Welding: Comply with AWS D1.1 for procedures of manual metal-arc welding, appearance and quality of welds, and correction methods for defective welds.

I. Where members other than expansion bolts or inserts are fastened into concrete, set such members in proprietary-type expanding grout manufactured specifically for such purpose. Use grouts strictly in accordance with manufacturer's directions. Form to receive members with galvanized metal sleeves, or other approved method to provide at least 1/2 in. clearance around entire perimeter. At exposed applications, hold expanding grout back 1/2 in. from finish surface and fill voids with Portland cement grout to match color and texture of surrounding concrete surface.

J. Electrolytic Isolation: Where dissimilar metals are to come into contact with one another, isolate by application of a heavy coating of bituminous paint on contact surfaces in addition to shop coat specified above. Do not permit the bituminous paint in any way to remain on surfaces to be exposed or to receive sealant.

3.03 INSTALLATION

A. Equipment Supports: Install Unistrut supports for various equipment items as indicated.

B. Partition Supports: Fabricate and install steel support channels and brackets above suspended ceilings where required to support partitions and door assemblies.

C. Counter Supports: Secure support brackets to concealed blocking to withstand loads specified.

D. Miscellaneous Items: Carefully review Drawings for miscellaneous metal items required by various trades but not specifically listed above, such as miscellaneous clip angles, miscellaneous steel bracketing, bracing, supports, and other miscellaneous metal items as indicated on Drawings, reasonably implied therefrom, or reasonably necessary for thorough completion of work.

3.04 REPAIRING, CLEANING, AND PROTECTION

A. Touch-Up and Repair: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas.

1. At galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780. Galvanizing repair paint shall have 65 percent zinc by weight, ZiRP by Duncan Galvanizing, or Tnemec 90-97 Zinc-Rich Primer. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A 123 or ASTM A 153, as applicable. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, or aluminum paints shall not be acceptable.

2. At factory-primed surfaces, touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 ft.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Provide all rough carpentry work, as indicated on the Drawings and as specified herein. Rough carpentry shall include but not be limited to:

1. Rough carpentry framing, sleepers, blockings, curbs, cants, edgings, grounds, nailers, furring, strapping, sheathing, etc., required for all trades.
2. Blocking for all interior trim, millwork, building specialties and accessories, cabinets, and related specialties.
3. Rough hardware, inserts, and related metal components, for work of this Section, except those items specifically specified to be provided by other trades.
4. Plywood backing panels for electrical and telephone work.
5. Wood preservative treatments and applications.
6. Building felts for work of this Section, and protective papers for finished floors.
7. Other usual items of normal rough carpentry work indicated on the Drawings or necessary for the proper completion of the Project, even though not specifically mentioned herein.
8. All rough carpentry work and materials not specified elsewhere, but which are implied by the Drawings and/or required for the work, shall be furnished under this Section, whether or not specifically described herein.

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 02070, SELECTIVE DEMOLTION.
2. Section 03300, CAST-IN-PLACE CONCRETE; Inserts and anchor bolt installation.
3. Section 05500, METAL FABRICATIONS.
4. Section 06200, FINISH CARPENTRY.
5. Section 09250, GYPSUM WALLBOARD AND ACCESSORIES.
6. Section 09900, PAINTING.
7. Division 15 - MECHANICAL.
8. Division 16 - ELECTRICAL.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements. Product data for the following products:

1. Engineered wood products.

2. Metal framing anchors.
3. Construction adhesives.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show all interfaces and relationships to work of other trades. Shop drawings showing location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcing specified in other Sections.
3. Apply WIC Certified Compliance Label to first page of shop drawings.

C. Certificates: Submit certificates of grading, treatment, and conformance to specified standards. Certifications shall state date of treatment, conformance with Specifications, and agency grading of wood.

D. Wood Treatment:

1. Submit wood-preservative-treatment data from chemical treatment manufacturer. Include certification of chemical solution and affirm that it complies with indicated treatment standard.
2. Submit fire-retardant-treatment data for material treated to reduce combustibility. Include certification by treating plant that treated materials comply with requirements.

E. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.

F. Verification Samples: Submit representative samples of each material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

G. Field Measurements: Take all necessary field measurements before preparation of shop drawings and fabrication to the greatest extent possible. Do not delay progress of the job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.

1.04 QUALITY ASSURANCE

A. Materials and workmanship shall conform to governing laws and building code.

B. Lumber and plywood shall bear the grade-trademark of the association under the rules or standards of which they were produced. Grade-trademarks shall conform to the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

1. Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.
2. Lumber shall bear the grade mark of an American Lumber Standards Committee, Board of Review-approved agency. Lumber shall conform to USDC PS 20.
3. Lumber shall bear a mark of mill identification.
4. Plywood shall comply with APA Design/Construction Guide, Residential and Commercial grading requirements, USDC PS 1, and ANSI A199.1.

C. Installer Qualifications: Arrange for exterior architectural woodwork installation by a firm that can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this Project.

D. Single-Source Responsibility for Fabrication and Installation: Engage a qualified woodworking firm to assume undivided responsibility for fabricating and installing woodwork specified in this Section.

E. Quality Standard: Except as otherwise indicated, comply with the following standard:

1. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grades of exterior architectural woodwork, construction, finishes, and other requirements.

a. Provide AWI Certification Labels or Certificates of Compliance indicating that woodwork meets requirements of grades specified.

2. Fasteners shall comply with CABO NER-272.

F. Fire-Test-Response Characteristics: Provide materials with the following fire-test-response characteristics as determined by testing identical products per ASTM test method indicated below by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify fire-retardant-treated material with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1. Surface-Burning Characteristics: Not exceeding values indicated below, when subjected to accelerated weathering test ASTM D 2898, Method A, and then tested per ASTM E 84 for 30 minutes with no evidence of significant combustion. In addition, the flame front shall not progress more than 10-1/2 feet (3.2 m) beyond the center line of the burner at any time during the test.

a. Flame Spread: 25.
b. Smoke Developed: 450.

1.05 COORDINATION

A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

B. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

1.06 PRODUCT DELIVERY AND STORAGE

A. Materials when delivered to site shall be stacked and stored above the ground under protective coverings or indoors in such manner as to insure proper drainage, ventilation, and protection. No kiln dried materials shall be placed in the building until concrete and masonry work have been completed and are sufficiently dry.

B. Rough carpentry materials shall be stored on elevated piles to allow for air circulation below and tipped in one direction to effectively drain moisture. Lumber shall be wrapped completely, including bottoms, in waterproof tarps. Tarps shall be tied down to protect against wind blow-off. Should delays in Project be anticipated, lumber shall be stored in covered storage trailers.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Obtain and comply with woodwork manufacturer's and Installer's coordinated advice for optimum temperature and humidity conditions for woodwork during its storage.

B. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions will permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

C. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verify locations of concealed framing, blocking, and reinforcements that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19%, by weight. Where exposed or semi-exposed, wood members shall be selected for best possible appearance from the grade of stock specified.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. WCLIB - West Coast Lumber Inspection Bureau.
4. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked 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.

1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

D. Lumber shall be surfaced four sides (S4S) and shall bear the grade and trademark of the association under whose rules it is produced, and a mark of mill identification.

E. Lumber shall be furnished in longest practical lengths with respect to each intended use, and single length pieces shall be used wherever possible.

2.02 LUMBER

A. Lumber shall be of sound stock, new, straight, of consistent size, free of stains and mildew, and kiln dried to a moisture content of not more than 19%, by weight. Where exposed or semi-exposed, wood members shall be selected for best possible appearance from the grade of stock specified.

1. Unless otherwise indicated, lumber for wood beams, joists, rafters, headers, stringers, plates, and sills, shall be Spruce-Pine-Fir, Grade #2 or Better, with a minimum tabulated allowable bending stress "Fb" = 875 psi (single use) and "Fb" = 1000 psi (repetitive use), and the Modulus of Elasticity "E" shall be at least 1,400,000 psi.
2. Wood studs shall be Eastern Hemlock, Eastern Spruce, or Hem-Fir, Graded "Stud" Grade, #2 or Better, wood studs, spaced 16 in. o.c., except as otherwise noted.

    a. Except as otherwise indicated, wood studs at exterior wall shall be 2 in. x 6 in.
    b. Except as otherwise indicated, wood studs at interior walls and partitions shall be 2 in. x 4 in.
    c. Except as otherwise indicated, window and door headers shall be 2 in. x 10 in. or 2 in. x 8 in., as indicated, constructed in accordance with Massachusetts State Building Code.
    d. Provide all diagonal or plywood bracing of corners and provide all wood blocking and firestopping required by Code.

2. Engineered wood products for construction shall include prefabricated wood I-joists, laminated veneer lumber (LVL) and parallel strand lumber (PSL). Engineered member sizes shall be as indicated on the Drawings and shall comply with all applicable codes.

    a. Laminated Veneer Lumber (LVL) for beams as indicated shall have a minimum "Fb" = 2850 psi; Modulus of Elasticity "E" shall be at least 2,000,000 psi; and "Fv" = 285 psi. LVL beams shall be "Paralam LVL" by Truss Joist MacMillan; Georgia Pacific G-P LAM LVL; or approved equal.

3. Built-up beams shall be fabricated of No. 2 Grade or better Douglas Fir or Dense Southern Yellow Pine with horizontal shear "Fv" not less than 95 psi.
4. Dimensioned lumber for floor joists shall be No. 2 Grade or better Hem-Fir or Spruce-Pine-Fir with a minimum extreme fiber stress in bending "Fb" not less than 1000 psi for repetitive members.

B. Plywood shall conform to the requirements of APA Design/Construction Guide, Residential and Commercial.

C. General Carpentry Material Schedule shall be as follows:

Item	Grade	Species
Structural joists and planks	No. 1 with "Fb" of 1200 psi or better	Southern Pine, Hem-Fir, or Douglas Fir
Lumber 2 in. nominal thickness or greater	No. 2 Structural or better	Hem-Fir or Spruce
Lumber less than 2 in. Nominal thickness	No. 2 Common	Hem-Fir or Spruce

Item	Grade	Species
Plywood, concealed	USDC PS 1, pressure treated APA C-C plugged, exterior glue	Group 1 Species
Plywood, exposed (including telephone electrical panels)	USDC PS 1, pressure treated APA A-C plugged, exterior glue	Group 1 Species

2.03 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: Comply with AWPA C2 (lumber) and AWPA C9 (plywood) and the following for woodwork items indicated to receive pressure preservative treatment. Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

1. Preservative Chemicals: Pressure-impregnate woodwork with preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
2. Pressure-treat above ground items with preservatives to a minimum retention of 0.25 lb./cu. ft. (4.0 kg/cu. m). Kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 and 15 percent.

B. Extent of Treatment: As indicated.

2.04 ROUGH HARDWARE

A. Provide all rough hardware required to complete this work and to attach this work in a secure and rigid manner to work of this and other trades, including all inserts, anchors, anchor bolts, lag bolts, screws, washers, nuts, nails, and other rough hardware. Assist other trades as necessary in the placement of inserts and anchor bolts in concrete and furnish full instructions regarding locations, sizes, and other requirements of the items in order that they may properly prepare their work to receive same. Rough hardware shall comply in all respects with requirements of the governing laws and codes.

B. Rough hardware items for use at roof framing, blocking, nailers, etc., and other exterior uses, and to be exposed in the finished interior work, shall be hot-dip galvanized zinc or cadmium-plated steel, or stainless steel in accordance with ASTM A 153, or non-ferrous, as indicated or as approved by Architect. Galvanizing shall conform to ASTM A 153. Concealed interior nails shall be bright. Other concealed items shall be cadmium plated or zinc chromate plated. Rough hardware items shall be of appropriate type and of proper capacity and size as required for each specific application.

C. Unless otherwise called out, wood framing, blockings, nailers, etc., of 2 in. nominal thickness or greater shall be bolted to back-up material with 1/2 in. bolts (galvanized at exterior locations and at roofs) located 4 in. from ends and splices, and spaced not greater than 32 in. on center along lengths of the members, to develop positive and secure anchorage to the back-up material. Nails shall be of sufficient length to penetrate the receiving member a minimum of 1-1/2 in.

D. Fasteners for securing wood framing, blocking or plywood into masonry if required, shall be hammer drive anchors of sufficient length to penetrate the receiving member a minimum of 1-1/2 in.

E. Unless otherwise called out, wood framing, nailers, furring, etc., less than 2 in. nominal thickness shall be secured to back-up material by use of appropriate fasteners located 4 in. from ends and spaced not greater than 16 in. on center along lengths of the members. Type and length of fastening devices shall be such as to develop positive and secure anchorage to the back-up material.

2.05 MISCELLANEOUS MATERIALS

A. Building Felts: Provide 15 lb. asphalt saturated felts, non-perforated, conforming to ASTM D 226, Type I.

B. Kraft paper for protective purposes shall be positively non-staining. Kraft paper shall be equal to "Seekure", manufactured by Fortifiber Corporation, or approved equal.

C. Blocking, Shims, and Nailers Softwood lumber, kiln dried to less than 15 percent moisture content.

D. Nails: Select material, type, size, and finish required for each use. Comply with Fed. Spec. FF-N-105 for applicable requirements.

E. Screws: Select material, type, size, and finish required for each use, nonferrous metal or hot-dip galvanized, unless otherwise indicated. Comply with ASME B18.6.1 for applicable requirements.

1. For metal framing supports, provide screws as recommended by metal-framing manufacturer.

F. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors.

2.06 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.
2. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to 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.

D. Shop-cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal edges with a water-resistant coating suitable for exterior applications.

2.07 SHOP FINISHING

A. Scope: Shop finishing work includes, but is not limited to, the following:

1. Painted Work: Provide prime coat complying with Section 09900, PAINTING.

PART 3 - EXECUTION

3.01 ROUGH CARPENTRY WORK

A. No attempt is made in this Specification to list the various elements of rough carpentry work, as the major part of the work to be done is clearly shown on or reasonably inferred from the Drawings. The rough carpentry work required shall include all such work, regardless of whether or not each and every item is specifically called for. Refer to Drawings to determine the major extent of the rough carpentry work required.

B. The Contractor shall be responsible for structural integrity, connections, and anchorage of all rough carpentry work.

C. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned, or too small to fabricate with minimum number of joint or optimum jointing arrangements, or which are of defective quality with respect to surfaces or sizes.

D. Butt joints in wood shall be flush to provide a smooth, uniform line with no irregularities. Built-up blocking shall have butt joints staggered 4 in. minimum layer to layer. The minimum length of any individual piece of woodwork shall be 12 in. All lengths of woodwork shall have a minimum of four fasteners.

E. Construct all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials.

F. Structural members shall be full-length without splices, and spaced not farther than 16 in. on center, except as may be otherwise specifically indicated on the Drawings.

G. Wood framing members shall be one-piece full length for maximum strength. Wood blockings, edgings, nailers, etc., shall be installed as indicated or specified and shall be furnished in not less than 12 ft. lengths, except where shorter lengths are required.

H. Wood blockings, nailers, edgings, etc., shall be installed as indicated or specified and shall be furnished in lengths not less than 12 ft., except where shorter lengths are required.

I. Nailing of rough carpentry work shall conform to requirements of the governing laws and codes.

J. Install all wood grounds required at gypsum wallboard work, including those required by other trades to properly attach their work, such as grounds to assure proper lines and levels and for attachment of fixtures, louvers, grilles, registers, diffusers, etc. Do not, however, include fixture support blockings at steel stud framed or furred gypsum wallboard finished walls or partitions as work of this Section.

K. If nailing, drilling, or powder-driving into concrete or masonry causes puncturing of conduits, pipes, ducts, etc., embedded in such work, repair all damage so caused.

3.02 FASTENING

A. Wood shall be secured to wood substrates and other wood to wood connection with nails spaced 12 in. on center maximum staggered along the centerline of the member being installed. All nail heads must be flush with the top surface.

B. Wood to masonry connections shall be completed using hammer driven anchors through predrilled holes spaced 8 in. on center maximum. Predrill the hole, insert fastener sleeve, and secure in place with nail.

C. Plywood installed to masonry surfaces shall be secured using hammer driven anchors through predrilled holes spaced 12 in. on center along the top and bottom edges. Keep fasteners 3 in. minimum from the board edge. Fastener heads shall be driven flush with the surface. Plywood installed to wood substrates shall be secured with nails at same spacing as hammer driven anchors.

D. Installation and nailing of plywood shall be in strict accordance with the published specifications and recommendations of APA – The Engineered Wood Association (APA), including APA Design/ Construction Guide, Residential and Commercial. Plywood wall sheathing shall be nailed at 3 in. o.c. at edges and 12 in. o.c. for panel field nailing, with 10d galvanized steel nails.

E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum lengths of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints, carefully fitting pieces to provide water-resistant joints. Anchor trim work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping, and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with finished surface, matching final finish.

3.03 ROUGH CARPENTRY WORK

A. Fabricate and install rough carpentry work in accordance with the Drawings, the Specifications, and AWI Quality Standards applicable or referenced to this work.

B. Miscellaneous Items: Install all required standing and running trim and other miscellaneous items throughout, as indicated on the Drawings and as required to satisfactorily complete the entire work, whether or not each and every required piece is specifically indicated on the Drawings. Trim shall be of same material and finish as the larger member to which applied.

3.04 BUILDING FELT AND PROTECTIVE PAPER

A. Provide all building felt required for installation of work of this Section and protective paper required for protection of finished floors except where specified to be provided by a different trade.

3.05 CLEANING

A. Upon completion of rough carpentry work in any given area remove all rubbish and debris from the work area and leave in broom clean condition.

END OF SECTION

SECTION 06200

FINISH CARPENTRY

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.
electrical panels

1.01 WORK INCLUDED

A. Provide all finish carpentry as indicated on the Drawings and as specified herein. Include, but do not limit to:

1. Interior standing and running trim, including miscellaneous partition caps, casing, moldings, and all other interior trim.
2. Birch veneer plywood casework below counters including drawers, adjustable shelving, and related work.
3. Solid surfacing work for countertops, as scheduled.
4. Plywood backing for solid surfacing countertop.
5. All other finish carpentry and millwork indicated.

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 02070, SELECTIVE DEMOLITION.
2. Section 06100, ROUGH CARPENTRY; Wood framing and blocking.
3. Section 09650, RESILIENT FLOORING; Resilient wall base.
4. Section 09900, PAINTING; Field finishing of work of this Section.
5. Section 12370, PREMANUFACTURED CABINETRY.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements. Include the following:

1. Moldings.
2. Cabinet hardware and accessories.
3. Solid surfacing.
4. Finishing materials and processes.

B. Shop Drawings: Provide large scale shop Drawings for fabrication, installation and erection of parts of work. Provide plans, elevations, and details of anchorage, connections and accessory items. Provide installation templates for work installed by others. Show interfaces and relationships to work of other trades.

1. Include details and location of anchorage and fitting to floors, walls, and base, including required blocking or back-blocking.
2. Include layout of casework and millwork with relation to surrounding walls, doors, windows, and other building components.
3. Coordinate shop drawings with other work involved.
4. Include manufacturer's recommendations for blocking and securing of casework units and fittings and all other woodwork and millwork.

C. Certifications: Provide certifications stating that materials and fabrication complies with specification requirements.

D. Field Measurements: Take necessary field measurements before preparation of shop Drawings and fabrication. Do not delay progress of job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.

E. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.

F. Verification Samples: Submit representative samples of each material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

1. One minimum 6-inch by 6-inch sample of each type of countertop specified.

G. Test Reports: Product test reports from and based on tests performed by a qualified independent testing laboratory evidencing compliance of casework finishes with requirements specified for chemical and physical resistance.

1.04 QUALITY STANDARDS

A. Source: For each material type required for work of this Section, provide primary materials which are product of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.

B. Installer: A firm with a minimum of three years' experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.

C. Quality Standard: Provide work complying with applicable requirements of AWI Quality Standards. Where not otherwise indicated, fabricator may choose among options permitted by AWI for grade of work specified.

1. Fire Performance for Woodwork: Concealed woodwork in this Section shall be UL labeled fire-retardant treated. Exposed woodwork shall have a flame spread of less than 200 when tested in compliance with ASTM E 84.

D. Catalog Standards: Manufacturer's catalog numbers may be shown on drawings for convenience in identifying certain casework hardware and accessories. Unless modified by notation on drawings or otherwise specified, catalog description for indicated number constitutes requirements for each such hardware and/or accessory item

1. The use of catalog numbers and specific requirements set forth in drawings and specifications are not intended to preclude the use of any other acceptable manufacturer's product or procedures which may be equivalent but are given for purpose of establishing standard of design and quality for materials, construction, and workmanship.

E. Veneers and Lumber: AWI Lumber Grade 1 and AWI Paint Grade Birch Veneer, Rotary Cut, minimum 5 in. face veneer width. Kiln dry to 6-8 percent moisture content. Components shall be free of defects and sapwood. Match adjacent pieces for color and grain pattern.

F. Mock-ups: Before beginning primary work of this Section, provide mock-ups of the following items of work at locations acceptable to Architect and obtain Architect's acceptance of visual qualities. Protect and maintain acceptable mock-ups throughout the work of this section to serve as criteria for acceptance of this work.

1. Typical interior standing and running trim, including miscellaneous moldings, trim and sills.
2. Typical solid surfacing countertop including edge.
3. Typical shelving and hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products only after wet work has been completed and environmental conditions similar to those of the finished work are established and maintained. Store and handle work to prevent deterioration and damage. Comply with AWI Quality Standards and recommendations. Sequence deliveries to avoid delays but minimize on-site storage.

1.06 PROJECT CONDITIONS

A. Substrates: Proceed with work only when substrate construction and penetration work is complete.

B. Wet Work: Proceed with work of this Section after wet work has been complete and fully dry or cured. Wet work is defined as plaster, gypsum drywall, paint, concrete, etc.

C. Conditioning: Advise Contractor of temperature and humidity requirements for woodwork installation. Do not install work of this Section until required temperature and relative humidity in areas of installation has been stabilized and will be maintained.

D. Environmental Limitations: Do not deliver or install millwork until wet-work is completed.

E. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork by accurate field measurements before being enclosed. Record measurements on final shop drawings.
2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating millwork without field measurements. Provide allowance for trimming at site and coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.07 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that finish carpentry items can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 FINISH CARPENTRY, GENERAL

A. Do not deliver materials to site until wet work is completed and sufficiently dry. Obtain Architect's approval before delivering materials or fabricated items. Store materials off the floor, fully protected from damage.

B. Provide fasteners and hardware required to complete the work. Use concealed fastenings wherever possible. Provide cadmium plated or zinc chromate plated fasteners at concealed locations; stainless steel or chrome plated at exposed interior locations.

C. Provide materials and products which meet or exceed the requirements of the indicated AWI Quality Standards specified for each type of work.

1. Painted Finish: AWI Quality Standards, Custom Grade.

D. Provide solid lumber, kiln-dried to moisture content of 5% to 10% by weight, with average not to exceed 8%.

E. Furnish lumber in longest practical lengths. Use single-length pieces wherever possible.

F. Take necessary field measurements before starting fabrication of built-in work.

G. Adhesives, adhesive bonding primers, or adhesive primers used on this Project shall meet or exceed the VOC content limits of the State of California South Coast Air Quality Management District (SCAQMD) Rule #1168 – Adhesive and Sealant Applications'.

H. Finish carpentry work shall not use composite wood and agrifiber products that contain urea-formaldehyde resin.

2.02 FINISH CARPENTRY, MATERIALS - GENERAL

A. Materials:

1. Plywood for exposed paint finish shall be paint grade, Birch veneer, Rotary Cut, veneer core, conforming to AWI Quality Standards for Custom Grade.
2. Solid stock hardwood for exposed painted finish shall be plain sawn/sliced natural birch, conforming to AWI Quality Standards for Custom Grade.

B. Standing and Running Trim: Standing and running trim work includes, but is not limited to, the following:

1. Miscellaneous molding and trim as indicated.

C. Quality Standard: Provide AWI Premium Grade materials and workmanship, unless noted otherwise.

1. Finger jointed material will not be permitted.

D. Wood Species and Cuts: Provide as follows:

1. Painted Work: Paint Grade Birch complying with AWI Quality Standards.

E. Shop Assembly: Shop assemble casings and frames with accurately mitered joints, pressure glued with lemon shaped splines.

2.03 SOLID SURFACING MATERIAL FOR COUNTERTOPS

A. Solid Surfacing Material:

1. Material shall be a homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 Type 5 or Type 6, without a precoated finish.
2. Color/pattern: As selected by Architect.
3. Thickness: As indicated.
4. Edge Detail: As selected by Architect.
5. Backsplash: Matching 4 in. high.

B. Core: Provide APA B-B Exterior Grade plywood.

C. Countertop Fabrication: Fabricate countertops to have fewest possible seams. Locate seams where shown on shop Drawings as approved by Architect. Do not use any exposed fasteners or connectors. Use concealed bolts to hold seams and joints hairline, lightproof tight.

1. Location of Counter Joints and Seaming: All seam locations shall be approved prior to fabrication.
2. Seaming of Joints: Counter material shall have seams made per manufacturer's recommendations. Provide all temporary supports, clamping, and materials required. Seam shall match adjacent countertop and shall not be visible in completed work.

D. Acceptable Manufacturers / Products:

1. LG HI-MACS 100% Acrylic Solid Surface, manufactured by LG Solid Source, LLC, 8009 W. Olive, Peoria, AZ 85345, or approved equal by DuPont or Wilsonart.

2.04 BIRCH VENEER PLYWOOD CASEWORK AND SHELVING

A. Scope: Birch veneer plywood casework includes, but is not limited to, the following:

1. Base cabinets with shelving.
2. Miscellaneous casework items.

B. Quality Standard: Provide casework and drawers conforming to AWI Quality Standards Section 400, meeting the requirements for AWI Premium Grade materials and workmanship.

1. AWI Type of Cabinet Construction: As indicated.
2. Reveal Dimension: 1/2 inch (13 mm).
3. Grain and Veneer Matching: Premium Grade.
4. Semi-exposed Surfaces other than Drawer Bodies: Match species and cut indicated for exposed surfaces.
5. Drawer Sides and Backs: Solid-hardwood lumber, same species indicated for exposed surfaces.
6. Drawer Bottoms: Hardwood plywood, same species indicated for exposed surfaces.
7. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

C. Shelving: Provide as follows:

1. Provide 3/4 in. Birch veneer shelves and matching solid wood edge bands on all six sides.

D. Shelf Deflection: Design and brace shelves to limit deflection to 1/4 in. maximum when loaded to 50 lb. per square foot. Space braces not more than 4 ft. on center.

E. Joinery: Do not use any exposed fasteners, including finish nails or staples.

F. Casework: Provide casework matching elevations and details indicated. Provide cabinets having the following features and characteristics:

1. Drawers: Provide drawers with all four corners dovetailed and glued construction. Edges shall be radiused. Drawer fronts shall be applied to drawer boxes with drawer front adjusters (Blum Model No. 295.1000).
2. Cabinet Backs: Provide 1/2 in. thick high density particleboard or plywood with veneer.
3. Cabinet Tops and Bottoms: Provide minimum 3/4 in. high density particleboard or plywood with Paint Grade Birch veneer.
4. Cabinet Ends: Provide minimum 3/4 in. high density particleboard with Paint Grade Birch veneer.
5. Shelves: Provide minimum 3/4 in. high density particleboard with Paint Grade Birch veneer on all exposed interior surfaces, top, bottom and edges. All shelves shall be adjustable on concealed standards and shall meet AWI Standards for deflection.
6. Casework Joinery: Do not use any exposed fasteners, including finish nails or staples.

G. Shop Finishing

1. Finish millwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
2. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.
3. Paint Finish: Comply with requirements of Section 09900, PAINTING.

H. Hardware: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard. Provide following or Architect approved equal:

1. Wire Pulls: Back mounted, 4 inches (100 mm) long, 5/16 inches (8 mm) in diameter by Doug Mockett, Haefele, equal to the following:

   a. Hafele Stainless Steel Wire Pulls, 4 inch with matte finish; Hafele Item 116.11.635.

2. Silencers: Glynn Johnson GJ-6, or equal manufactured by Blum or Hafele. Provide resilient pads to silence drawer closing.
3. Adjustable Cabinet Shelving Standards and Supports: Knape and Vogt 255 WH standards with 256 WH supports.
4. Wall Shelving Standards and Brackets: Knape and Vogt No. 85 ANO extra-heavy duty. Shelf bracket shall be No. 185 ANO. Brackets shall be furnished and installed with shelf rests, Knape & Vogt Model No. 106 ANO. Provide matching K&V top caps for standards.
5. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, by K&V 1400 Series, or equivalent by Accuride, or Blum.

   a. Box Drawer Slides: 100 lbf (440 N).

6. Drawer Locks: BHMA A156.11, E07041 by Best Lock only (no substitutes).
7. Exposed Hardware Finishes: Complying with BHMA A156.18 for BHMA finish number indicated.

   a. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
   b. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.

2.06 FINISHING

A. Painted Finish: Provide prime coat prior to installation complying with Section 09900, PAINTING. Provide two coats of finish paint per Section 09900, PAINTING.

PART 3 - EXECUTION

3.01 WORKMANSHIP AND INSTALLATION REQUIREMENTS

A. Dressed and sand finish carpentry work free from machine and tool marks, abrasions, raised grain, or other defects on surfaces exposed to view.

B. Provide tight joints formed to conceal shrinkage. Fit butt joints with concealed spline. Glue and dowel shop miters which are four inches or greater. Glue and spline miters less than 4 in., with spline concealed.

C. Blind nail finish work to the greatest extent possible. Where surface nailing is used, set and fill nails to match adjacent wood.

D. Wherever nailing into concrete is done, care shall be taken to protect pipes or conduits embedded in the slab. No puncturing of pipes or conduits will be allowed. Damage to embedded work shall be corrected without further cost to Owner. Inserts and anchor bolts shall be placed before the pouring of concrete.

E. Secure work to prevent checks or warps. Finish carpentry work shall be properly framed, closely fitted, and accurately set to the required lines and levels and shall be rigidly secured in place.

3.02 PAINTING AND FINISHING

A. Field painting and finishing is specified under Section 09900, PAINTING. All finish carpentry items shall be primed or sealed, as work of this section, before installation. Paint or seal coats must be dry before items are installed.

B. Sand all finish work at field joints and where required by installation.

3.03 SPECIFIC INSTRUCTIONS

A. Important Note: No attempt is made in the following specific instructions to list all elements of finish carpentry required on this project. It is the responsibility of the Contractor to determine for himself from the Drawings the scope and nature of the work required. These specific instructions are intended only to provide additional instructions regarding those portions of the finished carpentry for which information beyond that given on the Drawings or covered in the AWI Quality Standards seems needed to properly describe the work. Where the scope of a category is listed it is done in a general manner to assist the Contractor in determining the general nature of work he shall look for as being required in said category, and not to limit the work.

3.04 FINISH CARPENTRY INSTALLATION

A. Fabricate and install finish carpentry work in accordance with the Drawings, the specifications, and AWI Quality Standards applicable or referenced to this work.

B. Solid Surfacing: Install per manufacturer’s recommendations and as indicated on the Drawings.

C. Miscellaneous Items: Install all required standing and running trim and other miscellaneous items throughout, as indicated on the Drawings and as required to satisfactorily complete the entire work, whether or not each and every required piece is specifically indicated on the Drawings. Trim shall be of same material and finish as the larger member to which applied.

D. The Installer shall examine substrates, supports, and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of installation work means Installer's acceptance of substrates and conditions.

E. Condition woodwork to average prevailing humidity conditions in installation areas prior to installation.

F. Proceed with installation only when required ambient conditions have been properly maintained, as determined by all attending pre-installation conference.

1. Provide work to sizes, shapes, and profiles indicated on approved shop drawings.
2. Install work to comply with quality standards and tolerances specified for shop work.

G. Install millwork plumb, level, true and straight. Shim as required using concealed shims. Install work, including tops, to a tolerance of ± 1/8 in. in 8 ft.

H. Scribe and cut architectural woodwork to fit adjoining work. Refinish cut surfaces.

I. Anchor casework securely in place.

3.05 COMPLETION

A. Just prior to completion of work of this Section, inspect work in the company of Architect and make adjustments and corrections to work leaving operating parts in perfect operating condition, all jointing to adjacent material tight, all surfaces without blemishes or stains, all work properly executed and complete, and all defects and damaged work replaced or corrected.

3.06 REPAIRING AND PROTECTION

A. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired.

B. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protections and reclean as necessary immediately before final acceptance.

END OF SECTION

SECTION 07210

THERMAL INSULATION

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Provide all labor, materials, and equipment necessary to complete the work of this Section. The work of this Section includes, but is not limited to the following:

1. Fiberglas blanket/batt insulation, as indicated.
2. Extruded polystyrene insulation at wall perimeter insulation and under concrete slab.
3. Rigid fiberglass insulation at columns, beams, windows, and other areas indicated.
4. Vapor barrier at interior side of exterior wall.
5. Accessories for insulation installation.
6. Other thermal insulation work as may be called for on Drawings and not indicated or specified to be included under other Sections.

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 03300, CAST-IN-PLACE CONCRETE.
2. Section 06100, ROUGH CARPENTRY; Wood framing and miscellaneous wood blocking.
3. Section 09250, GYPSUM WALLBOARD AND ACCESSORIES; Acoustical and sound attenuation insulation in gypsum board partitions.
4. Division 15 - MECHANICAL; Insulation for mechanical equipment, ductwork, piping, etc.

1.03 SUBMITTALS

A. Product Data: Submit product data of materials and systems. Include manufacturer's installation instructions, use limitations, and recommendations for each material used.

B. Test Reports: Provide certified test reports of each insulation type, showing that materials meet specified requirements of this Section.

1.04 QUALITY ASSURANCE

A. Materials and workmanship shall conform to governing laws and building code.

B. Thickness: Where R values are indicated, provide thicknesses of insulation materials required to achieve value specified.

C. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to site in original, unopened packages or containers bearing manufacturer's names, brand names, and types and thicknesses of contents.

B. Store off floor in interior spaces, adequately protected against damage from all sources.

C. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.06 COORDINATION AND PROJECT CONDITIONS

A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering insulation products that may be incorporated in the work include, but are not limited to, the following:

1. Extruded Polystyrene Insulation:

a. The Dow Chemical Company.
b. Amoco Foam Products Company.
c. Owens-Corning, Inc.

2. Glass-Fiber Blanket Insulation:

a. CertainTeed Corporation.
b. Owens-Corning Fiberglas Corporation.
c. Johns-Manville Corporation.

3. Rigid Fiberglass Insulation:

a. CertainTeed Corporation.
b. Owens-Corning Fiberglas Corporation.
c. Johns-Manville Corporation.

2.02 FIBERGLAS BLANKET/BATT INSULATION

A. Unfaced Fiberglas Blanket Insulation: shall be indicated thickness(es) by full 16-1/8 in. and 24-1/8 in. width (depending of spacing of framing members) unfaced, commercial fiberglass blanket insulation, conforming to ASTM C 665, Type I manufactured by Owens-Corning Fiberglas Corp., Johns-Manville Corp., CertainTeed Corp., or approved equal.

B. Kraft Faced Fiberglas Blanket Insulation: shall be indicated thickness(es) by full 16-1/8 in. and 24-1/8 in. width (depending of spacing of framing members) kraft faced, commercial fiberglass blanket insulation, conforming to ASTM C 665, Type II, Class C, manufactured by Owens-Corning Fiberglas Corp., or equivalent manufactured by Johns-Manville Corp., CertainTeed Corp., or approved equal.

C. Fiberglass Blanket Insulation: for applications with no fireproof covering material within 1 in. of insulation shall be Owens Corning Flame Spread 25, mineral (glass) fiber blanket with foil-reinforced kraft fiber reinforced fire retardant vapor barrier, conforming to ASTM C 665, Type III, Class A, manufactured by Owens-Corning Fiberglas Corp., or equivalent manufactured by Johns-Manville Corp., CertainTeed Corp., or approved equal. ASTM E 84 surface burning characteristics shall be 25 flame spread and 50 smoke developed.

2.03 PERIMETER AND UNDERSLAB INSULATION

A. Extruded-Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation formed from polystyrene base resin by an extrusion process using hydrochlorofluorocarbons as blowing agent to comply with ASTM C 578 for type and with other requirements indicated below:

1. ASTM C 578, Type IV, minimum 25 psi compressive strength, 2.20-lb/cu. ft. (35-kg/cu. m) minimum density.
2. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 75 and 450, respectively.
3. Recycled Content: Not less than 50 percent blend of post-consumer and recovered polystyrene resins.
4. Provide boards with manufacturer's standard square edges.
5. Provide one of the following products, or Architect approved equal:

    a. "Styrofoam Square Edge" by The Dow Chemical Company.
    b. "Green-Guard CM" by Pactiv Building Products Company.
    c. "Foamular 250" by Owens Corning.

B. Adhesive: As recommended by the insulation manufacturer.

C. Unless otherwise indicated, thickness of insulation shall be as indicated on the Drawings.

2.04 RIGID FIBERGLAS INSULATION

A. Rigid Fiberglas Insulation shall be indicated thickness of rigid industrial insulation "700 Series", manufactured by Owens-Corning Fiberglas Corp., equivalent product manufactured by Johns Manville; CertainTeed; or approved equal.

1. Material shall conform to ASTM C 612.
2. Rigid insulation board shall be Type 704, 4.25 lb. per cu. ft. density, 200 psf compressive strength at 10% deformation, and thermal conductivity of 0.230. Inner face shall be complete with 0.0025 in. aluminum foil-reinforced Kraft paper facing, meeting Model Code requirements for exposed locations.

2.05 VAPOR BARRIER

A. Vapor barrier at other locations shall be natural color 6-mil polyethylene film sheet complying with ASTM D 4397 with laboratory-tested vapor transmission rating of 0.13 perms.

B. Vapor Retarder Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Insulating materials and installation shall be in strict accordance with manufacturer's printed instructions and specific recommendations, and health and safety precautions, for each of project conditions and in accordance with governing laws and building code.

3.02 RIGID PERIMETER AND UNDERSLAB INSULATION

A. Install indicated thickness of rigid perimeter insulation up interior faces of exterior walls and under interior edges of concrete slabs-on-grade, as indicated.

1. At vertical applications secure with daubs of compatible adhesive.
2. At slab edges lay horizontally directly over vapor barrier (vapor barrier by concrete trade), just prior to placement of concrete floor slab.
3. Work shall be in close coordination and cooperation with work of other affected Sections, including excavation and backfilling, and concrete work.

B. Install uniformly wide, in continuous rows, with joints tightly butted at ends of adjoining panels and at edge(s) where abutting other insulation panels. Provide neat cut-outs at projections through insulation.

3.03 RIGID FIBERGLAS INSULATION

A. Apply indicated thickness of rigid fiberglass insulation at locations indicated on the Drawings.

B. Install rigid insulation board into place, mechanically fastening where required to hold insulation in place prior to application of finish wall materials and trim.

1. Stagger joints in insulation.
2. Take special care to cut, fit, and position boards accurately so that joints within work, at perimeters of work, and at projections through work, are tightly butted.
3. Visible gaps will not be permitted. Tape joints with aluminum foil faced tape. Leave insulation tight, plumb, and with flush surface.

3.04 FIBERGLAS BLANKET/BATT INSULATION

A. Install blanket/batt insulation, fully filling spaces between steel stud curtain wall system members. Staple through insulation into rear face of sheathing with 9/16 in. long divergent point staples at center and near each corner of blanket/batt. Fit batts tightly together at joints. Pack tightly into corners, and fill double studs and box headers and sills, and other similar voids, with insulation to maintain insulation integrity across entire wall area.

B. Install continuous application of fiberglass blanket/batt at ceiling areas and at soffit areas to protect interior spaces of building, as indicated. Fit batts tightly together and to framing members, furring strips, penetrations, and abutting construction for positive thermal seal. Carry continuously behind light cans, junction boxes, etc.

C. Coordinate work with that of other Sections.

3.05 INSTALLATION OF VAPOR BARRIER

A. Install continuous application of vapor barrier over entire wall, continuous from floor slab to top of wall plate above. Lap and tape with waterproof tape all joints and edges. Cut neatly at wall openings and carry back into wall returns. Extend vapor barrier to cover miscellaneous voids in insulated substrates.

B. Extend vapor barrier to extremities of areas to be protected from vapor transmission. Secure with adhesives or other anchorage system as indicated or as recommended by the vapor barrier manufacturer. Extend vapor barrier to cover miscellaneous voids in insulated substrates.

C. Seal vertical joints in vapor barriers over framing by lapping not less than distance between two wall studs. Fasten to framing at top, end and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners 16 in. o.c.

D. Seal joints caused by pipes, conduits, electrical boxes and similar items penetrating vapor barriers with cloth or aluminized tape recommended by vapor barrier manufacturer to create air-tight seal.

E. Repair tears or punctures in vapor barriers immediately before concealment by other work. Cover with tape or another layer of vapor barrier material.

F. At conclusion of vapor barrier installation, request Architect to review installation of vapor barrier installation at walls prior to providing interior finish. Inspection shall be timed to coincide with weekly project meeting.

3.06 CLEANING

A. Upon completion of building insulation work in any area, remove rubbish and debris from work area and leave in broom clean condition.

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Provide all through penetration firestop system work required as part of this Contract in accordance with Commonwealth of Massachusetts State Building Code. Unless otherwise indicated, firestopping work shall include:

1. All patching or repair or replacement of existing firestopping damaged as a result of trade work.
2. New firestopping work as required for new work or renovation.

B. Provide firestop systems consisting of a material, or combination of materials, installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, or gases through openings in fire-rated barriers.

C. Where specific firestop system is not indicated on the Drawings for a through penetration, the Contractor shall include proposed firestop system designs in submittals.

D. Where there is no specific UL Firestop System available for a particular application, the firestopping contractor shall obtain from the firestop manufacturer a system drawing to be submitted to the Architect for approval prior to installation.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that relate directly to Work of this Section include, but are not limited to:

1. Section 02070, SELECTIVE DEMOLITION.
2. Section 06100, ROUGH CARPENTRY.
3. Section 09250, GYPSUM WALLBOARD AND ACCESSORIES.

1.03 SUBMITTALS

A. Submit product data and MSDS for each type of firestop products to be used.

1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

B. Product certificates signed by manufacturers of firestopping products certifying that their products comply with specified requirements.

C. Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases. Include the following:

1. Firestop all penetrations passing entirely through fire resistance rated wall and floor assemblies and other locations as indicated on the Drawings.
2. Provide and install complete through-penetration firestopping systems which have been tested and approved by UL, FM, or third party testing agency.
3. Provide and install complete through-penetration firestopping systems which are designed and approved for the specific through-penetrations to be firestopped.
4. Provide and install firestop materials of thickness, width, and density, as required for the fire resistive ratings specified herein and/or as indicated on the Drawings.
5. The installation of the correct firestop system is as important as the firestop system itself.

B. F - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.

C. T - Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where the following conditions exist:

1. Where firestop systems protect penetrations located outside of wall cavities.
2. Where firestop systems protect penetrations located outside fire-resistive shaft enclosures.
3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature-rise rating.
4. Where firestop systems protect penetrating items larger than a 4 in. diameter nominal pipe or 16 sq. in. in overall cross-sectional area.

D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119 or UL 2079, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.

E. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 in. or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

F. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.

1. For firestopping exposed to view, provide systems which result in a finished appearance similar to adjacent surfaces.

1.05 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:

    a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by UL in their "Fire Resistance Directory," by Warnock Hersey, or by another qualified testing and inspecting agency.

3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 or UL 2079, under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:

    a. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
    b. Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.

B. Installer Qualifications: Engage an experienced Installer who is certified by and listed in the FM Directory. Submit qualifications of individuals certified by FM testing as “Designated Responsible Individual”.

1. The installer shall have the necessary experience, staff, and training to install classified firestopping systems with documented experience and references.
2. It is the intent that all firestopping be performed by one contractor as a sole source.

C. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.

1. Materials of different manufacture shall not be intermixed.

D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."

E. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

F. Request for Substitutions: Request for substitutions shall be submitted to Architect 10 working days prior to bid in order to evaluate comparison of substitute products. Submissions for substitutions must include the following:

1. Manufacturer's technical literature.
2. Material Safety Data Sheets (MSDS).
3. UL, FM, or independent laboratory system tests.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

C. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

1.08 DEFINITIONS

A. "Through-Penetration Firestop" is a material, device, or construction installed to resist, for a prescribed time, the passage of flame, heat, and gases through openings which penetrate the entire fire resistive construction in order to accommodate penetrating items. Incorporating the use of specific products installed in a specific manner, they shall only be installed in configuration for which they have been specifically tested and listed by Underwriters Laboratories (UL) and/or Factory Mutual (FM) as per UL 1479 and/or ASTM E 814.

B. "F-Rating" is the time period that a through penetration firestop limits the spread of flame and hot gases through the fire resistive construction, including the penetrating elements, when tested in accordance with the time-temperature curve defined in ASTM E 119.

C. "T-Rating" is the time period that a through-penetration firestop limits temperature rise through the fire resistive construction, including the penetrating elements, when tested in accordance with the time-temperature curve defined in ASTM E 119.

1.09 ENVIRONMENTAL REGULATIONS

A. All materials shall be asbestos free and non-carcinogenic.

B. Firestop materials shall contain no flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.

C. Firestop materials used shall not require solvent based chemicals for clean-up purposes.

D. If required, hazardous disposal of firestop materials shall be strictly observed as noted on the individual MSDS.

E. Water-based firestop materials shall be considered preferable over silicone or solvent based materials.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:

1. Permanent forming/damming/backing materials including the following:

   a. Semi-refractory fiber (mineral wool) insulation.
   b. Ceramic fiber.
   c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
   d. Fire-rated formboard.
   e. Joint fillers for joint sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

D. Materials shall conform to UL 1479 and ASTM E 814.

E. Self-extinguishing damming materials shall be used, as specified by the manufacturer, as part of the designated firestop system.

F. Firestop materials used shall be suitable and compatible with the penetrating item(s) including the surrounding materials.

G. Firestop material which contains solvents that would attack plastics are not to be used.

2.02 FIRE-SAFING BOARD INSULATION AND ACCESSORIES

A. Provide material tested, listed and labeled by UL and listed by UL in designs similar to applications indicated. Provide semi-rigid, non-asbestos mineral fiber board, rated noncombustible when tested according to ASTM E 136:

1. k-Value: 0.25 at 75^{o}F.

2. Thickness: 4 in., unless otherwise indicated, and not less than thickness necessary to obtain required fire-rating.
3. Density: Nominal 4 pcf.
4. Product: U.S. Gypsum Co., Thermafiber Safing Insulation; Partek Insulation, Inc., Paroc Safing Insulation; Fibrex, Inc., FBX Fire Safing Insulation; or approved equal.

B. Intumescent Tape: Pemko Hot Smoke Seal, adhesive-backed intumescent, Item HSS2000, manufactured by Pemko Mfg. Co., Memphis, TN, or equivalent manufactured by Dow Corning or Bio Fireshield.

C. Light Gage Bent Metal Retainer: Provide 14 gage, galvanized steel bent angle with 1 in. upturned leg set, continuous, as indicated to retain safing insulation and intumescent tape.

2.03 MINERAL WOOL

A. Provide loose mineral wool, rated noncombustible when tested in accordance with ASTM E 136, free of asbestos and glass fiber, and suitable for in-place density of 6 pcf to 12 pcf.

1. Hilti Mineral Wool; Hilti Corp.

2.04 CAULK AND PUTTY

A. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Biostop 500+; Bio Fireshield.
2. Fire-Barrier Series; 3M Fire Protection Products.
3. Flamesafe; W.R. Grace.
4. CLK Adhesive Firestop; Nelson Firestop.
5. STI SpecSeal S100.
6. Hilti FS – One High Performance Sealant, Hilti CP 617 Firestop Putty Pad, or Hilti CP 618 Firestop Putty Stick; Hilti Corp.

2.05 FIRESTOP MORTAR

A. Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogenous mortar.

B. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Novasit K-10; Rectorseal Corp.
2. KBS Mortar Seal; International Protective Coatings Corp.
3. CMP Firestop Compound; Nelson Firestop.
4. STI SpecSeal Mortar.
5. Hilti CP 637 Firestop Mortar; Hilti Corp.

2.06 FIRESTOP COLLARS

A. Provide premanufactured fire protective pipe sleeves equal to one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Bio-Fireshield Firestop Collars; Rectorseal Corp.
2. STI SpecSeal Firestop Collars.
3. Hilti CP 643N Firestop Collar or CP 644 Firestop Retaining Collar for Plastic Pipe; Hilti Corp.

2.07 FIRESTOP BAGS/PILLOWS

A. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

B. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Firestop Pillows; Rectorseal Corp.
2. KBS Sealbags; W.R. Grace.
3. PLW Firestop Pillow; Nelson Firestop.
4. STI SpecSeal Pillows.
5. Hilti FS 657 – Fire Block; Hilti Corp.

2.08 WRAP STRIPS

A. Single-component, elastomeric sheet with aluminum foil on one side. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Biostop Wrap Strip; Bio Fireshield.
2. SpecSeal Wrap Strip; STI.
3. Fire Barrier FS195 Wrap Strip; 3M.
4. Hilti CP 648E Endless Wrap Strip or CP 648S Single Wrap Strip; Hilti Corp.

2.09 COMPOSITE BOARDS

A. Provide one of the following products, or Architect approved equal, that meet or exceed specified requirements:

1. Hilti CP 675T Firestop Board; Hilti Corp.
2. Barrier Sheet Material; 3M or equivalent product by Johns Manville or Firetemp.

2.10 FIRE FOAM SEALANT

A. Provide the following products that meet or exceed specified requirements:

1. Hilti CP 620 Fire Foam; Hilti Corp.

2.11 DAMMING/FORMING MATERIALS, FASTENERS, AND ANCHORAGE ACCESSORIES

A. Provide damming/forming materials in accordance with manufacturer's recommendations.

B. Provide fasteners and anchorage accessories complying with UL designs and other components and accessories as needed and as recommended by the firestopping material manufacturer.

2.12 MIXING

A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

A. General: Comply with the "System Performance Requirements" article in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

1. Coordinate with fire protection and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals.
2. Schedule and sequence the work to assure that partitions and all other construction which would conceal penetrations are not erected prior to the installation of firestop and smoke seals.
3. 1 hr. and 2 hr. rated columns and beams and wall assemblies enclosed in gypsum board shall be firestopped where gypsum board meets structure above.
4. Provide minimum 1 hour rating for penetrations, expansion joints, and slab edge conditions at non-rated floor slabs.
5. Comply with manufacturer’s requirements regarding maximum size for annular spaces and materials to be used.

B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:

1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

B. Install joint fillers 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 that allow optimum sealant movement capability and develop fire-resistance rating required.

C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.

D. Tool non-sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 FIELD QUALITY CONTROL

A. Inspecting agency employed and paid by Owner will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.

B. Inspecting agency will report observations promptly and in writing to Contractor and Architect.

C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.

D. Where deficiencies are found, repair or replace firestopping so that it complies with requirements.

3.06 CLEANING

A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

B. Protect firestopping 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. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION

SECTION 07900

JOINT SEALANTS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Caulk and seal joints as indicated on the Drawings and as specified. Include, but do not limit to:

1. Sealing of interior perimeter joints at door frames and other wall openings.
2. Sealing of thresholds at doors.
3. All other interior sealing called for, or reasonably inferred from the Drawings.

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 06100, ROUGH CARPENTRY; Wood blocking.
2. Section 07840, FIRESTOPPING.
3. Section 09250, GYPSUM WALL BOARD AND ACCESSORIES.
4. Section 09900, PAINTING.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each sealant material used. Provide certifications that sealant materials comply with specified requirements.

B. Initial Selection Samples: Submit samples manufacturer's color charts showing complete range of colors, textures, and finishes available for each material used.

C. Verification Samples: Submit actual representative samples of each sealant material that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide sealant samples having minimum size of 4 in. long.

D. Test Reports: Provide certified reports for all specified tests.

E. Certificate of Product Compliance: Manufacturer’s certificate evidencing compliance of sealants, sealant primers, and accessory materials with requirements of this Section.

1.04 COMPATIBILITY

A. Provide sealant and sealant joint backing materials suitable for the use intended and compatible with the materials with which they will be in contact. Compatibility of sealant and accessories shall be verified by the sealant manufacturer.

1.05 QUALITY ASSURANCE

A. Source: For each sealant material type required for the work of this section, provide primary materials which are the product of one manufacturer. Provide secondary or accessory materials which are acceptable to the manufacturers of the primary materials.

B. Installer: A firm with a minimum of five years' experience in type of work required by this Section and which is acceptable to the manufacturers of the primary materials.

C. Sealants and sealant primers used on this Project shall not exceed the VOC limits defined in Regulation 8 (Organic Compounds), Rule 51 (Adhesive and Sealant Products) of the Bay Area Air Quality Management District (BAAQMD) of the State of California.

1.06 PROJECT CONDITIONS

A. Substrates: Proceed with work only when substrate construction and penetration work is complete.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Materials under this Section shall be delivered to, and stored at, the job site in unbroken factory sealed containers with labels intact.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Before installation check each sealant for compatibility with adjacent materials and surfaces and with indicated exposures. Select sealers which are recommended by manufacturer for each application indicated.

B. Sealants and sealant primers used on this Project shall not exceed the VOC limits defined in Regulation 8 (Organic Compounds), Rule 51 (Adhesive and Sealant Products) of the Bay Area Air Quality Management District (BAAQMD) of the State of California.

2.02 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations.

2.03 JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Elastomeric sealants shall be non-staining to porous substrates. Provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. Dow Corning Corporation; 786 Mildew Resistant.
    b. GE Silicones; Sanitary SCS1700.
    c. Bondaflex Technologies Sil 100 WF
    d. Pecora 898NST.
    e. Tremco Inc.; Tremsil 200.
    f. Or equal.

2. Extent of Use: Sanitary joints at interior toilet rooms and other wet areas.

D. Latex Sealant: Provide permanently flexible, latex rubber modified acrylic emulsion sealant, complying with ASTM C 834, Type P, Grade NF.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. Bostik Findley; Chem-Calk 600.
    b. Bondaflex Technologies Sil-A 700
    c. Pecora Corporation; AC-20+.
    d. Tremco Inc.; Tremflex 834.
    e. Or equal.

2. Extent of Use: Joints at non-moving interior surfaces, except where indicated to be sanitary joints.

2.04 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin) or other type, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Backer Rod: Provide compressible rod of durable non-absorptive material recommended by sealant manufacturer for compatibility with sealant. Provide products of one of the following manufacturers:

    a. Backer Rod Manufacturing and Supply Co.
    b. Dow Chemical Co.
    c. W. R. Meadows, Inc.
    d. Woodmont Products, Inc.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at the back or the base of the joint, where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.05 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer shall examine substrates and conditions under which this work is to be performed and notify Contractor, in writing, of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning of sealant work means Installer's acceptance of joint surfaces and conditions.

3.02 PREPARATION

A. Strictly comply with manufacturers' instructions and recommendations, except where more restrictive requirements are specified in this Section.

B. Clean joint surfaces immediately before installation of sealants, primers, tapes and fillers. Remove substances which could interfere with bond.

C. Unless otherwise indicated, use of sealants shall conform to ASTM C 790.

D. Tape or mask adjoining surfaces to prevent spillage and migration problems.

E. Prime surfaces as recommended by sealant manufacturer.

3.03 INSTALLATION

A. Provide backer rods for joint sealants except where specifically recommended against by sealant manufacturers.

B. Prevent three-sided adhesion by use of bond breaker tapes or backer rods.

C. Force sealant into joints to provide uniform, dense, continuous ribbons free from gaps and air pockets. Completely wet both joint surfaces equally on opposite sides.

D. Provide sealants to depths indicated, or if not indicated, follow manufacturer's recommendations. For joints up to 3/8 in. width, depth of joint shall not exceed 1/2 in.; for joints larger than 1/2 in. width, depth of joint shall not exceed 5/8 in.

3.04 EXTENT OF SEALANT WORK

A. General Extent: Seal joints at all interior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealant installation with backer rod in all interior control joints.

B. Interior Sealing: The work of this Section includes sealing the following at all work included under this Contract:

1. Perimeters of frames.
2. Metal to plaster joints.
3. Top of wall base along irregular walls.
4. Splash to counter joints and splash to wall joints at countertops.
5. Metal thresholds.

3.05 CURING

A. Cure sealants in strict compliance with manufacturers' instructions and recommendations to obtain highest quality surface and maximum adhesion. Make every effort to minimize accelerated aging effects and increase in modulus of elasticity.

3.06 CLEANING AND PROTECTION

A. Remove smears from adjacent surfaces immediately, as the work progresses. Exercise particular care to prevent smearing or staining of surrounding surfaces which will be exposed in the finished work, and repair any damage done to same as result of this work without additional cost to the Owner.

B. Remove and replace work that is damaged or deteriorated.

C. Clean adjacent surfaces using materials and methods recommended by sealant manufacturer. Remove and replace work that cannot be successfully cleaned.

D. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protection immediately before final acceptance.

END OF SECTION

SECTION 09250

GYPSUM WALLBOARD AND ACCESSORIES

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 WORK INCLUDED

A. Furnish and install gypsum drywall work, as indicated on the Drawings and as specified. Include, but do not limit to:

1. Steel suspension systems for ceilings and soffits.
2. Screwable steel stud interior partition framing.
3. Screwable steel stud framed and furred enclosures at columns and beams.
4. Blockings and attachments for fixture supports.
5. Gypsum wallboard finishes for interior ceilings, walls, partitions, ceiling edgings, soffits, column enclosures, beam enclosures, etc.
6. 'Paperless' faced gypsum board finish.
7. Acoustical sealing and acoustical insulation of gypsum wallboard finishes at partitions and furrings where indicated.
8. Other gypsum drywall work called for on the Drawings or reasonably required to complete the Project intent.

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 02070, SELECTIVE DEMOLITION.
2. Section 06100, ROUGH CARPENTRY; Wood framing and blocking.
3. Section 07900, JOINT SEALANTS.
4. Section 09650, RESILIENT FLOORING; Vinyl wall base.
5. Section 09900, PAINTING; Painting.
6. Division 15 - MECHANICAL and Division 16 - ELECTRICAL; Mechanical and electrical fixtures and appurtenances at drywall ceilings, including independent suspension.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each system component used. Provide certifications that materials and systems comply with specified requirements.

B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorage, connections and accessory items. Show spacings, sizes, gages, and thicknesses of all system components. Confirm on shop drawings that deflection will not exceed limitations specified.

C. Samples: Submit samples of all finish materials specified under this Section to the Architect for selection and approval.

D. Calculations: Provide professionally prepared calculations and certification of the performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied. Provide calculations stamped and signed by a professional engineer, licensed to practice in the Commonwealth of Massachusetts.

E. Test Reports: Provide certified reports for all specified tests.

1.04 QUALITY ASSURANCE

A. Reference Standards: Conform to governing laws, building code and manufacturer's printed standards.

B. Structural Performance: Limit deflection to L/240 for all work.

C. Sound Transmission Performance: Provide shaft wall assemblies with minimum STC of 47 tested in conformance with ASTM E 90, unless indicated otherwise on Drawings. Provide drywall partitions with minimum STC ratings indicated on Drawings tested in conformance with ASTM E 90.

D. Fire Resistance Ratings: Where indicated provide materials and assemblies identical to those tested and rated for fire resistance per ASTM E 119 by testing and inspecting organization acceptable to authorities that have jurisdiction

1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

E. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

F. Adhesives, adhesive bonding primers, and adhesive primers and sealants shall meet or exceed the VOC content limits of the State of California South Coast Air Quality Management District (SCAQMD) Rule #1168 – Adhesive and Sealant Applications'.

G. Volatile organic compound (VOC) content of sealants and sealant primers used on this Project shall not exceed the limits defined in Regulation 8 (Organic Compounds), Rule 51 (Adhesive and Sealant Products) of the Bay Area Air Quality Management District (BAAQMD) of the State of California.

1.05 COORDINATION

A. Work of this Section shall be coordinated with the work of other Sections to assure the steady progress of all the work of the Contract. Obtain complete information regarding wall and ceiling mounted fixtures, grilles, registers, equipment, accessories, etc. to be used on the work from other trades. In no case shall work of other Sections be concealed until it has been inspected.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver all manufactured materials to site in original packages, containers, or bundles bearing the manufacturer's name and brand names, type of material, and contents.

B. Store materials in interior spaces, above floors, under cover, away from sweating walls and other damp surfaces, and with good ventilation.

C. Handle gypsum boards to prevent damage to edges, ends, or surfaces. Protect metal corner beads, casing beads, and trim from being bent or damaged.

1.07 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

B. Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours prior to application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.

C. Ventilation: Ventilate building spaces, as required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Metal Furring Systems: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:

1. Dietrich Industries, Inc.
2. Gold Bond Building Products Div., National Gypsum Co.
3. Marino/Ware Industries Corporation.
4. United States Gypsum Co.
5. Dale Industries, Inc.

B. Grid Suspension Systems: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:

1. Chicago Metallic Corp.
2. National Rolling Mills Co.
3. USG Interiors, Inc.

C. Gypsum Boards and Related Products: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:

1. United States Gypsum Co.
2. Georgia-Pacific Corp.
3. Gold Bond Building Products Div., National Gypsum Co.

D. Glass Mat Faced Moisture Resistant Gypsum Boards and Related Products: Provide materials, products, and systems from one of the following manufacturers that meet or exceed specified requirements:

1. G-P Gypsum Corp., or approved equal.

2.02 METAL FRAMING SYSTEMS FOR SUSPENDED AND FURRED CEILINGS

A. General: Provide components that conform to ASTM C 754 for materials and sizes, unless indicated otherwise. Provide all metal runners, hangers, studs, and channels hot-dip galvanized conforming to ASTM A 525, G60, unless noted otherwise.

B. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, 12 gauge minimum.

D. Hanger Rods: Where required for loading or by local authorities, provide mild-steel rods, sized as required, hot-dip galvanized.

E. Flat Hangers: Where required for loading or by local authorities, provide mild-steel flat hangers, sized as required, hot-dip galvanized.

F. Angle-Type Hangers: Provide steel angles with legs not less than 7/8 in. wide, formed from 0.0635 in thick galvanized steel sheet conforming to ASTM A 446, G 90, with bolted connections.

G. Channels: Provide cold-rolled steel channels, minimum 16 gauge with 7/16 in. wide flanges, protected with corrosion-resistant coating, and as follows:

1. Carrying Channels: 1-1/2 in. deep, 475 lb. per 1,000 lin. ft., hot-dip galvanized.
2. Furring Channels: 25 gage hot-dip galvanized, screwable, pressed steel furring channels, 7/8 in. thick, hat section.
3. Clips for attachment of steel furring channels to steel carrying channels shall be proprietary clips as recommended by manufacturer.
4. Where resilient channels are indicated, provide RC-1 Resilient Channels.

H. Ceiling Suspension System: Provide a complete, mechanical suspension system, conforming to ASTM C 645. System shall be double-web, direct hung system, consisting of cold-rolled steel channel main runners, screwable steel furring channels hangers, anchors, required clips and other components, required for complete installation.

1. Equal to Series 640 for non-fire-rated ceilings and to Series 650 for fire-rated ceilings, manufactured by Chicago Metallic Corporation, or approved equal.

2.03 METAL FURRING SYSTEMS FOR WALLS AND PARTITIONS

A. Screwable Steel Wall Furring Channels: 25 gage hot-dip galvanized, screwable, pressed steel furring channels, 7/8 in. thick, hat section.

B. Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or non-slotted web, fabricated from steel sheet complying with ASTM A 653 or ASTM A 568; with a minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.

C. Steel Strapping: 18 gage galvanized steel strapping, 2 in. wide.

D. Fasteners: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.04 GYPSUM BOARDS

A. Regular Gypsum Wallboard: Provide gypsum board 48 in. width by lengths as required, tapered edge, paper finish, conforming to ASTM C 36.

1. Unless otherwise indicated, gypsum board shall be 5/8 in. thick.
2. Where used in fire-rated assemblies, provide Type X fire resistant type.

B. Glass Mat, Moisture-Resistant Interior Gypsum Wall Panel (For Toilet Rooms): Coated glass mat-faced, moisture- resistant, treated core gypsum wallboard. Physical properties conforming to the applicable sections of ASTM C 1177 and ASTM C 630.

1. Product: Subject to compliance with requirements, provide DensArmor Plus Interior Panels manufactured by G-P Gypsum Corp.
2. Core: As indicated. 1/2 in. (12.7 mm), regular.
3. Long Edges: Tapered.

C. Joint Treatment Materials: Joint treatment materials shall conform to ASTM C 475.

1. Laminating Adhesive and Joint Finishing Compound: As recommended by gypsum wallboard manufacturer.
2. Joint Tape: 2 in. to 2-1/2 in. wide paper tape, as recommended by gypsum wallboard manufacturer.

2.05 FASTENERS

A. Screws for Attachment of Gypsum Wallboard to Steel Furring Members: Self-drilling, Type S, bugle head screws, conforming to ASTM C 1002, with bugle-type Phillips-head, appropriate size and length in each case as recommended by manufacturer.

B. Screws for Attachment of Gypsum Wallboard to Wood Framing and Wood Blocking: Self-drilling Type W screws conforming to ASTM C 1002, with bugle-type Phillips-head. Screw length and size in each case shall be as recommended by gypsum wallboard manufacturer.

2.06 METAL TRIM AND ACCESSORIES

A. General: Provide metal trim and accessories conforming to ASTM C 840.

B. Control Joint: 26 gauge, galvanized steel, "Vee" type, with perforated flanges, for compound finishing.

C. Corner Bead: 1 in. by 1 in. perforated flange, standard type, 26 gauge, galvanized steel, for compound finishing.

D. Metal Trim: 24 gauge, galvanized steel, with perforated flanges, for compound finishing.

2.07 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.

C. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot grouting hollow metal door frames.

D. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.

E. Sound Attenuation Insulation: Provide mineral wool type insulation, minimum 2.5 pcf density, equal to Thermafiber Insulation, or approved equal.

F. Acoustical Sealant for Concealed Applications: Provide "BA-98 Acoustical Sealant", manufactured by Pecora Chemical Corp., equivalent product manufactured by U.S. Gypsum Co., National Gypsum Co., or approved equal.

G. Acoustical Sealant for Exposed Applications: Provide paintable "AC-20 Acrylic Latex Caulk", manufactured by Pecora Chemical Corp., equivalent product manufactured by DAP or Gibson Homans Co., or approved equal.

PART 3 - EXECUTION

3.01 INSPECTION AND COORDINATION

A. Inspect job conditions and related work and report to Architect in writing, all conditions interfering with the proper installation of work of this Section. Commencement of work in any given area shall constitute acceptance of conditions in that area as acceptable to receive work of this Section.

B. Change and adjust work of this Section to accommodate work of other Sections, providing cutting and patching until it has been inspected.

3.02 GENERAL REQUIREMENTS

A. Provide work conforming to published specifications and installation instructions of each manufacturer, the approved shop drawings, above-referenced quality assurance standards, the governing laws and code. Refer to Drawings to determine location of fire-resistive, fire-protective, and acoustically-rated work, and construct this work to conform to the specifications and installation instructions of UL or other testing agency(ies). Also refer to the Drawings to determine the number of layers of gypsum board, thickness of board, etc., for each of the installations.

B. Erect gypsum drywall work, rigidly supported, and securely fastened in place, in such a manner that plumb, level, and true finished lines and surfaces will result in the finished work in accordance with the requirements of ASTM C 754 and ASTM C 840.

C. Construct gypsum drywall work only after all windows and door openings are enclosed and a temperature of not less than 55^{O}F. is maintained during and up to completion of the drywall work.

3.03 CEILING FRAMING AND FURRING

A. Suspended Ceilings: Install complete suspended steel ceiling framing system in accordance with ASTM C 754, and the following:

B. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not connect or suspend steel framing from ducts, pipes or conduit.

C. Sway-brace suspended steel framing with hangers used for support.

D. Unless otherwise indicated, install suspended steel framing components in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 0.1620-inch (8-gage) diameter, 4 feet o.c.
2. Carrying Channels (Main Runners): 1-1/2 inch, 4 feet o.c.
3. Rigid Furring Channels (Furring Members): 16 inches o.c.

E. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

F. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.04 STEEL WALL FURRING

A. Steel Furring: Install steel furring in conformance to ASTM C 754, and stud manufacturer's recommendations. Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

B. Steel Furring: Install screwable steel furring channels over faces of concrete or masonry walls to receive gypsum wallboard finishes, continuously along tops and bottoms of walls and in continuous vertical rows spaced 16 in. o.c. Securely anchor at maximum spacing of 16 in. o.c. along full length of each furring member, through alternate flanges.

C. Access Panels: Install all access panels at partitions, furrings, column enclosures, and suspended ceilings. Access panels will be furnished to this trade loose under other Section(s).

D. Fixture Attachments: Before any wallboard is installed, a complete survey of all fixtures, accessories, cabinet work, shelves, rail brackets, door stops, or other items to be attached to the finished work of this Section shall be made and wood blocking or other attachments shall be installed within the steel framing and furring work to receive the loads. Blockings or other attachments for the various loads shall be as recommended by the manufacturer and shall be described on the shop drawings. All such fixture attachments shall be observed by the Architect before commencing installation of wallboard.

E. Miscellaneous Framing and Furring: Construct all special miscellaneous framing and furring, such as at ceiling edgings, soffits, column and beam enclosures, etc., as detailed and as required to achieve the shapes and profiles indicated and other miscellaneous framing indicated and/or reasonably required for the thorough completion of the Project.

1. Thoroughly fasten together, anchor, and brace to provide absolutely rigid structural conditions fully capable of supporting the loads to be applied with factor of safety not less than 2-1/2 to 1. Carry out the work generally as detailed, strictly following instructions of the manufacturer. Screw all connections with self-tapping metal screws or other appropriate fasteners and provide all additional reinforcement required to assure the required performance.

3.05 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Apply thicknesses and layers of gypsum wallboard at ceilings, walls, partitions, column and beam enclosures as indicated. Stagger joints in each layer. Locate joints in first layer on opposite sides of partitions to occur on different studs. Apply wallboard at ceilings with long dimension perpendicular to furring channels, with each end occurring over a framing member. Install wallboard at walls and partitions with long dimension vertical, and with each end and edge lying over a framing member.

1. At double layer installations apply second layer by combination of laminating adhesive and mechanical fastenings (through first layer into the steel framing and/or furring member behind), in strict accordance with manufacturer's printed recommendations for each project condition.
2. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
3. Fit gypsum panels around ducts, pipes, and conduits.

4. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4-to-1/2-inch-wide joints to install sealant.

C. Carry gypsum wallboard, each side, continuously from floor to underside of construction above, for acoustical and fire-resistive performances. Where installing perpendicular to joists, fit carefully to, and around to provide positive, fire-safe barrier.

D. To minimize end joints, use maximum practical lengths. Bring gypsum wallboard panels into contact, but do not force into place. Fit abutting ends and edges neatly. Provide slots for sealant at top, bottom, ends, and corners of wallboard at all walls and partitions indicated to receive acoustical insulation, as indicated. Also provide slots for sealant where wallboard abuts other finish materials, as specified hereinbelow.

E. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

F. Spacing and installation of drywall screws for the various applications and fire-rating requirements shall conform to the printed standards of the manufacturer.

G. Set heads of fasteners flush with surface of the paper, but not breaking the paper. Where attached loosely to a framing or furring member, a second fastener shall be installed within 1-1/2 in.

H. Cut gypsum wallboard neatly at corners, edges, etc., and for pipes, electrical outlets, electrical conduit and raceway, recessed cabinets, and other projections.

3.06 ACOUSTICAL INSULATION

A. Walls and partitions indicated on the Drawings with STC Rating or indicated to receive acoustical insulation shall have a single, continuous layer of insulation installed as indicated and specified, filling the entire open space between the framing members. Carry insulation behind backs of all electrical boxes and similar appurtenances. Provide mechanical attachment to prevent future settlement.

3.07 INSTALLATION OF WALLBOARD ACCESSORIES

A. Install accessories at gypsum wallboard installations, as follows, in strict accordance with manufacturer's instructions.

1. Install joint reinforcement tape at all joints, and at all internal corners where abutting surfaces are both gypsum wallboard construction.
2. Install corner beads at all external wallboard corners.
3. Install casing bead wherever finish wallboard abuts dissimilar materials and other places where specifically called for on the Drawings.
4. Install control joints generally over (and under) centers of all major wall openings (those greater than 40% of wall height, measured floor to ceiling), over all door frames, over control joints in back-up materials, and at maximum distance of 30 ft. in walls, 60 ft. or to limit areas to not more than 2400 sq. ft., at ceilings (except where lesser distance is indicated), and other places specifically called for on the Drawings. Interrupt furring and/or framing behind the control joints. Specific locations of control joints shall be as indicated or as directed by Architect; submit proposed locations of control joints to Architect for approval before beginning work.

3.08 JOINT FINISHING

A. Finish all corners, joints, and edges of gypsum wallboard and gypsum soffit board work, and all corner beads, casing beads, control joints and other trim to provide complete finishing of all exposed wallboard surfaces, in strict accordance with manufacturer's printed instructions and ASTM C 840. Finish to absolutely flush, true surface showing no irregularity when tested by light source parallel to the plane of the nominal wallboard face.

B. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Provide Level 4 for all gypsum board surfaces, except as outlined below.
2. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.

3.09 ACOUSTICAL SEALING

A. Walls and partitions designated on the Drawings with an STC Rating and/or indicated to receive acoustical or thermal insulation, including interior faces of exterior walls, do all sealing work required, as indicated on the Drawing and generally as listed below.

1. Seal all joints between the gypsum wallboard and surrounding construction.
2. Seal full perimeters of all frames, sleeves, ducts, and other items set into, or passing through, gypsum wallboard construction.
3. Seal full perimeters of all projections through the gypsum wallboard construction, such as pipes, conduits, etc.
4. Seal all control joints in the gypsum wallboard work.
5. Seal all joints between gypsum wallboard and adjoining gypsum wallboard panels at corners and intersections.
6. Seal all joints between gypsum wallboard and adjoining door and window frames in exterior walls.
7. Do all other sealing called for on the Drawings or reasonably required to produce maximum thermal and sound transmission reduction through the walls and partitions.

B. Sealing shall be done using sealant of type specified hereinbefore, in strict accordance with manufacturer's printed instructions and applicable requirements of ASTM C 919. Sealant shall thoroughly fill void for a complete sound and thermal seal, and shall be tooled to dense, smooth, concave finish.

1. Except as may be otherwise specifically called for on the Drawings, in two layer wallboard work seal only the outer layer.

3.10 PROTECTION AND CLEANING

A. Protect the work of other Sections and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

END OF SECTION

SECTION 09510

ACOUSTICAL TILE CEILINGS

(Filed Sub-bid Required)

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

The following should appear on the upper left hand corner of the envelope:

Name of Sub-Bidder: _____
_____
_____

Project: MILLBURY HIGH SCHOOL –
FOODS PROGRAM ROOM RENOVATIONS
Millbury Memorial Junior/Senior High School
12 Martin Street
Millbury, Massachusetts 01527

Sub-Bid for Section: 09510, ACOUSTICAL TILE CEILINGS

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.02 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.03 DESCRIPTION OF WORK

A. Work Included: Provide all labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Provide all labor, materials, and equipment necessary to provide suspended acoustical tile ceilings (2 ft. x 2 ft. acoustical ceiling panels and exposed standard 15/16 inch suspension system matching existing acoustical ceiling) as indicated on Drawings and as specified herein. Work of this Section includes, but is not limited to:

   a. Removal and reinstallation of ACT as indicated and as required to construct the proposed renovations including reinstallation of existing panels and grid suitable for reuse and providing new acoustical panels to match for replacement of existing panels damaged or otherwise unsuitable for reinstallation.
   b. Patch or replace any damaged ACT to match existing.

B. Alternates: Not Applicable

C. Items to Be Installed Only: Not Applicable

D. Items To Be Furnished Only: Not Applicable.

E. Reference To Drawings: Work specified in ACOUSTICAL TILE CEILINGS is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1; D-1.2; A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

F. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 02070, SELECTIVE DEMOLITION.
2. Section 06100, ROUGH CARPENTRY; Wood blocking, furring, and grounds.

3. Division 16 - ELECTRICAL; Electrical fixtures and appurtenances at acoustical ceilings, including independent suspension.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials comply with requirements.

B. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.

C. Verification Samples: Submit representative samples of each material to be exposed in the finish work, showing full range of color and finish work, showing full range of color and finish variations expected. Provide minimum 12 in. x 12 in. samples of each panel type. Provide minimum 12 in. long samples of each exposed suspension systems

D. Test Reports: Submit certified reports for tests required.

E. Fire Rated Assemblies: Where UL Design Assemblies are indicated as part of floor/ceiling or roof ceiling construction, provide substantiating data and certifications from the ceiling system manufacturer that the acoustical ceiling system components provided as part of that assembly have been tested and meet the requirements contained in UL Fire Resistance Directory or are otherwise suitable as part of the indicated Design Assembly.

1.05 QUALITY ASSURANCE

A. Comply with governing laws and building codes and the requirements of The Ceilings and Interior Systems Construction Association (CISCA) ‘Ceiling Systems Handbook’, CISCA ‘Use and Practice’, and ASTM C 636.

B. Installer: A firm with minimum three years’ experience in work of type required by this Section, and which is authorized, certified or licensed by the manufacturers of the primary materials.

C. Source: For each type of material required for the work of this Section, provide primary materials which are the products of a single manufacturer. Provide secondary materials which are acceptable to the manufacturers of primary materials.

D. All ceiling panels shall be from the same run at production facility and shall be manufactured within acceptable tolerances for color consistency.

E. Adhesives shall meet or exceed the VOC content limits of the State of California South Coast Air Quality Management District (SCAQMD) Rule #1168 – Adhesive and Sealant Applications’.

1.06 TESTS

A. Fire Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

B. Surface Burning Characteristics: Provide materials whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.

C. Noise Reduction Coefficient (NRC): Where NRC ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose NRC ratings have been tested in compliance with ASTM C 423 by independent agencies acceptable to the Architect and authorities having jurisdiction.

D. Ceiling Attenuation Class (CAC): Where CAC ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose CAC ratings have been tested in accordance with ASTM E 1414 by Underwriters Laboratories, Inc.

E. Light Reflectance (LR): Where LR rating is indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose LR rating has been tested in compliance with ASTM C 523 by independent agencies acceptable to the Architect and authorities having jurisdiction.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing manufacturer's name, brand names, type of material, and contents.

B. Store materials in interior spaces, above floors, under cover, away from sweating walls and other damp surfaces. Provide ventilation.

1.08 PROJECT CONDITIONS, SEQUENCING, AND SCHEDULING

A. Environment: Perform work only when temperature and humidity conditions are within the limits established by manufacturers of the materials and products used.

B. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1. Proceed with installation of ceiling only when construction above ceilings and penetrating work is complete. Delay installation of ceiling tiles or panels until near time of Substantial Completion.
2. Perform work of this Section coordinated with the layout of light fixtures, HVAC equipment and fixtures, fire suppression system components and all other related work. In general, every penetration shall occur at the center of a ceiling tile or panel.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEMS

A. Provide products of the following manufacturer that meet or exceed requirements specified:

1. Armstrong World Industries, Inc. (Armstrong).
2. USG Interiors, Inc. (USG).
3. Chicago Metallic Corporation.

B. Exposed Suspension Systems - General

1. Where fire rated assembly is indicated, provide a fire-rated ceiling suspension system manufactured by one of the above-named manufacturers.
2. Provide grid modules to match ceiling panel sizes.

C. Suspension System Types: Provide the following suspension system types:

1. 15/16 in. hot-dipped galvanized steel suspension system, 2 ft. x 2 ft. to match existing, equal to Armstrong Prelude XL Suspension System., manufactured by Armstrong, or equal as approved by the Architect.

a. Suspension system shall comply with ASTM C 635 for "Intermediate-Duty System".
b. Provide manufacturer's baked enamel finish on steel exposed surfaces; color shall be 'White'.
c. Where fire rated assembly is required, provide UL-listed fire rated system.

D. Attachment Devices: Provide attachment devices sized for five times design load indicated by ASTM C 635, Table 1, for Direct Hung.

E. Hanger Wire: ASTM A 641, galvanized, soft temper, pre-stretched, Class 1 Coating, minimum 12 gage. Size wire so that stress at three times hanger design load given in ASTM C 635, Table 1, Direct Hung, will be less than the yield stress of the wire.

F. Moldings and Trim: Provide manufacturer's standard profiles to suit edge conditions, panel profile and penetrations.

2.02 ACOUSTICAL CEILING PANELS

A. Provide ceiling panel products of one of the following manufacturers that meet or exceed requirements specified:

1. Armstrong World Industries, Inc. (Armstrong).
2. USG Interiors, Inc. (USG).
3. BPB Celotex (Celotex).

B. Interior Ceiling Panels: Provide the following ceiling panel products, or equal products by other named manufacturers:

1. Acoustical Ceiling Panel (To Match Existing Ceiling Panel): 24 in. x 24 in. panel x 5/8 in. thick, square edge, wet-formed mineral fiber ceiling panel with medium texture equal to Armstrong Cortega Square Lay-In Panel, Item Number 770, manufactured by Armstrong, or approved equal. Panel shall have the following characteristics:

a. Light Reflectance: LR 0.82 according to ASTM E 1477.
b. Flame Spread Rating: Class A (UL Labeled) according to ASTM E 1264.
c. Noise Reduction Coefficient: 0.55, according to ASTM C 423.
d. CAC: UL classified 33 minimum.
e. Recycled Content: 27-43%.
f. Panel Color: White.
g. Suspension System: Suspension System Type 1.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Installer shall examine substrates, supports, and conditions under which this work will be performed and notify Contractor in writing, of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected. Beginning work means Installer accepts substrates and conditions.

3.02 PREPARATION AND INSTALLATION - GENERAL

A. General: Strictly comply with manufacturer's recommendations and instructions.

B. Conditioning: Condition acoustical ceiling materials to temperature and humidity conditions which approximate those that will be present when spaces are occupied by unpackaging and separating material at least 24 hours prior to installation.

C. Exterior doors and windows shall be in place and glazed prior to ceiling installation. Cleaning, concrete, masonry, plaster, and other "wet-work" shall be complete and dry. Maintain a minimum temperature of 65^{O}F. before, during, and after the installation of acoustical work.

D. Coordination: Coordinate installation with other work to ensure proper locations of related work such as light fixtures, mechanical fixtures, fire protection systems and the like.

E. Layout: Measure each area and layout ceilings to balance panel widths on opposite edges of each ceiling in both directions. Avoid use of less than 1/2 width ceiling units wherever possible.

F. Suspension Installation: Erect suspension system in accordance with ASTM C 636, supported only from building structure. Level main suspension members to within a tolerance of 1/8 in. in 10 ft. Splay hangers where necessary and countersplay to balance resulting horizontal forces. Cross brace suspension to prevent lateral sway and displacement during full seismic loads prescribed by code.

G. Install acoustical units flush and level with joints in perfect alignment. Maintain direction of pattern and "mill-run" of acoustical units in one direction.

H. Finish acoustical ceilings and decorative trim shall be level to within 1/8 in. in 10 ft. with total accumulated error not to exceed 1/2 in. or L/960 of overall ceiling dimension, whichever is smaller, in any room or area.

I. Use white, clean gloves when handling ceiling materials.

3.03 INSTALLATION OF SUSPENDED EXPOSED "TEE" LAY-IN PANEL SYSTEM

A. Install exposed "Tee" suspension system where indicated, in accordance with ASTM C 635.

B. Secure hanger anchors symmetrically to structure above areas to receive "Tee" suspension grid, locating the hangers in rows directly above exposed main "Tees". Install main "Tees" at proper elevation with manufacturer's recommended ties. Install cross "Tees" at spacing required for developing a 2 ft. x 2 ft. grid as indicated. Install wall moldings at perimeter walls and columns where main or cross "tees" do not occur, or as otherwise called for on the Drawings. Miter corners where wall molding intersect or install corner caps.

C. After installation of the exposed "Tee" suspension system, install acoustical panels flush and level, with panel grain in single direction.

3.04 CLEANING

A. Protect the work of other trades and work of this Section already installed against soiling and damage by the exercise of reasonable care and precautions. Repair or replace any work so damaged or soiled.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

(Filed Sub-bid Required)

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

The following should appear on the upper left hand corner of the envelope:

Name of Sub-Bidder: _____

_____

_____

Project: MILLBURY HIGH SCHOOL –
FOODS PROGRAM ROOM RENOVATIONS
Millbury Memorial Junior / Senior High School
12 Martin Street
Millbury, Massachusetts 01527

Sub-Bid for Section 09650, RESILIENT FLOORING

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.02 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.03 DESCRIPTION OF WORK

A. Work Included: Provide all labor, materials, and equipment necessary to complete the resilient flooring work of this Section, including but not limited to the following:

1. Provide new resilient flooring for Foods Program Room, as indicated on the Drawings and as specified including furnishing and installation of luxury vinyl tile (LVT) flooring and vinyl wall base (VB).
2. Install new VCT flooring to match in areas where existing VCT needs to be replaced.
3. Mastics and leveling compounds.
4. Preparatory work of materials and surfaces to receive resilient flooring beyond that specified to be done as work of other Sections, shall be included as work of this Section.

B. Alternates: Not Applicable.

C. Items To Be Installed Only: Not Applicable.

D. Items To Be Furnished Only: Not Applicable.

E. Reference To Drawings: Work specified in RESILIENT FLOORING is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1; D-1.2; A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

F. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 02070, SELECTIVE DEMOLITION.
2. Section 03910, CONCRETE REPAIR.
3. Section 03920, SHOTBLASTING OF CONCRETE FLOORS.

1.04 SUBMITTALS

A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation, and maintenance instructions for flooring and accessories.

B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.

C. Submit Safety Data Sheets (SDS) available for adhesives, moisture mitigation systems, primers, patching/leveling compounds, floor finishes (polishes) and cleaning agents and Material Information Sheets for flooring products.

D. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Section 01700, CONTRACT CLOSEOUT. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents specified herein.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including moisture mitigation systems, primers, leveling and patching compounds, and adhesives.

B. Select an installer who is experienced and competent in the installation of solid vinyl tile flooring and the use of specified products.

1. Engage installers certified by the flooring manufacturer as Commercial Flooring Certified Installers.
2. Confirm installer's certification by requesting their credentials.

C. Fire Performance Characteristics: Provide resilient tile flooring with the following fire performance characteristics as determined by testing material in accordance with ASTM test methods indicated below by a certified testing laboratory or other testing agency acceptable to authorities having jurisdiction:

1. ASTM E 648 (NFPA 253) Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.
2. ASTM E 662 (NFPA 258) (Smoke Generation) Maximum Specific Optical Density of 450 or less.

1.06 REFERENCES

A. Armstrong Flooring Technical Manuals

1. Armstrong Flooring Guaranteed Installation Systems instructions.

B. ASTM International:

1. ASTM E 648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
2. ASTM E 662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
3. ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
4. ASTM F 1482, Standard Guide to Wood Underlayment Products Available for Use Under Resilient Flooring
5. ASTM F 1700 Standard Specification for Solid Vinyl Tile
6. ASTM F 1861 Standard Specification for Resilient Wall Base
7. ASTM F 1869 Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
8. ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

1.07 SYSTEM DESCRIPTION

A. Performance Requirements: Provide flooring which has been manufactured, fabricated, and installed to performance criteria certified by manufacturer without defects, damage, or failure.

B. Administrative Requirements

1. Pre-installation Meeting: Conduct an on-site pre-installation meeting to verify project requirements, substrate conditions, manufacturer’s installation instructions and manufacturer’s warranty requirements.
2. Pre-installation Testing: Conduct pre-installation testing as follows: (i.e., moisture tests, bond test, pH test, etc.).

C. Test Installations/Mock-ups: Install at the project site a job mock-up using acceptable products and manufacturer approved installation methods, including concrete substrate testing. Obtain Owner’s and Architect’s acceptance of finish color, texture and pattern, and workmanship standards.

1. Mock-Up Size: Minimum 4 ft. x 4 ft.
2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
3. Incorporation: Mock-up may be incorporated into the final construction with Owner's approval.

D. Sequencing and Scheduling

1. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.
2. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond, moisture tests and pH test.

1.08 PROJECT CONDITIONS

A. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65ºF (18ºC) and a maximum temperature of 85ºF (29ºC) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55ºF (13ºC) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances. Refer to the flooring manufacturer’s instructions for a complete guide on project conditions.

B. Do not install resilient flooring materials until they are at the same temperature as the space where they are to be installed.

C. Maintain relative humidity in spaces to receive resilient flooring before, during, and after installation within the range recommended by manufacturer.

D. Close spaces to traffic during resilient flooring installation.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver resilient flooring, and installation accessories to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C).

C. Store resilient flooring on flat surfaces. Move floor materials and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

D. Move resilient floor coverings and related products into spaces where they will be installed at least 72 hours in advance of installation.

1.10 COORDINATION, SEQUENCING, AND SCHEDULING

A. Coordinate work of this Section with work of other Sections affecting, or affected by, this work, as necessary to ensure completion of work of the Contract on schedule.

B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.

1.11 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

1. Furnish not less five percent (5%) of each type and color of LVT used on the Project from the same manufacturer’s run, boxed, and properly labeled for complete and easy identification.
2. Furnish not less than 3% of resilient wall base of each type and color installed.

1.12 LIMITED WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Limited Warranty Period: Twenty (20) years for luxury vinyl tile (plank) flooring.

C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

1.13 EXTENDED SYSTEM LIMITED WARRANTY

A. Resilient Flooring System: Submit a written warranty executed by the manufacturer, agreeing to repair or replace system (subfloor preparation products, adhesive, and floor covering) that fails within the warranty period.

B. Limited Warranty Period: Ten (10) years on top of the Resilient Flooring Limited Warranty.

C. The installation of the flooring product along with the recommended adhesive, as well as any of the subfloor preparation products listed above, provides 10 additional years of limited warranty coverage. The limited warranty covers the installation integrity for the length of the flooring product warranty plus 10 years. To qualify for the Warranty, any subfloor preparation product needed for an installation must be an Armstrong Flooring product.

D. For the System Limited Warranty to be valid, this product is required to be installed using the appropriate Flooring Guaranteed Installation System. Product installed not using the specific instructions from the Guaranteed Installation System will void the warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Resilient flooring, wall base, adhesives and subfloor preparation products and accessories:

1. Armstrong Flooring Inc., 1770 Hempstead Road, Lancaster, PA 17605, armstrongflooring.com/commercial., or approved equal.
2. Manufacturer must have a headquarters in the United States of America.

2.02 RESILIENT TILE FLOORING MATERIALS

A. Luxury Vinyl Tile (LVT) Flooring: Provide Natural Creations® Luxury Vinyl Plank (Wood Look) Flooring manufactured by Armstrong Flooring Inc.

1. Description: A layered construction consisting of a tough, clear, rigid vinyl wear layer protecting a high-fidelity print layer on a solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish, the wear surface is embossed with different textures to enhance each of the printed visuals. Colors are insoluble in water and resistant to cleaning agents and light.
2. Reference Specification - ASTM F 1700, “Standard Specification for Solid Vinyl Tile", Class III, Type B – Embossed Surface. Meets requirements for size, squareness, thickness, thickness of wear layer, residual indentation, resistance to chemicals, resistance to light and resistance to heat.
3. Pattern and Color: Color selected from the range currently available from Armstrong Flooring Inc.
4. Size: 6 in. x 48 in. (152 mm x 1219 mm).
5. Wear layer thickness: 0.020 in. (0.5 mm).
6. Thickness: 0.125 in. (3.2 mm).

2.03 WALL BASE MATERIALS

A. Provide 1/8 in. (3.18 mm) thick, 4 in. (10.16 cm) high Armstrong Flooring Wall Base with a matte finish, conforming to ASTM F 1861, Type TP - Rubber, Thermoplastic, Group 1 - Solid, Style B – Cove.

B. Wall Base Color: Armstrong R41SG – SMOKE GREY.

2.04 ADHESIVES

A. Provide Armstrong S-995 Flooring Adhesive under the flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

1. High Moisture Resistant Adhesive: [TBD].

B. Provide Armstrong S-319 Adhesive for field areas and S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.

2.05 ACCESSORIES

A. For patching, smoothing, and leveling monolithic subfloors (concrete), provide Armstrong S-194 Cement-Based Patch, Underlayment and Embossing Leveler / S-195 Underlayment Additive; S-463 Level Strong™ cement based self-leveling compound; S-466 Patch Strong™ flexible patching and smoothing compound.

B. For priming porous substrates to aid in adhesive bond strength and reducing subfloor porosity, provide S-464 Prime Strong™ acrylic primer for porous substrates. For non-porous substrates, provide S-465 NP Prime Strong™ acrylic primer for non-porous substrates.

C. For creating a moisture barrier, provide S-462 Seal Strong™ two-part moisture mitigation system.

D. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.

E. Provide transition/reducing strips tapered to meet abutting materials.

F. Provide threshold of thickness and width as shown on the Drawings.

G. Provide resilient edge strips of width shown on the Drawings, of equal gauge to the flooring, homogeneous vinyl, or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.

H. Provide metal edge strips of width shown on the Drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 - EXECUTION

3.01 MANUFACTURER’S INSTRUCTIONS

A. Compliance: Comply with manufacturer’s product data, including technical bulletins, product catalog, installation instructions, and product carton instructions for installation and maintenance procedures as needed.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions (i.e., moisture tests, bond test, pH test, etc.).

B. Visually inspect flooring materials, adhesives, and accessories prior to installation. Flooring material with visual defects shall not be installed and shall not be considered as a legitimate claim.

C. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.

D. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.

E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.03 PREPARATION

A. Subfloor Preparation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong Flooring [S-184 Fast-Setting Cement-Based Patch and Underlayment][S-194 Cement-Based Patch, Underlayment and Embossing Leveler / S-195 Underlayment Additive] [S-463 Level Strong™ cement based self-leveling compound] [S-466 Patch Strong™ flexible patching and smoothing compound] [S-464 Prime Strong™ acrylic primer for porous substrates] [S-465 NP Prime Strong™ acrylic primer for non-porous substrates] as recommended by the flooring manufacturer. Refer to Armstrong Flooring Guaranteed Installation Systems instructions and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.].

B. Subfloor Preparation Moisture Mitigation: Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, mitigate moisture and other defects with Armstrong Flooring [S-194 Cement-Based Patch, Underlayment and Embossing Leveler / S-195 Underlayment Additive] [S-463 Level Strong™ cement based self-leveling compound] [S-466 Patch Strong™ flexible patching and smoothing compound] [S-462 Seal Strong™ two-part moisture mitigation system] [S-464 Prime Strong™ acrylic primer for porous substrates] [S-465 NP Prime Strong™ acrylic primer for non-porous substrates] as recommended by the flooring manufacturer. Refer to Armstrong Flooring Guaranteed Installation Systems instructions and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.].

C. Subfloor Cleaning: The surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers, and other foreign materials that might affect the adhesion of resilient flooring to the concrete or cause a discoloration of the flooring from below. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring

material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate, they must be mechanically removed prior to the installation of the flooring material. Refer to the Armstrong Flooring Guaranteed Installation Systems instructions and ASTM F 710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring for additional information on subfloor preparation.

D. When using S-995 Adhesive, perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes" and Bond Tests as described in publication instructions "Armstrong Flooring Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Internal relative humidity of the concrete shall not exceed 99%. On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.

E. [When using S-319 Adhesive, perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes" and Bond Tests as described in "Armstrong Flooring Guaranteed Installation System," instructions to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Internal relative humidity of the concrete shall not exceed 99%. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained].

F. [When using S-1000 Adhesive, perform subfloor moisture testing in accordance with [ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes"] [ASTM F 1869,"Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride"] and Bond Tests as described in "Armstrong Flooring Guaranteed Installation System" instructions to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. [Internal relative humidity of the concrete shall not exceed 100%.] [MVER shall not exceed 14 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained].

G. Concrete pH Testing: Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.

3.04 INSTALLATION OF FLOORING

A. Install flooring in strict accordance with the latest edition of Armstrong Flooring Guaranteed Installation Systems instructions. Failure to comply may result in voiding the manufacturer's warranty listed in Section 1.08.

B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.

1. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.

2. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
3. Roll with a 100-lb. (45.36 kilogram) roller in the field areas. Refer to specific rolling instructions of the flooring manufacturer.
4. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.05 INSTALLATION OF ACCESSORIES

A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths if practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.

1. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.
2. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.
3. Apply [butt-type] [overlap] metal edge strips where shown on the drawings, [before] [after] flooring installation. Secure units to the substrate, complying with the edge strip manufacturer's recommendations.

3.06 CLEANING

A. Perform initial and on-going maintenance according to the latest edition of the maintenance recommendations for the specified flooring.

3.07 PROTECTION

A. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See Finishing the Job in the latest edition of Armstrong Flooring Guaranteed Installation Systems instructions.

END OF SECTION

SECTION 09900

PAINTING

(Filed Sub-bid Required)

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

1.01 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

   The following should appear on the upper left hand corner of the envelope:

   Name of Sub-Bidder: _____
   _____
   _____

   Project: MILLBURY HIGH SCHOOL –
   FOODS PROGRAM ROOM RENOVATIONS
   Millbury Memorial Junior/Senior High School
   12 Martin Street
   Millbury, Massachusetts 01527

   Sub-Bid for Section: 09900, PAINTING

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.02 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.03 DESCRIPTION OF WORK

A. Work Included: Provide all labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Provide painting and finishing work throughout interior of Project as indicated and scheduled on the Drawings and as specified.
2. Examine Contract Documents to determine full extent of painting and finishing work required. Materials provided under other Sections that need painting or finishing and are left unfinished under requirements of other Specification Sections, shall be painted and finished to completion under work of this Section, unless specifically scheduled herein to be left unfinished.
3. Preparatory work of materials and surfaces to receive paint beyond that specified to be done as work of other Sections, shall be included as work of this Section.

B. Painting Contractor shall be responsible for insuring that all coatings and the application of all coatings conform to all federal, state, and local regulations, including VOC/VOS rules at the time of application.

C. Alternates: Not Applicable.

D. Items to Be Installed Only: Not Applicable

E. Items To Be Furnished Only: Not Applicable.

F. Reference To Drawings: Work specified in PAINTING is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1, D-1.2, A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, and E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

G. Related Work: The following items are not included in this Section and will be performed under the designated Sections:

1. Section 03910, CONCRETE REPAIR.
2. Section 04520, MASONRY REPAIR.

3. Section 05500, METAL FABRICATIONS.
4. Section 07920, JOINT SEALANTS.
5. Division 15 - MECHANICAL and Division 16 - ELECTRICAL; Factory finish and prime coats on mechanical and electrical fixtures and equipment.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

B Initial Color Selection Samples: Submit manufacturer's standard color charts or chips showing complete range of colors, textures, and finishes available for each paint system used.

1. Provide brush-off for color match meeting Owner and Architect’s approval.

C. Verification Samples: After initial selection of colors, submit representative samples of each paint system color that is to be exposed in the completed work. Show full color ranges and finish variations expected. Provide texture to simulate actual conditions. Define each separate coat, including block fillers and primers. Resubmit samples until required sheen, color, and texture have been approved. Provide samples as follows:

1. Paint Samples for Smooth Surfaces: Provide samples of painted finishes on gypsum drywall or Masonite board having minimum size of 144 sq. in.

1.05 QUALITY ASSURANCE

A. Source: Provide primers and undercoat paint produced by same manufacturer of finish coats for each substrate.

B. Coordination: Review other Specification Sections where primers are provided to ensure compatibility with finish coatings provided under this Section.

C. Mock-Ups: Prior to commencing work of this Section, provide 100 sq. ft. mock-ups of each color, paint system, and substrate at locations acceptable to the Architect. Obtain Architect's acceptance of visual qualities. Refinish mock-ups until Architect's acceptance is obtained. Maintain acceptable mock-ups throughout the remainder of the work to serve as criteria for acceptance of the work. Acceptable mock-ups may be incorporated into the finish work.

D. The painting subcontractor shall submit qualifications indicating his experience as a painting contractor. These qualifications shall include a list of projects successfully completed, similar in size and scope to this Project.

1.06 TESTS

A. The Owner may employ an independent testing agency to perform tests, evaluations, and certifications of products used. Cooperate and permit samples of materials to be taken as they are used.

1.07 PROJECT CONDITIONS

A. Weather, Temperature, and Humidity: Perform work only when existing and forecasted weather conditions fall within limits established by manufacturers of materials used.

1. Indoor Temperature: Maintain indoor temperature at 65°F. during application and drying of paints.
2. Do not paint exterior surfaces while surfaces are exposed to the hot sun.

B. Substrates: Proceed with work only when substrate construction and penetration work is complete.

C. Lighting: Since lighting conditions can alter appearances of finish painting work, perform work of this Section under lighting conditions simulating permanent lighting system to the greatest extent possible.

D. Where painting operations require the use of interior paints and coatings which are not latex or acrylic based materials (i.e. solvent-based materials) or paint or coating materials which when applied will produce fumes or vapors which may adversely affect the occupants of the building, the Contractor shall schedule this painting work (applying solvent-based or oil-based paints and coatings) during premium time (overtime), at no additional cost to the Owner, so as not to affect other contractors working on-site.

E. A room shall be assigned for the storage of painting tools and materials. The floor shall be properly protected with drop cloths or building paper. Paint shall be mixed in suitable containers, and necessary precautions shall be taken to prevent fire. This room shall be locked at the completion of each day's work. The Contractor shall have duplicate keys.

F. Protect all adjacent surfaces from damage by paint and provide all drop cloths and masking to accomplish the same.

G. Do not use any plumbing fixture or pipe for the disposal of waste materials. Carry all water required to the mixing room and dump all waste materials in containers outside the building. Remove oily rags and other combustible waste materials from the building daily.

H. Removal of Accessories

1. The General Contractor will remove and replace all finished hardware applied to doors, except butts, and shall be responsible for the removal and replacement of all accessories, plates and fixtures of other trades, as necessary for the satisfactory completion of work under this Section.
2. Doors already in place shall be removed and the top and bottom edges finished with two (2) coats of specified finish applied prior to finishing face of doors. Doors shall be replaced after edges are dry.
3. In no case shall there by any attempt to paint around finish hardware or other new or existing removable items which are already in place.

1.08 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products in accordance with Section 01600, MATERIAL AND EQUIPMENT.

B. Deliver materials in unopened original containers bearing manufacturer's labels.

C. Store materials in fully sealed containers, outside the building, preferably in exterior storage shed, well ventilated, and with a minimum ambient temperature of 45°F. Oily rags and waste must be removed from the building every night, and under no circumstances will be allowed to accumulate. Each space containing stored paint materials shall be provided with UL labeled fire extinguisher of suitable type, class, and capacity.

1.09 COORDINATION

A. Work under this section shall be properly coordinated with the work of other sections to assure the steady progress of all the work of the Contract.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Paints and Coatings: Provide first quality products as manufactured by one of the following manufacturers that meet or exceed specified requirements:

1. Benjamin Moore and Co. (Moore).
2. Devoe and Raynolds (Devoe).
3. The Sherwin-Williams Company (S-W).
4. Tnemec Company, Inc. (Tnemec).

B. Clear Penetrating Sealer for Concrete (Except for Concrete Floors to receive Epoxy Floor System): Provide products of the following manufacturer that meet or exceed specified requirements; equal products of other manufacturers will be acceptable substitutes provided that material meets the performance characteristics of the specified product:

1. Ashford Formula, manufactured by Curecrete Chemical Company, Inc.; or approved equal by Sika Corporation, Chem-Trete; or approved equal.

C. Materials used shall be best grade products of their respective kinds. The Painting Schedule is based on products the above-named manufacturers. These are specified to establish a standard of quality and kind of material desired. Provide these products or equals as approved by Architect.

D. Note: If substitutes are proposed, submit complete schedule showing materials specified and equivalent materials proposed as substitutes. Provide complete manufacturer's product data on proposed materials. Substitutes must be approved by Architect before commitment for materials is made.

E. Assume full responsibility for proper performance of materials, for method of application, and for compatibility of materials applied over shop coats or other coats previously applied, including but limited to primers, sealers, preservative treatments, etc. Notwithstanding specific schedules in this Section, select primers which have been verified to be appropriate for each of the substrates and finishes encountered.

F. Provide miscellaneous painting materials such as linseed oil, shellac, turpentine, and thinner of the highest quality.

2.02 COLORS

A. Provide colors in accordance with approved Color Schedule. Colors designations indicated in the Color Schedule are associated with a particular paint or coating manufacturer's custom and/or standard line of available colors.

B. Paint or coatings of other manufacturers as listed herein will be acceptable provided that the paint or coating meets or exceeds the quality of paint or coating specified and that the paint or coating may be tinted as required to provide an acceptable color match and appropriate degree of gloss, acceptable to the Architect.

C. Tint and match colors to the satisfaction of Architect. Provide facilities for comparison and adjustment of colors.

D. No limit is placed on number of colors that may be required; however, the following maximum number of colors may be used in any one room, area, or surface:

1. Four colors.

E. Colors and Finishes:

1. Walls:

a. Wall Color (Field): BEHR PPU18-10 Natural Grey.
b. Wall Color (Accent): Maroon (match exist H.S. Maroon).

2. Trim:

a. Window Trim: Maroon Semi-Gloss (match exist H.S. Maroon).
b. Door Trim: Semi-Gloss White.

3. Doors:

a. Doors: Match exist color.

PART 3 - EXECUTION

3.01 INSPECTION AND GENERAL PREPARATION

A. Inspect surfaces to receive finishes to ensure they are in proper condition to receive work under this Section.

B. If surfaces are not thoroughly dry, or if surfaces cannot be put in proper condition to receive paint or other finish by customary cleaning methods, sanding, or spackling, notify Architect in writing.

C. Commencing work on any surface will be construed as acceptance of the surface as being satisfactory to properly receive the work of this Section.

D. Furnish and lay drop cloths in all rooms and areas where painting and finishing is being done, to adequately protect flooring and other work from all damage during the painting work.

E. Remove hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Use skilled mechanics for removal, resetting, and protection.

F. Cleaning: Do not paint over dirt, dust, rust, grease, moisture, or other contaminants detrimental to the formation of a durable paint finish. Clean surfaces thoroughly prior to painting in any given area.

G. Touch up bare or abraded spots on surfaces with shop or existing finishes scheduled to be painted under this Section. Use same material used for shop coat. Substrate shall be smooth, free from raised grain; putty sags, cracks, rust, grease, dirt, or other foreign matter or defect.

H. Incompatible Shop Primers: Remove incompatible shop primers and reprime surfaces, or provide barrier coats in compliance with finish paint manufacturer's instructions.

3.02 SURFACE PREPARATION

A. Prepare surfaces to receive work of this Section in strict accordance with manufacturer's instructions applicable to each material, condition, and finish.

B. Gypsum Wallboard: Fill holes, dents, and similar flaws in gypsum wallboard with joint compound. Cut out and fill cracks. Sand surface of patch smooth and flush with adjacent surfaces. Do not abrade adjacent surfaces. Patched areas shall not be detectable in finished work.

C. Wood to be Painted: Sand surfaces smooth and free of marks prior to applying first coat. Wash sap spots and knots with mineral spirits. When dry, touch-up spots and knots with an approved sealer for exterior work, and with two coats of shellac for interior work.

1. Fill nail holes, cracks, open joints, and other defects, with putty or plastic wood filler. Sand smooth when dry.
2. Prime tops, edges, and bottoms, of unprimed wood doors immediately upon delivery. Prime hardware cut-outs in similar manner prior to installation of butts, locks, and closers.
3. Prime wood edges, ends, faces, undersides, backsides, including cabinets, casework, paneling, and moldings and trim.
4. Prime wood glazing rabbets and sealant slots before glazing or sealant work is begun.
5. All exterior trim shall be backprimed prior to installation.

C. Masonry to be Painted: Power wash as required; masonry shall be clean and dry, free of surface contaminants

D. Field-Welded Metal: After installation, field-welding, and grinding, and immediately before painting, remove rust, loose mill scale, dirt, weld flux, weld spatter, weld smoke stains, burnt primer, and other foreign material with wire brushes and/or steel scrapers. Power tool clean in accordance with SSPC SP 3. Remove grease and oil by use of solvent recommended by paint manufacturer. Sand exposed surfaces, and between coats, as required to produce smooth, even finishes.

1. Sand smooth and spot prime welded areas, and areas where prime coat has been damaged or abraded, using rust inhibitive primer scheduled in this Section.

E. Other Ferrous Metal: Remove rust, mill scale, and foreign materials. Wire brush or sand damaged or rusted area to bright metal. Remove grease or dirt with solvents recommended by paint manufacturer just prior to applying paint.

1. Spot prime all areas where shop coat has been damaged or abraded, using same type paint as used for shop coat.

F. Field-Welded Galvanized Metal: After installation, field-welding, and grinding, and immediately before painting, remove rust, loose mill scale, dirt, weld flux, weld spatter, weld smoke stains, and other foreign material with wire brushes and/or steel scrapers. Power tool clean in accordance with SSPC SP 3. Remove grease and oil with solvents recommended by paint manufacturer. Sand exposed surfaces, and between coats, as required to produce smooth, even finishes.

1. Sand smooth welded areas and areas where galvanized coating has been damaged or abraded. Spot prime using zinc primer scheduled in this Section.

G. Other Galvanized Metal: Prior to installation, remove corrosion and foreign materials by sanding or other appropriate method. Remove grease or dirt with solvent recommended by paint manufacturer just prior to applying primer.

H. Other Non-Ferrous Metal: Prepare shop primed non-ferrous metals similarly to ferrous metals, specified above.

1. Prepare unprimed non-ferrous metals by thoroughly cleaning of oil, grease, and temporary protective coatings using solvent recommended by primer manufacturer. Provide additional pretreatment recommended by primer manufacturer to assure permanent adhesion of paint coats.

I. Concrete to Receive Clear Penetrating Sealer:

1. Concrete to be Sealed: Allow a minimum of 30 days curing time prior to sealing new concrete.
2. Sweep all areas to be sealed with a fine bristle broom or scrub, hose off with water and let dry, to remove surface dust, dirt, and contamination.

J. Other Materials: Prepare other materials in strict accordance with recommendations of manufacturers of materials to be finished, and primers and finishes to be applied.

K. Materials Preparation: Mix and prepare paint materials in accordance with manufacturer's printed instructions. Use only thinners approved by paint manufacturer, and only within recommended limits.

3.03 APPLICATION

A. Painting Schedule in this Section lists minimum number of coats required. If specified minimum number of coats does not completely cover or hide base materials, provide additional coats required for coverage and uniform finish appearance, without additional cost to Owner.

B. Apply paint in strict accordance with manufacturer's instructions. Use applicators and techniques best suited for substrates and types of materials being applied. No material shall be thinned in any way except as directed by manufacturer.

1. Workmanship shall be of the highest quality. Only skilled workmen shall be employed. All materials shall be applied under adequate illumination, evenly spread and smoothly flowed on without runs or sags. All work not conforming to the specifications shall be cleaned off and repainted at the expense of the Painting Contractor.
2. Do not apply initial coating until moisture content of surface is within limitations recommended by manufacturer and surface is prepared in conformance with specifications and manufacturers recommendations.
3. All materials shall be applied in accordance with the manufacturer's directions as printed on container and any thinning required shall be done in the manner and exclusively with the type of reducer recommended.
4. No painter's finish shall be applied until the preceding coat is thoroughly dry and in no case less than six (6) days for exterior work and two (2) days for interior work, unless manufacturer of the paint material in question specifically directs otherwise. Exterior painting shall not be undertaken at temperatures below 50 degrees F. or immediately following rain, frost, or if dew is on the surface, sand and dust between each coat to remove defects.
5. Finishing materials shall be free from skins, lumps or any foreign matter when used and shall be kept well stirred while being applied. Each coat shall be evenly brushed out.

C. Apply paints and coatings at coverage rates and dry film thicknesses scheduled at the end of this Section. Each coat applied must be inspected and approved by Architect prior to application of succeeding coat, otherwise no credit for the coat applied will be given and work in question shall be recoated without additional expense to Owner. Notify Architect when each coat is ready for inspection.

D. Additional Coats: Provide additional coats necessary to eliminate show through and bleed through conditions.

E. Drying Time: Allow manufacturer's recommended drying time between successive coats. However, allow each coat to thoroughly dry prior to application of subsequent coat.

F. Sanding: Lightly sand finishes between coats using #00 sandpaper.

G. Tinting: Tint prime coat on gypsum wallboard and plaster to approximate color of final shade.

H. Closets: Finish closets inside the same as adjoining rooms, unless otherwise specified or scheduled.

I. Doors and Panels: Paint all doors, panels, access panels, etc., in the "open" position. Paint all edges, tops, bottoms, and both faces. Paint back face of access panels and removable or hinged covers to match adjacent exposed surfaces.

J. Movable Equipment and Furnishings: Paint surfaces behind movable equipment and furnishings same as adjacent exposed surfaces.

K. Permanently Fixed Equipment: Paint surfaces behind permanently fixed equipment with prime coat only.

L. Duct Interiors: Paint interior surfaces of ducts where visible through registers, grilles, or louvers with flat black, non-specular paint.

M. Concrete to Receive Clear Penetrating Sealer: Apply sealer in accordance with manufacturer's recommendations at a rate not to exceed 150 sq. ft. / gallon.

N. Finished work shall be free from runs, sags, hairs, defective brushing, and clogging of lines and angles. Flaws visible in the completed work shall be removed and the area satisfactorily repaired.

O. Mechanical and Electrical Work: Painting of mechanical and electrical items is limited to items exposed to view in occupied areas; mechanical and electrical items within mechanical rooms, attic, and other similar spaces are to be left unpainted or shop finished without a field-applied finish):

1. Mechanical items to be painted include, but are not limited to:

   Ductwork.
   Heat exchangers.
   Insulation
   Motors and mechanical equipment.
   Piping, hangers, and supports.
   Tanks and equipment.

2. Electrical items to be painted include but are not limited to:

   Conduit and fittings.
   Switchgear.

P. Completed Work: Provide finishes that match approved samples and mock-ups for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.04 COMPLETION

A. Cleaning: At completion of work of this Section, remove paint and varnish spots, and oil, grease, and other stains caused by this work from exposed surfaces. Leave finishes in a satisfactory condition.

B. At completion of work of this Section, remove masking materials and other debris. Reinstall or replace fixtures, plates, etc., removed to facilitate application of paint.

C. Retouching: Touch-up and repair applied finishes which, for any reason have been damaged during construction work. All finished work applied under this Section shall have finished surfaces as approved by finish material manufacturer.

D. Final Inspection: Protect painted surfaces against damage until date of Substantial Completion. Architect will conduct final inspection of painting work. Areas that do not comply with requirements of these Specifications shall be repainted or retouched to satisfaction of Architect at no additional cost to Owner.

E. Paint Schedule: Prepare Schedule which includes a schedule identifying paint manufacturer, paint type, paint color, and gloss for each painted surface in each room. Said Schedule shall be sufficiently detailed to permit the Owner to use this Schedule for future maintenance, repainting, and reordering of paints and coatings.

3.05 SURFACES NOT TO BE FINISHED

A. Finishes for the following items are either included under other appropriate Sections or require no painting, except as otherwise specifically scheduled with subsequent Exterior and Interior Schedules.

1. Chrome or nickel plating, stainless steel, bronze, brass, and aluminum other than mill finished, unless otherwise specified.
2. Factory finished mechanical and electrical equipment, pumps, and machinery, which occur in mechanical or equipment rooms or areas.
3. Galvanized ducts, pipes, conduits, etc., occurring within mechanical areas or spaces. Also all such items fully concealed from view in the finished work (except items located above open cell ceilings in corridors).
4. Factory finished materials, specialties, and accessories unless otherwise specified.
5. Ceramic and clay products, glass, plastic, and other surfaces with "integral" finishes, except as otherwise scheduled hereinbelow.
6. Exterior concrete.
7. Architectural woodwork specified as shop finished.

3.06 PAINT SCHEDULE

A. Number of coats scheduled is minimum. Refer to Paragraph 3.02 for surface preparation and Paragraph 3.3A., hereinbefore.

B. Painting of Interior Surfaces: Important Note: Notwithstanding anything in the following schedule to the contrary, interior painting and finishing shall conform to the applicable laws and building code regarding fire hazard classifications of finish materials.

1. Interior Gypsum Wallboard Ceilings and Soffits for Acrylic Latex Finish, Eggshell or Satin:

   a. One Coat - Benjamin Moore Pristine Eco Spec Interior Latex Primer Sealer 231.
   b. Two Coats - Benjamin Moore Pristine Eco Spec Interior Latex Eggshell Enamel 223.

2. Interior Gypsum Wallboard Ceilings and Soffits for Acrylic Latex Finish, Eggshell or Satin:

   a. One Coat - Benjamin Moore Pristine Eco Spec Interior Latex Primer Sealer 231.
   b. Two Coats - Benjamin Moore Pristine Eco Spec Interior Latex Eggshell Enamel 223.

3. Interior Gypsum Wallboard for Epoxy Finish:

   a. One Coat - Benjamin Moore Super Spec HP Polyamide Epoxy High Gloss Enamel P42 (DFT 2.0 to 3.0 mils).
   b. Two Coats - Benjamin Moore Super Spec HP Acrylic Epoxy Coating P43 (DFT 1.5 mils).

4. Interior Masonry Walls for Epoxy Paint Finish:

   a. Primer - Tnemec Series 130 Envirofill Acrylic Block Filler, spray- applied and rolled out; applied at 100 sq. ft. per gallon.
   b. Two Coats - Tnemec Series 83 Ceramalon II (DFT 5.0 to 7.0 mils).

5. Interior Finish Carpentry for Semi-Gloss Paint Finish (softwoods, paint grade hardwood, plywood, MDF, MDO, and hardwood veneers):

   a. One Coat - Benjamin Moore Pristine Eco Spec Interior Latex Primer Sealer 231.
   b. Two Coats - Benjamin Moore Pristine Eco Spec Interior Latex Semi-Gloss 224.

6. Interior Metal Handrail and Railing Assemblies:

   a. One Coat - Epoxy Primer in shop, under other Section.
   b. After Installation:

      1). Touch-Up Coat - Tnemec "No. 161 Hi-Build Epoxoline" Epoxy.
      2). Two Coats - Tnemec "No. 73 Endura-Shield III" Acrylic Polyurethane (DFT 1.5 to 2.0 mils).

7. Interior Metals not Specified to Receive other Coating Systems:

   a. One Coat - Approved primer, in shop under other Sections where specified), or Benjamin Moore #M04 Acrylic Metal Primer

      Note: One prime coat only is required at interior metal work, except touch-up of areas which have become rusted or damaged prior to finish painting.

   b. Two Coats - Benjamin Moore Pristine Eco Spec Interior Latex Semi-Gloss 224.

8. Exposed Structure overhead including overhead deck, beams, and conduit and piping, ductwork:

   a. Shop Primer - Tnemec Series 10-1009 Grey Non-Lead Based Primer (DFT 2.5 mils).
   b. One Coat - Tnemec Series 16 Unibond Rust Inhibitive Coating (DFT 3.0 mils).

9. Penetrating Sealer for Exposed Concrete Floor not scheduled to receive another finish:

   a. One Coat - Curecrete Chemical Co. "Ashford Formula" (150 sq. ft. per gallon).

10. Mechanical and Electrical Work (Paint all exposed items throughout the project except factory finished items with factory-applied baked enamel finishes which occur in mechanical rooms or areas, and excepting chrome or nickel plating, stainless steel, and aluminum other than mill finished. Paint all exposed ductwork and inner portion of all ductwork visible through grilles and registers):

    a. Same as specified for other interior metals, hereinabove.

END OF SECTION

SECTION 10520

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. Provide fire extinguishers and fire extinguisher brackets as required to complete the work of the Contract, as indicated on the Drawings and as specified herein. Include, but do not limit to:

1. Fire extinguishers.
2. Mounting brackets.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:

1. Section 06100, ROUGH CARPENTRY; Wood blocking.
2. Section 09250, GYPSUM WALLBOARD AND ACCESSORIES.
3. Section 10800, BUILDING SPECIALTIES.

1.03 QUALITY ASSURANCE

A. Provide portable fire extinguishers and accessories by one manufacturer, unless otherwise acceptable to Architect.

B. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

C. FM Listed Products: Provide new portable fire extinguishers which are approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher indicated and carry appropriate FM marking.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. Larsen's Mfg. Co.
2. J.L. Industries.
3. J.W. Moon, Inc.
4. Potter Roemer.

2.02 FIRE EXTINGUISHERS

A. Provide fire extinguishers that comply with requirements of governing authorities. Extinguishers shall conform to NFPA 10.

B. Provide fire extinguishers for each extinguisher location indicated, in colors and finishes selected by Architect from manufacturer's standard which comply with requirements of governing authorities.

C. Abbreviations indicated below to identify extinguisher types related to UL classification and rating system and not, necessarily, to type and amount of extinguishing material contained in extinguisher.

D. Fire Extinguisher Types:

1. Type 1 Fire Extinguisher: Multi-Purpose Dry Chemical Type: UL-rated 4A:60:B:C, 10 lb. nominal capacity, in enameled steel container, for Class A, Class B, and Class C fires.

2.03 MOUNTING BRACKETS

A. Provide manufacturer's standard bracket designed to prevent accidental dislodgement of extinguisher, of proper size for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

1. Mounting bracket shall be a heavy gage steel bracket with baked enamel finish equal to Larsen's Model Number 862 Fire Extinguisher Bracket.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install all items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

1. Securely fasten mounting brackets to structure, square and plumb, to comply with manufacturer's instructions.
2. Where exact location of bracket-mounted fire extinguishers is not indicated, locate as directed by Architect.

B. Location and Quantity of Fire Extinguishers:

1. As indicated on the Drawings.
2. Where local authorities having jurisdiction require relocation of extinguishers or require additional installations, comply with requirement of AHJ.

3.02 IDENTIFICATION

A. Identify bracket-mounted extinguishers with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface. Letter size, style and location as selected by Architect.

END OF SECTION

SECTION 10800

BUILDING SPECIALTIES

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. This Section includes building specialties as indicated on Drawings and as specified herein including the following:

1. New metal thresholds.

1.02 RELATED WORK

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:

1. Section 02070, SELECTIVE DEMOLITION.
2. Section 07900, JOINT SEALANTS.
3. Section 10520, FIRE EXTINGUISHERS.

1.03 SUBMITTALS

A. Product Data: For thresholds include installation details, material descriptions, dimensions of individual components and profiles, fasteners and accessories, and finishes.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed building specialties similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Supplier Qualifications: Building specialties supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor and Architect.

C. Thresholds: For thresholds, provide units not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

1.05 COORDINATION

A. Coordinate layout and installation of thresholds with floor construction. Provide recommended inserts into concrete.

B. Templates: Obtain and distribute to the parties involved templates for threshold installation work. Check Shop Drawings of other work to confirm that adequate provisions are made for installing door thresholds to comply with indicated requirements.

C. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications are required, field verify existing conditions and coordinate installation of door threshold to suit opening conditions and to provide proper approved installation at each location.

1.06 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following:

1. National Guard Products (NGP).
2. Pemko; ASSA ABLOY (Pemko).
3. Reese Enterprises (Reese).
4. Zero International (Zero).

2.02 MATERIALS

A. Thresholds: Furnish ADA compliant metal (aluminum) thresholds as scheduled and per Architectural Drawings and details.

1. Size(s): Custom sized as required for installation at each location.
2. Acceptable Manufacturer and Product:

a. Manufacturer: (TBD).
b. Product Item No.: (TBD).

3. Threshold Finish: Mill aluminum.

B. Fasteners:

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work as closely as possible.

3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent that no standard units of type specified are available with concealed fasteners.
4. All hardware shall be installed with the fasteners provided by or recommended by the threshold manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine each required opening to receive threshold with Installer present, for compliance with requirements for installation tolerances, floor construction, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare opening to receive threshold manufacturer’s recommendation and to comply with ADA and MAAB.

3.03 INSTALLATION

A. Install each threshold to comply with manufacturer's written instructions in compliance with ADA and MAAB.

B. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Section 079200, JOINT SEALANTS.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by hardware installation.

B. Provide final protection and maintain conditions that ensure item is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 11400

FOOD SERVICE / KITCHEN EQUIPMENT

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. This Section includes the Foodservice/kitchen equipment as indicated on Drawings and as specified herein.

B. Contractor-Furnished, Contractor-Installed (C-F, C-I): The following will be furnished and installed by the General Contractor:

1. New 36 inch wide, stainless steel exhaust hood at each range, including ventilation and light, as scheduled.
2. All other appliances scheduled or indicated.

C. Owner-Furnished, Contractor-Installed (O-F, C-I): The following will be furnished by the Owner and shipped to the project site; the General Contractor shall receive equipment, unpack, assemble, and install this equipment:

1. New built-in electric range with front controls, as scheduled.
2. New built-in dishwashers.
3. New stainless steel desk/worktable with shelves and casters.
4. New stainless steel stools.
5. New pantry cabinet.

D. Existing Equipment to be Removed, Stored Temporarily, Relocated, and Installed by Owner at Locations Indicated (by Owner): The following existing equipment will be removed, stored temporarily, relocated, and installed at locations indicated (by Owner):

1. Existing refrigerators; quantity – two (2).
2. Existing microwave ovens; quantity – two (2).
3. Existing pantry cabinets; quantity – six (6).
4. Existing desks and chairs.
5. Existing teacher desks and equipment.

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 02070, SELECTIVE DEMOLITION; Removal and legal disposal of existing appliances indicated to be removed and removal and salvage of existing appliances where Owner chooses to keep these appliances.
2. Section 06200, FINISH CARPENTRY; Finish carpentry work including solid surfacing for counters and backsplash on scheduled walls.
3. Section 12370, PREMANUFACTURED CABINETRY.
4. Section 15401, PLUMBING; Sinks, sink faucets, and food waste disposers.
5. Section 15601, HVAC.
6. Section 16101, ELECTRICAL WORK; Electrical power supply and electrical wiring.

1.03 SUBMITTALS

A. Product Data: Submit complete manufacturer's product data of appliances and equipment to Architect for approval, consisting of complete product description and specifications, complete installation instructions, and other pertinent technical data required for complete product and product use information.

B. Shop Drawings: Prepare plans at a scale of 1/2 inch to the foot showing dimension location, size, height above finished floor and, where necessary, capacity of mechanical services required for each item of equipment.

C. Equipment: Prepare detailed drawings at a minimum scale of 3/4 inch to the foot, plus necessary cross sections at a scale of 1-1/2 inch to the foot, showing complete details of each item of specially fabricated equipment. Include accurately dimensioned layouts and locations for floor depressions if required or called for in these specifications. Include accurately dimensioned details and locations of special wall openings where items of equipment extend through walls.

D. Warranty: Submit to the Owner the standard manufacturer's warranties for each appliance or equipment item.

E. Do not order materials or begin fabrication until Architect's approval of submittals has been obtained.

1.04 QUALITY ASSURANCE

A. Qualification of Subcontractors:

1. Fabricate all equipment specified as custom using an equipment fabricator who has the plant, personnel and engineering facilities to properly design and manufacture high quality equipment. The selected fabricator is subject to approval by Architect and Owner.
2. Furnish evidence that the Subcontractor is a recognized distributor for the items of equipment specified in this section which are of other manufacture than their own.
3. Furnish evidence that equipment of approximately the same type and design has been installed elsewhere and has been operating successfully for at least five (5) years. Equipment installed for test or prototype is not considered acceptable.

B. Fabricate and install equipment to meet Local, State and National Board of Health regulations. Perform work and provide materials in full accordance with latest rules of U.S. Public Health Services, National Board of Fire Underwriters, and local or State Ordinances, regulations of State Fire Marshal and Underwriters Laboratory.

C. Reference Standards:

1. NSF Standards: Comply with applicable National Sanitation Foundation standards and recommended criteria. Provide each principal item of equipment with a "NSF Seal of Approval".

2. UL Labels: Where available, provide UL Labels on items of equipment with prime electrical components. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL, where available.
3. ANSI Standards: Comply with applicable ANSI standards for gas-burning appliances, for piping to compressed gas cylinders, and for vacuum breakers and air gaps to prevent siphoning in water piping (ANSI 221 series, ANSI B57.1, ANSI A40.6 and ANSI A40.4).
4. Energy Ratings: Provide energy guide labels with energy cost analysis (annual operating costs) and efficiency information as required by Federal Trade Commission.
5. All equipment and appliances shall have Energy Star rating.

1.05 EXISTING CONDITIONS

A. Field Measurements: Check measurements at building and be responsible for making the appliance or equipment fit.

1. Examine drawings and identify critical areas which might affect the fitting of equipment, aisles, installation, or other functional aspects of the equipment. Submit drawings which show structural measurements and dimensions which are critical to the proper execution and fitting of work.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Properly package and protect equipment during shipment, handling, and storage to prevent damage.

B. Deliver products to project site in manufacturer's undamaged protective containers, after spaces to receive them have been fully enclosed.

C. Store indoors or under cover, on raised platforms, fully protected from dirt and moisture.

1.07 QUALITY CONTROL AND GUARANTEE

A. Appliances and equipment shall be guaranteed against defect in workmanship and material for one year from date of installation. This guarantee shall cover replacements of such defective materials, at Contractor's expense, including transportation and labor, but it shall not cover any cost whatsoever for replacement of parts of work made necessary by carelessness or misuse of equipment. After one year appliances and equipment shall be warranted in accordance with standard warranties as are offered by each manufacturer.

B. Equipment and appliances supplied under this Contract shall be fabricated in accordance with the National Sanitation Foundation (NSF) requirements.

C. Color and Finish: It is the intent of this contract that the equipment and appliances shall harmonize in color and finish. Colors and finishes shall be selected by the Architect. The Contractor shall submit, for approval, any color or finish the Contractor proposes to use.

1.08 GUARANTEES AND WARRANTIES

A. Provide manufacturers' standard guarantees and warranties for work under this section. Such guarantees and warranties shall be in addition to and not in lieu of other rights and remedies which Owner may have by law or by other provisions of the Contract Documents.

B. Provide new equipment furnished with a guaranty for a period of one calendar year, beginning on the date of final acceptance of the work of this Section, except in the case of a manufacturer whose standard warranty exceeds this period. The guarantee shall protect against defective material, design and workmanship.

C. In addition to the guarantee called for under the General Conditions, this Contractor shall further agree that in the event of failure of any system or item of equipment or improper functioning of specified work during the guarantee period, the Contractor shall have "on call" competent service personnel available to make the necessary repairs or replacements of specified work promptly at no cost to the Owner. In the event that replacements of an entire item is required, the Owner shall have the option of full use of the defective equipment until a replacement has been delivered and completely installed.

PART 2 – PRODUCTS

2.01 FOODSERVICE / KITCHEN APPLIANCES - CONTRACTOR FURNISHED AND INSTALLED. (C-F, C-I)

A. The following items will be provided (furnished and installed by the Contractor):

1. Exhaust Hood, 36 inch wide, stainless steel type with built-in blower and controls, lighting, and vented.

B. Acceptable Manufacturer/Product:

1. KitchenAid 600 CFM 36" wide stainless steel island canopy range hood with built-in blower and electronic controls; KitchenAid Model #KVIB606DSS Island Hood.

2. Features:

a. 600 CFM/65K BTU threshold.
b. Perimeter ventilation.
c. Auto speed setting.
d. Automatic turn on.
e. LED task lights.
f. Halogen night light.
g. 3-speed fan with electronic touch control with boost function (10 min.)
h. Whisper Quiet® System @ 49 dBA (1.5 sones) at low speed.
i. Dishwasher safe grease filters, removable.
j. Easy in-line conversion.
k. Venting type exterior.

3. Approximate Dimensions:

a. Height: 32-1/2 inches.

C. Other Manufacturers:

1. Z-Line
2. Bosch.
3. Zephyr.
4. GE Monogram.

2.02 FOODSERVICE / KITCHEN APPLIANCES - OWNER FURNISHED AND CONTRACTOR INSTALLED (O-F, C-I)

A. The following items will be provided (furnished and installed by the Contractor):

1. New electric ranges.
2. New built-in dishwashers

3. New stainless steel desk/worktable with shelves and casters.
4. New stainless steel stools.
5. New pantry cabinet.

B. Acceptable Manufacturers:

1. Electric Range: (TBD).
2. Built-In Dishwasher: (TBD).
3. Stainless steel desk/worktable with shelves and casters: (TBD).
4. Stainless steel stools: (TBD).
5. Pantry cabinet: (TBD).

PART 3 - EXECUTION

3.01 INSPECTION AND PREPARATION

A. Rough-in-work: Subcontractor shall examine roughed-in mechanical and electrical services and installation of floors, walls, columns and ceilings, and conditions under which the work is to be installed. Subcontractor shall verify dimensions of services and substrates before fabricating and installing the work and shall notify Contractor in writing of unsatisfactory conditions for proper installation of food service equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions are corrected in a manner acceptable for proper installation of equipment.

3.02 INSTALLATION - GENERAL

A. Service Lines and Equipment Connections:

1. Comply with applicable requirements of Section 15401, PLUMBING for plumbing piping connections and piping systems.
2. Comply with applicable requirements of Section 15601, HVAC for mechanical ductwork/piping connections and systems.
3. Comply with applicable requirements of Section 16101, ELECTRICAL WORK Sections for electrical work, including equipment connections.

B. Equipment Installation: Comply with manufacturer's instructions and recommendations. Set in place, level and adjust to correct height each item of non-mobile and non-portable equipment. Anchor to supporting substrate where indicted and where required for sustained operation and use without shifting or dislocation.

1. Built-In Equipment: Securely anchor units to supporting cabinetry or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
2. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate for proper appliance operation.

C. Conceal anchorages where possible. Adjust countertops and other work surfaces to a level tolerance of 0.0625 inch maximum offset, and maximum variation from level or indicated slope of 0.0625 inch per foot.

3.03 APPLIANCE AND EQUIPMENT INSTALLATIONS

A. Contractor-Furnished and Installed (C-F, C-I):

1. Contractor shall install new appliances (dishwasher, range, exhaust hood) at locations indicated in conformance with appliance manufacturer's printed installation instructions. Do not alter any components that will result in damage or voiding of product warranty.

B. Owner-Furnished and Contractor-Installed (O-F, C-I):

1. Contractor shall install Owner-furnished equipment at locations indicated in conformance with equipment manufacturer's printed installation instructions. Do not alter any components that will result in damage or voiding of product warranty.

3.04 ADJUST AND CLEAN

A. Testing: Test each item of appliance or equipment to verify proper operation.

B. Make necessary adjustments.

3.05 CLEANING AND RESTORING FINISHES

A. After completion of installation, and completion of other major work in food preparation and service areas, remove protective coverings, and clean food service equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.06 TESTING, START-UP AND INSTRUCTIONS OF OWNER'S PERSONNEL

A. General: Start-up equipment after service lines have been tested, balanced and adjusted for pressure, voltage and similar considerations, and after water lines have been cleaned and treated for sanitation.

B. Test each item of operational equipment to demonstrate that it is operating properly and that controls and safety devices are functioning. Repair or replace equipment found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

C. Instruct Owner's operating personnel on the proper operation and maintenance procedures for each item of operational food service equipment.

D. Final Cleaning: After testing and start-up, and before the time of Substantial Completion, clean and sanitize foodservice equipment, and leave in condition ready for use in food service.

END OF SECTION

SECTION 12370

PREMANUFACTURED CABINETRY

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

A. The BIDDING REQUIREMENTS, CONTRACTING REQUIREMENTS, and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, shall be included in and made a part of this Section.

B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.01 WORK INCLUDED

A. The work of this Section includes, but is not limited to, the following:

1. New solid square inset, Shaker style panel door design wall and base cabinets in Foods Program Room Kitchen.
2. Work includes delivery of cabinets to the building, setting in place, leveling, scribing to walls and floors, and securely anchoring in place.

B. Coordinate all mechanical and electrical work with casework.

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 06200, FINISH CARPENTRY; Solid surfacing type countertops.
2. Section 11400, FOOD SERVICE / KITCHEN EQUIPMENT.
3. Section 15401, PLUMBING; Sinks, including traps, fixtures, services, and connections.
4. Section 16101, ELECTRICAL WORK.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

B. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used. Submit the following:

1. 2 in. square samples of solid wood members with transparent finish.
2. One unit of each type of exposed hardware.

C. Verification Samples: Submit representative samples of each material selected from initial selection samples to be exposed in the completed work. Show full color ranges and finish variations expected. Submit the following:

1. 12 in. long sample of selected solid wood members with transparent finish.
2. One unit of each type of exposed hardware.

D. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of the work. Provide plans, elevations, and details of anchorage, connections and accessory items. Provide installation templates for work installed by others. Show all interfaces and relationships to work of other trades.

E. Certifications: Product certificates signed by the manufacturer certifying that materials furnished comply with specified requirements.

F. Mock-Up: Submit to Architect for approval a complete mock-up cabinet unit, 12 in. to 18 in. wide, with at least one drawer and one door. Include all hardware and accessories.

G. Maintenance Data: Maintenance data for casework to include in the "Operating and Maintenance Manual" specified in Section 01700, CONTRACT CLOSEOUT.

1.04 DEFINITIONS

A. Exposed Surfaces: Surfaces visible when drawers and opaque doors are closed; behind clear glass doors; bottoms of casework 43 inches or more above finished floor.

B. Semi-Exposed Surfaces: Surfaces which become visible when opaque doors are open or drawers are extended; bottoms of casework are more than 30 inches and less than 42 inches above finished floor.

C. Concealed Surfaces: Surfaces considered concealed when surfaces not visible after installation; bottoms of casework less than 30 inches above finished floor; tops of casework over 78 inches above finished floor and not visible from an upper level; stretchers, blocking, and components concealed by drawers.

D. Flush Overlay: Door and drawer faces cover cabinet frame with space between faces sufficient for operating clearance.

E. Flush: Door and drawer faces flush with cabinet face.

1.05 DIMENSIONS AND FIELD MEASUREMENTS

A. General: Take necessary field measurements prior to preparation of shop drawings and fabrication. Do not delay progress of the Project. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.

B. The General Contractor shall field measure every unit to confirm dimensions and shall prepare shop drawings of kitchen cabinet layout for each typical kitchen type based on these measurements. Cabinet sizes may need to be adjusted based on the field measurements.

1.06 STORAGE AND PROTECTION

A. Do not deliver casework until painting, wet work, and similar operations have been completed in each unit.

B. Deliver casework as factory-assembled units, packaged individually, and shipped in its own carton.

1.07 QUALITY ASSURANCE

A. Kitchen Casework: Comply with ANSI/KCMA A161.1 and HUD "Minimum Property Standards," Housing 4910.1, paragraph 611-1.1 Extreme Use Classification.

1. KCMA Certification: Provide kitchen casework with Kitchen Cabinet Manufacturers Association (KCMA) "Certified Cabinet" seal affixed in a semi-exposed location of each unit, showing compliance with above standard.

B. Single-Source Responsibility: Obtain casework from one source of a single manufacturer.

1.08 PROJECT CONDITIONS

A. Environmental Conditions: Comply with casework manufacturer's written requirements for temperature and humidity conditions during storage and installation. Do not install casework until these conditions have been attained and stabilized.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS/MANUFACTURERS

A. Acceptable Manufacturer: Provide products of one of the following manufacturers that meet or exceed specified requirements:

1. Tru-Wood Cabinets, Inc.
2. Evans Cabinet Corp.
3. Mid-America.
4. Or approved equal meeting HUD Severe Use requirements.

B. Kitchen Cabinets (Foods Program Room Kitchen): The following cabinets have been specified herein to establish standard of quality, performance, and design for this Project.

1. Tru-Wood Cabinets Inc. ‘Extreme Series Frontier Style’, stained wood cabinets with solid square inset, Shaker style panel door style. Comparable products from one of the above-named manufacturers may be acceptable subject to review and approval by the Architect and the Owner.

a. Equivalent cabinets by Evan Cabinets, Mid-America, or equal may be submitted to the Architect for approval.

2. Cabinets for use in Handicap Accessible Units shall be manufactured by the same manufacturer and shall comply with these specifications, the manufacturer’s standard specifications, as well as the following: UFAS (Uniform Federal Accessibility Standards); MAAB, ADA, and other applicable State and Federal Regulations.
3. Cabinetry Finish: The finish color of doors and drawers shall be consistent with sample approved by the Architect and the Owner. Excessive variations from the approved sample will be rejected. The sole judgment and decision of the Architect shall be final.

a. Stained wood finish; color shall be Gray as selected by Owner and Architect.

C. Specific Cabinet Requirements:

1. Front Frame: 3/4 inch thick kiln dried solid hardwood. Mortise and tenon or bore and dowel construction frame joinery reinforced with glue and nails. Stiles shall be 1-1/2 inch wide; mulls – 3 inch wide; Rails - 1-3/4 inch wide. Stiles and top and bottom rails shall be dadoed to receive ends, tops, and bottoms.
2. End Panels: Nominal 1/2 inch thick multi-ply hardwood plywood.
3. Top / Bottom Panels: Nominal 1/2 inch thick multi-=ply hardwood plywood.
4. Hanging Rails: Nominal 3/4 inch thick; 3 inch high for wall cabinets and 7-1/4 inch high for base cabinets.
5. Back Panel: Nominal 1/4 inch thick hardwood plywood.
6. Shelves: Nominal 5/8 inch thick, multi-ply hardwood plywood.
7. Toe Board: Three sided ACQ pressure treated toe board.
8. Base Corner Braces: Two 3/4 inch x 21-1/2 inch solid hardwood.
9. Drawers: 11/16 inch thick solid pine lumber four-sided drawer box. Provide 1/4 inch thick hardwood plywood bottom.
10. Drawer Guides: Epoxy coated steel, extreme grade, side mounted types, self-adjusting in mounting brackets. Guides shall have built-in stop, be self-closing, and have stay-closed feature. Guides shall have 100 lb. rated load capacity.
11. Hinges: Provide heavy duty, high quality steel hinges, concealed 6-way adjustable type with self-closing feature.
12. Finish: Furniture quality protective finish system.

2.02 MATERIALS - GENERAL

A. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.

B. Hardwood Lumber: Provide hardwood lumber free of defects selected from First Grade Lumber (NHLA), of species indicated.

C. Hardboard: ANSI A135.4, Class 1, tempered.

D. Hardware: Provide manufacturer's standard hardware units conforming to ANSI A156.9, of type, size, and finish (stainless steel), as selected by Architect from manufacturer's standard choices.

1. All hardware shall be securely installed at shop except locks and exposed projecting hardware such as pulls, for which holes shall be shop-drilled and the hardware furnished loose for installation at site.
2. Cabinet Door and Drawer Pulls: 1/4 inch diameter x 3-1/2 inch x 1-3/16 inch wire type; finish as selected by Owner.

    a. Unless otherwise indicated, exposed hardware including pulls shall be stainless steel.

E. Steel Support Brackets for HC Countertops:

1. Support system for countertops shall be equal to MAX Bracket as manufactured by John Sterling Corporation. Brackets and wall uprights shall be epoxy-coated steel, frost white color except as may be otherwise noted on the Drawings. Include the following:

    a. Brackets at Handicap Countertops: Heavy duty 20 inch bracket (19.25 in. x 12.5 in.); MAX Bracket 0049-20WT.

2. Coordinate with Section 06200, FINISH CARPENTRY for installation of countertop.

2.03 FABRICATION

A. Fabricate casework cabinetry to dimensions and profiles indicated on Drawings.

B. Assemble units in shop in components as large as practicable to minimize field cutting and jointing.

C. Fillers: Provide all required fillers and closures as indicated matching cabinets.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install casework cabinetry with no variations in flushness of adjoining surfaces using concealed shims. Where casework cabinetry abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework cabinetry face.

B. Install casework cabinetry 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 cabinetry hardware and accessories as indicated.

C. Install casework cabinetry level and plumb to a tolerance of 1/8 in. in 8 ft.

D. Fasten unit of casework cabinetry to adjacent unit and into structural support members of wall construction with #10 sheet metal or wood screws with washer head or washer.

3.02 ADJUSTING AND CLEANING

A. Adjust hardware to center doors and drawers in openings and lubricate to provide unencumbered operation.

B. Clean casework cabinetry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

C. Before Completion, clean casework cabinetry inside and out, adjust hardware for proper fit and for smooth and easy operation.

D. Upon completion of installation, remove cartons, debris, saw dust, scraps, etc., and tools and equipment, and leave work areas in clean conditions.

END OF SECTION

SECTION 15401

PLUMBING

(Filed Sub-bid Required)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

The following should appear on the upper left hand corner of the envelope:

Name of Sub-Bidder: _____
_____
_____

Project: MILLBURY HIGH SCHOOL –
FOODS PROGRAM ROOM RENOVATIONS
Millbury Memorial Junior/Senior High School
12 Martin Street
Millbury, Massachusetts 01527

Sub-Bid for Section: 15401, PLUMBING

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.3 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.4 DESCRIPTION OF WORK

A. Work Included: Provide all labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Domestic cold-water system to every fixture and piece of equipment requiring domestic cold water.
2. Domestic Hot Water and Hot water return to every fixture and piece of equipment requiring domestic hot water.
3. Plumbing Fixtures and Accessories.
4. Sanitary waste and vent system to each and every fixture and piece of equipment requiring sanitary drainage.
5. Valves.
6. Insulation.
7. Hangers, supports and attachments.
8. Disinfection of water piping.
9. Fire Stopping for plumbing pipe penetration in fire rated construction.
10. Coordination drawings and record drawings and similar requirements.
11. Hoisting Equipment: The Plumbing subcontractor shall furnish, install and maintain in safe and adequate condition all mechanical hoisting equipment, operating personnel and rigging that is necessary for the proper execution of the Work of this Section.
12. Staging, Planking and Scaffolding: The Plumbing subcontractor shall furnish, install and maintain in safe and adequate condition, all staging, planking and scaffolding that is necessary for the proper execution of the Work in this Section.
13. Smoke proofing of all plumbing penetrations in smoke barrier penetration.
14. Caulking around plumbing fixtures in toilets and counter top faucets.

B. Alternates: Not Applicable.

C. Items to Be Installed Only: Not Applicable

D. Items To Be Furnished Only: Not Applicable.

E. Reference To Drawings: Work specified in PLUMBING is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1, D-1.2, A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, and E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

F. Related Work:

1. Examine all other sections of the Specifications and all drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and coordinate all work under this section therewith.
2. The following related items are not included in this Section and will be performed under the designated Sections:

   a. Section 07840, FIRESTOPPING.
   b. Section 09900, PAINTING: Painting of all exposed ductwork and other mechanical equipment not having enameled, surfaces, stainless steel or chromed finishes.
   c. In general, all wiring required for equipment provided by the HVAC Contractor that requires Automatic Controls and all interlock wiring for this HVAC equipment that is not shown or indicated on the Electrical Drawings of Section 16101, ELECTRICAL WORK, shall be provided under Section 15601, HEATING, VENTILATING AND AIR CONDITIONING (HVAC).

G. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation.

H. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation.

I. Give notices, file plans, obtain permits and licenses, pay fees and back charges, and obtain necessary approvals from authorities that have jurisdiction as required to perform work in accordance with all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.

1.5 SUBMITTALS

A. Comply with requirements specified in Section 01300, SUBMITTALS.

B. Material and equipment requiring Shop Drawing Submittals shall include but not be limited to:

1. Plumbing fixtures and trim.
2. Piping.
3. Fittings, unions, flanges, and couplings.
4. Insulation.
5. No-hub couplings.
6. Hangers, plates, and inserts.

1.6 DEFINITIONS

A. As used in this Section, "provide" means "furnish and install" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."

1.7 MODIFICATIONS IN LAYOUT

A. Plumbing Drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structure and other trades and to meet Architectural requirements.

B. In all spaces, prior to installation of visible material and equipment, including access panels, review Architectural Drawings for exact locations and where not definitely indicated, request information from Architect.

C. Check Contract Drawings as well as Shop Drawings of all subcontractors to verify and coordinate spaces in which work of this Section will be installed.

D. Maintain maximum headroom at all locations. All piping and associated components to be as tight to underside of structure as possible.

E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.

F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect for review and approval.

1.8 SITE VISIT

A. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observer.

1.9 EXISTING CONDITIONS AND PREPARATORY WORK

A. Before starting work in a particular area of the project, visit site and examine conditions under which work must be performed including preparatory work done under other Sections or Contracts or by the Owner. Report conditions that might affect work adversely in writing through General Contractor to Architect. Do not proceed with work until defects have been corrected and conditions are satisfactory. Commencement of work shall be construed as complete acceptance of existing conditions and preparatory work.

1.10 CODES, STANDARDS, AUTHORITIES AND PERMITS

A. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and Federal governments, and other authorities that have legal jurisdiction over the site. Materials and equipment shall be manufactured, installed and tested as specified in latest editions of applicable publications, standards, rulings and determinations of:

1. Local and state building, plumbing, fuel gas mechanical, electrical, fire and health department codes.
2. American Gas Association (AGA).
3. National Fire Protection Association (NFPA).
4. American Insurance Association (A.I.A.) (formerly National Board of Fire Underwriters).
5. Occupational Safety and Health Act (OSHA).
6. Factory Mutual Association (FM).
7. Underwriters' Laboratories (UL).
8. American National Standards Institute (ANSI).

B. Material and equipment shall be listed by Underwriters' Laboratories (UL), and approved by ASME and AGA for intended service.

C. Plumbing Fixtures and Potable water shall meet both the NSF 61, lead free and NSF 372 test standards via third-party testing and certification.

D. When requirements cited in this Specification conflict with each other or with Contract Documents, most stringent shall govern work. Architect may relax this requirement when such relaxation does not violate ruling of authorities that have jurisdiction. Approval for such relaxation shall be obtained in writing.

E. Most recent editions of applicable specifications and publications of the following organizations form part of Contract Documents:

1. American National Standards Institute (ANSI).
2. American Society of Mechanical Engineers (ASME).
3. National Electric Manufacturers Association (NEMA).
4. American Society for Testing and Materials (ASTM).
5. American Water Works Association (AWWA).
6. Thermal Insulation Manufacturers Association (TIMA).
7. Institute of Electrical and Electronics Engineers (IEEE).
8. Insulated Cable Engineers Association (ICEA).
9. National Fire Protection Association (NFPA).

1.11 GUARANTEE AND 24-HOUR SERVICE

A. Guarantee Work of this Section in writing for one year following the date of beneficial occupancy by the User Agency. If the equipment is used for ventilation, temporary heat, etc. prior to initial beneficial occupancy by the User Agency, the bid price shall include an extended period of warranty covering the one-year of occupancy, starting from the initial date of beneficial occupancy by the User Agency. The guarantee shall repair or replace defective materials, equipment, workmanship and installation that develop within this period, promptly and to Architect's satisfaction and correct damage caused in making necessary repairs and replacements under guarantee within Contract Price.

B. In addition to guarantee requirements of Division 1 and of Paragraph A above, obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in User Agency's name.

C. Replace material and equipment that require excessive service during guarantee period as defined and as directed by Architect.

D. Provide 24 hour service beginning on the date the project is first beneficially occupied by the User Agency, whether or not fully occupied, and lasting until the termination of the guarantee period. Service shall be at no cost to school. Service can be provided by this contractor or a separate service organization. Choice of service organization shall be subject to Architect and Project Manager approval. Submit name and a phone number that will be answered on a 24-hour basis each day of the week, for the duration of the service.

E. Submit copies of equipment and material warranties to Architect before final payment.

F. At end of guarantee period, transfer manufacturers' equipment and material warranties still in force to User Agency.

G. Part 2 Paragraphs of this Specification may specify warranty requirements that exceed those of this Paragraph.

H. Use of systems provided under this Section for temporary services and facilities shall not constitute Final Acceptance of work nor beneficial use by User Agency, and shall not institute guarantee period.

I. Provide manufacturer's engineering and technical staff at site to analyze and rectify problems that develop during guarantee period immediately. If problems cannot be rectified immediately, advise Architect in writing, describe efforts to rectify situation, and provide analysis of cause of problem. Architect will suggest course of action.

1.12 RECORD DRAWINGS

A. Comply with requirements specified in Section 01700, CONTRACT CLOSEOUT.

B. Drawings shall show record condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and make and model numbers of final equipment installation.

1.13 BULLETINS, MANUALS, AND OPERATING INSTRUCTIONS, AND PROTECTION

A. Obtain at time of purchase of equipment, three copies of operation, lubrication and maintenance manuals for all items. Assemble literature in coordinated manuals with additional information describing combined operation of field-assembled units, including as-built wiring diagrams. Manual shall contain names and addresses of manufacturers and local representatives who stock or furnish repair parts for items or equipment. Divide manuals into three sections or books as follows:

1. Directions for and sequence of operation of each item of Plumbing systems. Sequence shall list valves, switches, and other devices used to start, stop and control system. Include approved valve directory showing each valve number, location of each valve, and equipment or fixture controlled by valve.
2. Detailed maintenance and troubleshooting manuals containing data furnished by manufacturer for complete maintenance. Include copy of balancing report.

3. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.

B. Furnish three copies of manuals to Architect for approval and distribution to owner. Deliver manuals no less than 30 days prior to acceptance of equipment to permit User Agency's personnel to become familiar with equipment and operation prior to acceptance.

C. Provide framed and glazed charts as follows: mount as directed by Architect.

1. Flow diagrams from first part of manual as described above.
2. Valve directory.
3. Lubrication chart from third part of manual.

D. Operating instructions: Upon completion of installation or when Project Manager accepts portions of building and equipment for operational use, instruct User Agency's operating personnel in any or all parts of various systems. Instructions shall be performed by factory-trained personnel. User Agency shall determine which systems require additional instructions. Duration of instructions shall take equipment through complete cycle of operation (at least five working days). Make adjustments under operating conditions. This subcontractor shall videotape all instructions given to the Owner, and shall provide up the three hours of videotape instructions. Three copies of the videotaped instructions shall be submitted by the owner.

E. Each contractor shall be responsible for his work and equipment until finally inspected, tested, and accepted. Carefully store materials and equipment which are not immediately installed after delivery to site. Close open ends of work with temporary covers or plug during construction to prevent entry of obstructing material.

F. Each separate contractor shall protect the work and material of other trades that might be damaged by his work or workmen and make good all damage thus caused.

1.14 COORDINATION DRAWINGS

A. This plumbing subcontractor shall prepare coordination drawings clearly showing how his work is to be installed in relation to the other trades such as HVAC and Electrical, and including sections and details, as required under Division 1.

1.15 LOCATION OF FIXTURES AND EQUIPMENT

A. The Architect will establish the exact location of all fixtures, equipment, and devices to be located in finished spaces of the building. Such precise locations are, for the most part, indicated on the Architectural Plans of the various spaces, and it shall be the responsibility of this Section 15401 Subcontractor to obtain instructions from the Architect for the location of any items whose location is not specifically given on the Architectural Drawings. Any work installed contrary to the Architectural Drawings, or without the prior approval of the Architect, shall be relocated and any necessary changing or patching of the surrounding work shall be done at the expense of this Section 15401 Subcontractor.

PART 2 - PRODUCTS

2.1 PIPE, FITTINGS AND JOINTS

A. General

1. Pipe and fittings shall conform to the latest ANSI, ASTM, NFPA and AWWA Standards including latest amendments.
2. Each length of pipe, each pipe fitting, trap, material and/or device used in the respective system shall have cast, stamped or indelibly marked on it, the maker's name or mark, weight and quality of the product when such marking is required by the approved standard that applies.
3. Piping and fittings shall be factory coated.
4. Underslab Sub Drain Piping: Piping shall be service weight cast iron soil pipe except with hub and spigot with lead and oakum joints. The pipe shall be legibly marked on the barrel with the manufacturer's name and/or trademark.

B. Drainage Piping Above Floor (Soil, Waste, and Vent)

1. Piping 2" and larger shall be no-hub service weight cast iron soil pipe except at urinals and cleanouts and joints just prior to exiting the building which shall be service weight hub and spigot with lead and oakum joints. The pipe shall be legibly marked on the barrel with the manufacturer's name and/or trademark.
2. All cast iron soil pipe and fittings shall conform to the requirements of CISPI Standard 301, ASTM A 888 or ASTM A 74 for all pipe and fittings. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or receive prior approval of the engineer. Latest issue of each standard shall apply.
3. Sanitary piping 2” and smaller shall be type “L” copper.
4. Couplings for joining no-hub cast iron soil pipe: ASTM C1540, Couplings shall have a shield constructed of corrugated 304 stainless steel and provide a shield thickness of 0.16 inches or greater. Shield shall be a minimum width of 3 inches for pipe sizes 1-1/2 inch through 4 inch, and a minimum width of 4 inches for pipe sizes 5 inch through 10 inches. Couplings with at least 4 sealing bands shall require 80 inch pounds of torque per band. Tightening screws shall be 3/8 inch hexagon head. Couplings with only 2 sealing bands on sizes 1-1/2 inch through 4 inches shall require 125 inch pound of torque per band. Gaskets shall be neoprene rubber conforming to ASTM C-564.
5. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer's specifications using sweat fitting and lead free solder and non-corrosive flux.
6. Connections between earthenware of any fixture and flanges in soil and waste piping shall be made absolutely gas and watertight with closet setting compounds and gaskets which must be absolutely gas and fireproof, watertight, stain proof, containing neither oil nor asphaltum and which will not rot, harden or dry under any extreme climatic change, and must adhere on wet surfaces.

C. Water Piping (For Domestic Cold and Hot Water)

1. Above Ground

   a. 2-1/2 inches and smaller shall be hard drawn Type L copper with wrought or cast copper fittings.
   b. 3 inches and larger may be hard drawn Type L copper with roll grooved mechanical couplings.
   c. Joints in copper tubing except as otherwise specified herein shall be made according to manufacturer’s specifications using sweat fitting and lead-free solder and non-corrosive flux.
   d. Provide galvanized malleable iron unions, with bronze facings conforming to ANSI B16.39 for sizes 2 inch and smaller.
   e. Provide copper flanges conforming to ANSI B16.5, standard or welding neck pattern.

D. Unions and Flanges

1. Unless otherwise specified herein, unions for copper and brass piping two inches and smaller in diameter shall be 125 SWP, bronze body brass ground joint type. Those larger than two inches in diameter shall be 150 SWP flat faced cast brass flanges conforming to ANSI Standard B16.24.
2. Where brass flanges and ferrous flanges are to be joined, ferrous flanges shall be full faced.
3. Mating of ferrous and non-ferrous flanges shall be separated with rubber gaskets (1/16 inch minimum thickness) and teflon liners installed in the bolt holes. Bolt holes shall be drilled to receive the teflon lines. Physical contact between the ferrous and non-ferrous flanges including the bolts, nuts and washers will not be permitted.
4. Unions for ferrous piping shall be of the same material as the piping to which they connect.

2.2 VALVES AND SUNDRIES

A. General

1. Manufacturer: Subject to compliance with requirements, provide products from one of the manufacturers listed. Nibco, Watts, Apollo or approved equal.
2. Valve Design: Rising stem or rising outside screw and yoke stems.
3. Non-rising stem valves may be used where headroom prevents full extension of rising stems.
4. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.
5. Sizes: Same size as upstream pipe, unless otherwise indicated.
6. Operators: Provide the following special operator features:

    a. Handwheels, fastened to valve stem, for valves other than quarter turn.
    b. Lever handles, on quarter turn valves 6 inch and smaller, except for plug valves. Provide plug valves with square heads; provide one wrench for every 10 plug valves.

7. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
8. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.
9. End Connections: As indicated in the valve specifications.

    a. Threads: Comply with ANSI B1.20.1.
    b. Flanges: Comply with ANSI B15.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
    c. Solder-Joint: Comply with ANSI B16.18.

        1) Caution: Where soldered end connections are used, use solder having a melting point below 840 deg. F for gate, globe, and check valves; below 421 deg F for ball valves.

B. Valves in the interior domestic water piping systems (cold water, hot water) and gas system:

1. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, Nibco, Watts, Apollo, or approved equal.

2. Ball Valves

    a. Ball Valves, 1 Inch and Smaller: Rated for 400 psi WOG pressure; two piece construction; with bronze body conforming to ASTM B 62, standard (or regular) port, chrome-plated brass ball,

replaceable “Teflon” or “TFE” seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold-water service.

b. Ball Valves, 1-1/4 Inch to 2 Inch: Rated for 400 psi WOG pressure; 3 piece construction; with bronze body conforming to ASTM B 62, conventional port, chrome-plated brass ball, replaceable “Teflon” or “TFE” seats and seals, blowout-proof stem, and vinyl covered steel handle. Provide solder ends for domestic hot and cold-water service.

3. Butterfly Valves

a. Butterfly Valves, 2-1/2 Inch and Larger: MSS SP-67; rated at 200 psi; cast iron body conforming to ASTM A 126, Class B. Provide valves with field replaceable EPDM sleeve, nickel-plated ductile iron disc (except aluminum bronze disc for valves installed in condenser water piping), stainless steel stem, and EPDM O ring stem seals. Provide lever operators with locks for sizes 2 through 6 inches and gear operators with position indicator for sizes 8 through 24 inches. Provide lug or wafer type as indicated. Drill and tap valves on dead end service or requiring additional body strength.

4. Check Valves

a. Swing Check Valves, 2 Inch and Smaller: MSS SP-80; Class 125, cast bronze body and cap conforming to ASTM B 62; with horizontal swing, Y pattern, and bronze disc; and having threaded or solder ends. Provide valves capable of being reground while the valve remains in the line. Provide Class 150 valves meeting the above specifications, with threaded end connections, where system pressure requires or where Class 125 valves are not available.

b. Swing Check Valves, 2-1/2 Inch and Larger: MSS SP-71; Class 125 (Class 175 FM approved for fire protection ping systems), cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, and bronze disc or cast iron disc with bronze disc ring; and flanged ends. Provide valves capable of being refitted while the valve remains in the line.

C. Sundries

1. Acceptable Manufacturers: Chicago Faucet, Watts, T & S Brass and Bronze Works, Inc., Speakman Co., Josam Manufacturing, Jay R. Smith, Precision Plumbing Products or approved equal.
2. Vacuum breakers shall be full size of line feed. All hose bibbs shall be supplied with vacuum breakers attached to hose thread portion of hose bibb unless they are integral to fixture.
3. Shock absorbers (Hammer arrester) shall be of the mechanical, pre-pressurized type installed where indicated and in accordance with "Standard P.D.I.-WH201.” All shock absorbers must be located behind access panels or in readily accessible areas.
4. Combined Pressure Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 deg F, and pressure relief at 150 psi.
5. Pressure Regulating Valves: Single seated, direct operated type; having bronze body with integral strainer and complying with requirements of ASSE Standard 1003. Select proper size for maximum flow rate and inlet and outlet pressures indicated.
6. Relief Valves: Provide proper size for relief valve, in accordance with ASME Boiler and Pressure Vessel Codes, for indicated capacity of the appliance for which installed.
7. Manual Balancing Valve: Lead free flow calibrated brass balancing valve with built in flow meter and sight gauge. Furnish with check valve to protect circuit thermos siphoning.
8. Thermal Expansion Tank: The expansion tank diaphragm or bladder type shall be welded steel, constructed, tested and stamped in accordance with section VIII, Division 1 of the ASME code for a

working pressure of 150 psig, factory air pre-charged and field adjustable. All welds conforming to ASME section IX. All internal parts must comply with FDA regulations and approvals.

2.3 HANGERS AND ACCESSORIES

A. General

1. Provide pipe stands, supports, hangers and other supporting appliances as necessary to support work required by Contract Documents. All components of the hanger support system shall comply with the standards set forth in MSS-SP58 and MSS-SP69 (Manufacturers Standardization Society) latest publication.
2. Manufacturers: Subject to compliance with requirements, provide hangers and supports of Carpenter and Patterson, Inc, ITT Grinnel Corp., Elecen Metal Products or approved equal.

B. Secure vertical piping to building construction to prevent sagging or swinging.

C. Space hangers for horizontal piping as follows:

Pipe Size	Rod Diameter	Maximum Spacing
1/2" and 3/4"	3/8"	5 ft.-0"
1" and 1-1/4"	3/8"	8 ft.-0"
1-1/2 and 2"	3/8"	10 ft.-0"
2-1/2 and 3"	2"	10 ft.-0"
4 and 5"	5/8"	12 ft.-0"

D. Friction clamps shall be equal to Figures 126 and copper plated when in direct contact with copper or brass piping.

E. Hangers for uncovered (uninsulated) copper or brass piping 2" and smaller shall be Carpenter & Patterson Figure 1ACT steel, copper plated band type.

F. Hangers for uncovered (uninsulated) steel or cast iron piping 2" and smaller shall be Carpenter & Patterson Figure 1A steel band type.

G. Hangers for uncovered (uninsulated) steel or cast iron piping 2-1/2” and larger shall be Carpenter & Patterson Figure 100 steel clevis type.

H. Hangers for all insulated piping shall be Carpenter & Patterson Figure 100 steel clevis type with insulation shield specified below.

I. Hangers for uncovered (uninsulated) copper or brass piping 2-1/2” and larger shall be factory applied copper plated steel clevis hangers, Carpenter & Patterson Fig. 100 CT. Rods and nuts used with these hangers shall also be factory applied copper plated.

J. Hanger rods for other installations shall be sized in accordance with the recommended load capacities of ASTM Specifications Designation A-107, latest amendment.

K. Insulation protectors (shields) for horizontal piping shall be constructed of galvanized steel formed to a 180-degree arc and 12 inches long, equal to Carpenter & Patterson Figure 265P, 18 gauge Type H for hangers 5 inches in size and smaller, 16 gauge for hangers larger than 5 inches in size.

L. Exposed rods, clamps and hangers shall be electrogalvanized coated.

M. Installation of hangers which permit wide lateral motions of any pipe will not be acceptable.

N. "C" clamps installed with pipe hangers or equipment hangers will not be permitted unless provided with retaining straps.

2.4 INSERTS AND ESCUTCHEONS

A. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4 inch diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods up to 2 inch diameter to be passed through the insert body. Strip inserts shall have attached rods with hooked ends to allow fastening to reinforcing rods.

B. Unless otherwise specified herein, escutcheons shall be cast brass chrome plated type and provided with a set screw to properly hold escutcheon in place.

2.5 PIPE COVERING (INSULATION)

A. General

1. The pipe covering specified herein for piping system shall be provided to strict accordance with the manufacturer's printed instructions, the best practice of the trade and to the full intent of this Specification.
2. Flame/Smoke Ratings: Provide complete fibrous glass pipe insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
3. Manufacturer: Subject to compliance with requirements, provide products of Johns Manville “Micro-Lok HP”, Knauf Fiber-Glass, Owens Corning or approved equal.
4. Apply insulation after systems have been tested, proved tight and approved by Architect. Remove dirt, scale, oil, rust and foreign matter prior to installation of insulation.
5. No leaks in vapor barrier or voids in insulation will be accepted.
6. Insulation and vapor barrier on piping which passes through walls or partitions shall pass continuously through sleeve, except that piping between floors and through fire walls or smoke partitions shall have space allowed for application of approved packing between sleeves and ping, to provide fire stop as required by NFPA. Seal ends to provide continuous vapor barrier where insulation is interrupted.

B. Interior Cold, and Hot Water Recirculation pipe insulation:

1. 1” insulation for all pipe sizes.

   a. ASTM E-547, Class I

2. Hot Water Supply piping.

a. 1" thick insulation for pipe sizes less than pipe size 1.5" and 1.5" thick insulation for pipe sizes equal and greater than pipe size 1.5".
b. ASTM E-547, Class I

3. Fire retardant foil face jackets for ping insulation: ASTM C-921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at installation option.
4. Encase pipe fittings insulation with one piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.
5. Encase exterior piping insulation with 0.016" thick aluminum jacket with weatherproof construction.
6. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

2.6 CLEANOUTS

A. Cleanouts shall be Jay R. Smith, Josam, MIFAB or approved equal.

B. Bodies of cleanout in hub and spigot or no-hub piping shall be standard pipe size conforming in thickness to that required for pipe and fittings, and shall extend not less than 3/4 inch above the hub of the pipe. The cleanout plug shall be of cast brass and shall be provided with a raised nut 3/4 inch high. Cleanouts in threaded waste piping shall be cast iron drainage "T" pattern 90 degree branch fittings with extra heavy brass screw plugs of the same size as the pipe.

C. Floor cleanouts shall be as follows:

1. CO: Wall cleanout with cast bronze cleanout plug, round smooth stainless steel cover. The cleanout shall be equal to MiFAB C1430-RD-BA.

2.7 PLUMBING FIXTURES

A. Plumbing fixtures shall be as scheduled per drawings.

B. Fixtures and Trim

1. Fixture Trim and Accessories: Provide fixtures complete with floor mounted fixture carrier supports; faucets, flushometers; drain outlets, tailpieces, P-traps and stops and supplies.

a. Color and Finish: All trim exposed to view shall be polished chrome plated, and all fixtures and toilet seats shall be white unless specified otherwise.
b. Drain Outlets: Provide drain outlet of the same manufacturer as the fixture or faucet trim with chrome plated 17 gauge minimum weight tailpiece.

1) Provide 1-1/4 inch tailpiece on lavatories.
2) Provide 1-1/2 inch tailpiece on sinks.
3) Provide offset drain outlets on handicapped use lavatories and sinks.

2. P-Traps: Cast brass adjustable P-trap with cleanout plug, ground joint and 17 gage minimum weight extension with escutcheon.

a. Provide McGuire No. 8090 1-1/4 inch by 1-1/2 inch on lavatories.
b. Provide McGuire No. 8089 1-1/2 inch by 1-1/2 inch on sinks.

3. Stops and Supplies: Provide stops and supplies of the same manufacturer as the fixture or faucet trim, or provide McGuire Model 170-LK loose key angle stop with 5 inch long 2 inch nominal copper sweat extension, bell escutcheon, and 3/8 inch O.D. by 12 inch flexible riser.

C. Fixture Description

1. P-1: Countertop Sink:

Countertop Sinks: Stainless Steel Double Bowl Sink (Barrier Free) Elkay Manufacturing Co. Model LRAD-331955, 33" x 19" x 5-1/2" deep ledge type, 18-gauge, type 304 18-8 stainless steel. Interior and top surfaces polished to polished finish, sound deadened with self-rimming feature. Rear outlet strainer, lead free, 8" center, deck mounted sink faucet equal to Chicago No 1102-GN8AE35-317AB, ADA lever handles, 1.5 gpm aerator, flow control fittings, and pull out side spray. McGuire mfg. 1151 AWC pre-wrapped 1 1/2 offset tailpiece with 151 stainless steel basket strainer, rear center drain. McGuire mfg. 165LK loose key stops with supplies McGuire 8089 CP 1 1/2" x 1 1/2" cast brass "P" trap with cleanout. McGuire 2127 CP IPS nipple to cast set screw flange 2127. Provide ½ HP garbage disposer equal to Moen GXP50c. Provide point of use thermostatic mixing valve equal to Chicago Faucet model 131-CABNF.

2.12 FIRE STOPPING

A. Seal openings of fire rated construction with a material or product that has been tested at an independent testing laboratory, such as UL, FM, etc. Fire stopping shall conform to ASTM E-814 and UL 1479, with fire ratings equal to or exceeding the fire rating of the construction involved. Fire stopping shall be UL classified, and shall be similar to the 3M brand Fire Barrier Penetration Sealing Systems, GE Silicones, Calpico Inc or approved equivalent. Fire stopping of this type shall also be utilized for openings through smoke rated construction.

B. If desired by the Contractor and approved by local codes, the "Pro-Set" piping penetration system also may be utilized. Penetration system shall be UL certified and shall be the "Pro-Set" System A. Firestop coupling (sleeve) shall be filled with ceramic fiber material to provide insulation and fire stopping. System shall be capable of maintaining a 3-hour fire rating. Penetration system shall be secure, waterproofed, fire rated and smoke proof and shall allow for pipe expansion and contraction

C. Smoke proof and Seal all plumbing pipe penetration in corridor wall regardless it is rated or unrated wall construction.

2.13 SLEEVES AND PENETRATIONS

A. Piping penetrations through fire rated construction shall comply with a listed fire rated assembly as detailed in the UL Fire Resistance Directory. Pipe sleeves through floors, exterior walls and fire-rated construction shall be galvanized Schedule 40 steel pipe. Pipe sleeves through non-fire-rated partitions shall be 26-gauge galvanized steel.

2.14 VALVE TAGS

A. Upon completion of piping installation work provide valve tags on all valves installed under the work of the mechanical sections. Valve tags shall be at least 1-1/2-inch diameter brass or engraved plastic with 1/4 inch high lettering for service designation over 2 inch high consecutively numbered valve identification. Engraved valve tags shall be color coded as specified for piping identification. Provide service designation prefix as scheduled:

1. Plumbing Systems:	Prefix:
a. Domestic Cold-Water	CW
b. Domestic Hot Water	HW
c. Domestic Hot Water Circulation	HWR

B. Valve tags on plumbing systems may be engraved laminated plastic tags color-coded to match the pipe identification marks.

2.15 EQUIPMENT PROVIDED UNDER OTHER SECTIONS OR BY OWNER

A. Provide roughing and final connections for water, waste, vent and gas systems, including traps, tailpiece and strainers, wheel handle stops, valves, cocks and appurtenances furnished under other Sections or by User Agency as required. Provide valves and traps for fixtures and equipment, including work in, under and through tables, cabinets and equipment chases.

B. Equipment may vary from that indicated. Rearrangement of equipment from Drawings may be required. Make connections to rearranged equipment as part of work of this Section. Unpack, assemble and install supply trim for fixtures and equipment furnished under other Sections or by User Agency.

C. Provide miscellaneous equipment connections and indirect drains from fixtures and equipment. Provide unions at kitchen equipment and where necessary for disconnection of piping for maintenance.

D. Roughing shall not be undertaken until Architect has approved fixture and equipment shop drawings and template is furnished by pertinent manufacturer so that connecting requirements may be verified and work installed in neat and workmanlike manner. Exact location of service connections shall be obtained prior to roughing.

E. Provide shock absorbers with quick closing valves. Provide shut-off valves beneath absorbers. Absorbers shall be sized as required by Plumbing and Drainage Institute Standard PDI-WH 201.

F. Hook-up between garbage disposer and cold water branch shall include gate valve, solenoid valve and vacuum breaker for garbage disposer and cold water branch.

G. Provide shutoff valves on fixture and equipment supplies.

H. Provide vacuum breakers in conjunction with water lines to booster, garbage disposal and dishwasher and where required to prevent polluted back-syphoning.

I. All connections and piping within the kitchen shall be made with chrome plated IPS brass with CPB fittings or stainless steel with all stainless fittings.

J. All gas connections to cooking equipment shall be provided with a suitable, non-electric, mechanical link type shutoff valve. Essex Fluid Controls, Webstaurant, Assured automation or approved equal, fire safe

thermal shutoff ball valve, FM approved, UL listed, Model Series TA. Regulator shall be vented to atmosphere and shall be in conformance to NFPA 54

PART 3 – EXECUTION

3.1 IDENTIFICATION

A. All equipment and each length of pipe fitting, trap, fixture, control panel, starter and device used in the systems shall have a permanently attached nameplate or be cast, stamped or indelibly marked with the manufacturer's mark or name, the weight, type and class. The nameplates shall be kept clean and readable at all times.

3.2 DISINFECTION, CLEANING AND ADJUSTING

A. Disinfection

1. Each potable water system (cold and hot water) shall be cleaned and disinfected by this Contractor. Cleaning and disinfection shall be performed after all pipes, valves, fixtures, and other components of the systems are installed, tested and ready for operation.
2. All hot and cold-water piping shall be thoroughly flushed with clean potable water, prior to disinfection, to remove dirt and other contaminants. Screens of faucets shall be removed before flushing and re-installed after completion of disinfection.
3. Disinfection shall be done using sodium hypochlorite in the following manner:

    a. A service cock shall be provided and located at the water service entrance. The disinfecting agent shall be injected into and through the system from this cock only.
    b. The disinfecting agent shall be injected by a proportioning pump or device through the service cock slowly and continuously at an even rate. During disinfection, flow of disinfecting agent into main water supply is not permitted.
    c. All sectional valves shall be opened during disinfection. All outlets shall be fully opened at least twice during injection and the residual checked with ortho to lidin solution.
    d. When the chlorine residual concentration, calculated on the volume of water the piping will contain indicated not less than 50 ppm (parts per million) at all outlets, then all valves shall be closed and secured.
    e. The residual chlorine shall be retained in the piping systems for a period of not less than 24 hours.
    f. After the retention, the residual shall be not less than five parts per million. If less, then the process shall be repeated as described above.
    g. If satisfactory, then all fixtures shall be flushed with clean potable water until residual chlorine by orthotolidin tests shall be not greater than the incoming water supply. (This may be zero.)

4. All work and certification of performance shall be performed by approved applicators or qualified personnel with chemical and laboratory experience. Certification of performance shall indicate:

    a. Name and location of the job and date when disinfection was performed.
    b. Material used for disinfection.
    c. Retention period of disinfectant in piping system.
    d. ppm chlorine during retention.
    e. ppm chlorine after flushing.
    f. Statement that disinfection was performed as specified.
    g. Signature and address of company or person performing disinfection.

5. Upon completion of final flushing (after retention period) the plumbing subcontractor shall obtain a minimum of one water sample from each hot and cold-water line and submit samples to a State-approved laboratory. Samples shall be taken from faucets located at highest floor and furthest from meter or main water supply. The laboratory report shall show the following:

    a. Name and address of approved laboratory testing the samples.
    b. Name and location of job and date the samples were obtained.
    c. The coliform organism count. (An acceptable test shall show the absence of coliform organisms.)

6. If analysis does not satisfy the above minimum requirements, the disinfection procedure shall be repeated.
7. Before acceptance of the systems, this Contractor shall submit to Project Manager for his review, three (3) copies of Certification of Performance as specified above.
8. Under no circumstances shall this contractor permit the use of any portion of domestic water systems until properly disinfected, flushed and certified.

B. Cleaning and Adjusting

1. At the completion of the work, all parts of the installation shall be thoroughly cleaned. All equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by operation of the system for testing.
2. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishings due to the Plumbing sub- contractor's failure to properly clean the piping system shall be repaired by this Contractor at no increase in Contract costs.
3. At the completion of the work, all water systems shall be adjusted for quiet operation.
4. All automatic control devices shall be adjusted for proper operation.
5. All plumbing fixtures and exposed metal work shall be cleaned and polished. Floor drain strainers and traps shall be cleaned of all debris.
6. All items of equipment shall be thoroughly inspected. Any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match the original finish. All items so repaired and refinished shall be brought to the attention of the Architect and Project Manager for inspection and approval.

C. Sanitary Waste and Storm Drainage System

1. The Plumbing subcontractor shall be responsible for checking each pipe for alignment, center line elevation and invert grade for underground installations.
2. At times when work is not in progress, open ends of pipe and fittings shall be securely closed to the satisfaction of the Project Manager so that no trench water, earth or other substance shall enter the pipe or fittings. Any section of a building drainage system that is found defective in material, alignment, grade or joints before acceptance shall be corrected to the satisfaction of Project Manager. Pipe laid through rock excavation shall rest on a six-inch layer of well-compacted sand.
3. The sanitary (soil, waste and vent), storm drainage piping three inches and smaller in diameter shall pitch a minimum of 1/4 inch per foot. Piping four inches and larger in diameter shall pitch a minimum of 1/8 inch per foot.
4. The soil, waste and vent stacks shall be connected as shown and extended through the roof a minimum of 18 inches. Soil, waste and vent pipes shall be concealed unless otherwise noted.

5. Branch connections to each drainage system shall be made with "Wye" and long turn "Tee Wye" fittings. Installation of short radius 1/4 bends, common off-sets, double hub fittings and saddles shall not be approved. Installation of short "Tee Wye" fittings shall be permitted for vertical piping only,

and only where space conditions shall not permit the use of long turn fittings. Only fittings conforming to the Code shall be installed.

6. The changes in direction of each drainage system shall be made with "Wye" branches and 1/8 bends. Provide long sweep bends at bottom of stacks with a vertical cleanout just above the floor at places where a "Wye" and 1/8 bends and end cleanouts cannot be installed.
7. Every fixture shall be separately trapped and the traps must be vented unless an approved battery vented system is being installed. Floor drains shall be considered as a fixture.
8. Vents shall be connected to the discharge of each trap in the sanitary system, thence carried individually to a point above the flood level of the fixture before connecting with any other vent pipes. Pitch the branch vents back to the fixture.
9. Collect individual vent pipes together in branch vent lines and connect to vent stacks. Wherever possible, vent stack offsets shall be made with 45 degree fittings. The vents passing through the roof shall be a minimum size of four inches in diameter.
10. Cleanouts shall be provided in drainage piping at changes in directions, at foot of stacks or other required points accessible for cleaning or rodding out.
11. Cleanouts shall be of the same size as the pipe installed in up to four inches in diameter and not less than four inches in diameter for piping larger than four inches in diameter.
12. The maximum horizontal distance between cleanouts in piping four inches in diameter and smaller shall not be more than 50 feet apart. In piping five inches in diameter and larger, cleanouts shall not be more than 100 feet apart.
13. Traps on sanitary piping not integral with fixtures and in accessible locations shall be provided with a brass trap screw protected by the water seal, and shall be regarded as a cleanout.
14. Test tees with brass cleanout plugs shall be provided at the foot of all vertical soil, waste and storm drainage stacks and at each floor. Wherever cleanouts on vertical lines occur concealed behind finished walls, they shall be extended to back of finished wall, and a wall plate shall be provided.

D. Cold and Hot Water Piping

1. Vacuum breakers shall be installed on supplies to each piece of equipment to prevent back-siphonage.
2. Branch lines from water service or main lines shall be taken off the top or bottom of main, using such crossover fittings as may be required by structural or installation conditions. All water service pipes, fittings, and valves shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between coverings on the different services.
3. Provide shock absorbers at special equipment, tops of the risers, at each individual or each group of fixtures.
4. Water piping shall be run parallel and graded evenly to the drainage points. There shall be a 2 inch drain valve provided for each low point in the piping so that all parts of each water system can be drawn off.
5. Provide suitable means of thermal expansion for the hot water piping using swing joints, expansion loops and long-turn offsets as required to suit building conditions.
6. Piping connections to equipment shall be provided with unions or flanges to permit convenient disassembly for alterations and repairs.
7. No piping shall be installed in a manner to permit back-siphonage or any flow of water from sanitary or drainage systems into the water systems or their distribution piping under any conditions.
8. Air gaps, open end of funnel drains, and approved vacuum breaking devices shall be provided as specified or as indicated on the Drawings. Piping to hose-end faucets or hose-end fittings, or any fixtures where water supply outlet is below the fixture overflow rim shall have vacuum breakers.
9. Where flanges are installed in the water systems, red rubber gaskets shall be installed between each pair of flanges.
10. Heating or bending of copper tubing to eliminate the installation of fittings shall not be permitted.

11. Piping systems shall be kept clean during all phases of work. Open ends of incomplete piping shall be protected to prevent the entrance of foreign materials.
12. Pipe shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.
13. Provide copper-plated friction clamps on the old water supplies to each water closet and urinal flushometer. Friction clamp shall be firmly clamped to the pipe and shall be firmly attached to the adjacent wall structure.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Piping Installation

1. Install piping approximately as shown on the drawings and as directed during installation by the Architect's representative.
2. Piping shall be installed as straight and direct as possible, forming right angles or parallel lines with building walls, other piping and be neatly spaced.
3. The horizontal runs of piping, except where concealed in partitions, shall be installed as high as possible.
4. Piping or other apparatus shall not be installed in such a manner as to interfere with the full swing of the doors and access to other equipment.
5. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the Drawings shall be followed as closely as possible.
6. It shall be possible to drain the water from all sections of each cold and hot water piping system. Pitch piping back to drain valves.
7. Screwed piping of brass or chrome-plated brass shall be made up with special care to avoid marring or damaging pipe and fitting exterior and interior surfaces.
8. Small fittings shall be taper thread. Lampwick, cord, wool or any other similar material shall not be used to make up thread joints.
9. Screwed pipe and copper tubing shall be reamed smooth before installation.
10. All exposed piping in connection with fixtures shall be chrome plated. Where chrome-plated piping is installed, cut and thread pipe so that no unplated pipe threads are visible when work is completed.
11. Reducing fittings, unless otherwise approved in special cases, shall be provided in making reduction in size of pipe. Bushings shall not be allowed unless specifically approved.
12. Remove and replace with new materials, any copper or brass piping (chrome-plated or unplated) showing visible tool marks.
13. Vertical risers shall be firmly supported by riser clamps, properly installed to relieve all weight from the fittings.
14. Any piece of pipe six inches or less in length shall be considered as a nipple.
15. All water service piping shall be kept a sufficient distance from other work to permit finished covering to be not less than 1.5 inches from other work and not less than 1.5 inches between the coverings (insulation) on the different services.
16. Underground piping, welding and welded joints shall conform to welding procedure detailed in AWWA Standard C206 for field welding water pipe.

B. Hanger Installation

1. All piping shall be supported from the building structure by means of approved hangers and supports, to maintain proper grading and pitching of lines, to prevent vibration and to secure piping in place, and shall be so arranged as to provide for expansion and contraction.
    a. Maximum spacing of hangers on soil pipe shall be five feet and hangers shall be provided at all changes in direction. Vertical hanger rods to support piping from the structure or supplementary steel shall not exceed four feet in total length. Where pipe support assemblies

exceed four feet in total length vertically, Plumbing Subcontractor shall provide factory fabricated channels and all associated accessories.

b. Friction clamps shall be installed at the base of the plumbing risers and at each floor (above or below floor slabs). Friction clamps installed above floor slabs shall not be supported from or rest on floor sleeves.
c. Provide hangers at a maximum distance of two feet from all changes in direction (horizontal and vertical) and on both sides of concentrated loads independent of the piping.
d. Hangers, in general, for all horizontal piping shall be Clevis type hangers. These hangers shall be sized to fit the outside diameter of the pipe insulation and insulation protectors (sheet metal shields) specified herein. For sprinkler/stand-pipe systems, hanger shall be approved black malleable iron, heavy duty pattern having two (2) parts bolted together.
e. All vertical drops and runouts including insulated pipes shall be supported by split ring hangers with extension rods and wall plates. These hangers shall be copper-plated when used on uncovered copper tubing. Supports on insulated vertical piping shall be sized to fit the outside diameter of the pipe insulation with 360 degrees insulation protector.
f. Provide on each horizontal insulated lines, pipe covering protectors (shields) at each hanger. Each protector shall be sized to fit the outside diameter of the pipe insulation.
g. Retaining straps shall be provided with all beam clamps.
h. All supplementary steel, including factory fabricated channels, associated accessories, and 12 inch long sheetmetal shields, throughout the project for this Section of the Specifications, both suspended and floor mounted, shall be provided by Plumbing Subcontractor and shall be subject to the approval of the Engineer.
i. Hangers shall not pierce the insulation on any insulated pipe.
j. Wire, tape or wood fastenings for shims or support of any pipe or tubing shall not be used.
k. Remove all rust from the ferrous hanger equipment (hangers, rods, and bolts) and apply one coat of red lead immediately after erection.
l. Piping at all equipment and each control valve shall be supported to prevent strains or distortions in the connected equipment and control valves. Piping at equipment shall be supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without requiring additional support after these items are removed.
m. All piping shall be independently supported from the building structure and not from the piping, ductwork, conduit or ceiling suspension systems of other systems.
n. Installation of hangers which permit wide lateral motions of any pipe shall not be acceptable.
o. "C" clamps installed with pipe hangers or equipment hangers shall not be permitted unless provided with retaining straps.
p. All no-hub cast iron pipe 6 inches or larger in diameter shall be braced to prevent horizontal movement as recommended by the Cast Iron Soil Pipe Institute by using braces, blocking or rodding as illustrated in the CISPI Handbook, Vol. II, Specification Section 310.

C. Pipe Covering Installation

1. Before pipe covering is applied, all pressure tests shall have been performed and approved by the Local Plumbing Inspector.
2. Pipe covering shall be applied over clean, dry surfaces.
3. Pipe covering shall be continuous and shall be carefully fitted with side and end joints butted firmly and tightly together and finished as specified herein.
4. Pipe covering and auxiliaries shall be kept dry during storage and application.
5. Adhesives, cements and coatings shall not be applied when the ambient temperature is below 40 degrees Fahrenheit.
6. Valve bodies shall have covering applied up to the stem.

7. It is the intent of this Specification that all vapor barriers be sealed and be continuous throughout. Staples shall not be used on vapor barrier jackets.
8. Where pipe covering ends occur at equipment or fixtures, end caps on the covering shall be provided.
9. Adequate operating clearances shall be provided at control mechanisms.
10. Pipe covering for flanges shall overlap the adjoining pipe by a minimum of three inches on each side.
11. Pipe covering shall be provided on all piping passing through ceilings and through the interior above ground sleeves (wall and floor).
12. All voids and seams in insulation shall be filled with insulating cement and finished as specified herein.
13. End joints of each section of the installed pipe covering shall be tightly butted.

D. Installation of Sleeves, Inserts and Escutcheons (New and existing floors and walls)

1. Sleeves in floors shall be set one (1) inch above the finished floor surface or as indicated on the Architectural Drawings.
2. Sleeves through interior masonry or non-masonry walls or partitions shall be set flush with the finished surfaces of the wall or partition.
3. Field drilling for inserts required for work under this Section of the Specifications shall be provided by plumbing subcontractor.
4. Each interior wall or partition sleeve shall be packed with foam or glass wool to within one inch of each face of wall, and the remaining portion of each end of sleeve to be sealed with U.L. listed fireproof caulking compound equal to the rating of the partition.
5. Escutcheons shall be installed around all exposed insulated or bare pipe, except water closet starts or bends passing through a finished floor, wall or ceiling. Escutcheons shall fit snugly around the bare pipe or insulated pipe.

E. Valve Installation

1. Location of Valves: There shall be valves where indicated on the drawings and where specified as follows:

    a. At building service entrances, foot of all supply risers, branches to groups of fixtures, branches to separate fixtures, equipment, wall hydrants, hose bibbs, connections to other systems and sectionalizing points in each system.
    b. Each fixture supply shall have a separate angle stop or straight stop finished like the pipe it services.
    c. Each piece of equipment shall have isolation valves for each service connected.
    d. At the foot of each riser, on the inlet and outlet side of control valves.
    e. At the low points of each water system including trapped sections, provide a tee with 2 inch branch and valve with 3/4 inch hose end adapter and attached chain with cap.
    f. Valves shall be located to permit easy operation, replacement or repair.

F. Sewer Connections

1. Connections to the site sewer within 10’ of the building shall be in accordance with local regulations. Coordinate sewer inverts with the site contractor

G. Installation of Plumbing Fixtures

1. General:

a. Refer to Architectural Drawings for locations and mounting heights of all plumbing fixtures, counter-sinks, water fountains and showers.
b. Provide with all plumbing fixtures, all trim, supports, fittings, connections and all incidentals necessary to make a complete installation in accordance with plumbing codes and the Contract Documents.
c. All visible hanger nuts and all escutcheons shall likewise be chrome-plated over nickel plate.

2. Examination:

a. Examine roughing-in for potable cold water and hot water supplies and soil, waste, and vent piping systems to verify actual locations of piping connections prior to installing fixtures.
b. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.
c. Do not proceed until unsatisfactory conditions have been corrected.

3. Fixture Roughings

a. Install rough plumbing including fixture carriers and supports, valves and water hammer arrestors within chase tolerances. Supply roughing through finish walls and at hose bibbs and shower heads shall be secure and free of movement. Locate valves and water hammer arrestors within 12 inches of approved access panel location.
b. Align exposed waste and supply pipe roughings with fixture connections within 1 inch tolerance. Provide flush valves in alignment with the fixture, without vertical or horizontal offsets. Obtain fixture manufacturer roughing data sheets for recommended roughing dimensions.
c. Provide fixture templates for casework contractor for counter mounted sinks and lavatories.

1) Rough handicapped use water closets to locate the flush valve handle on the wide side of the toilet stall.

d. Secure fixture supports to floor slab construction with lag bolts and metal expansion shields to support at least 250 pounds on the front rim of the fixture for 5 minutes.
e. Mounting Heights: Coordinate with Architectural Details

4. Fixture Supports

a. All fixtures (including drinking fountains) shall be supported and fastened to the building structure. The method of support for each type fixture shall be specified herein, except when the fixture designations on the Contract Drawings indicate modifications.
b. Wall hung water closets shall be generally supported on combination drainage fittings and chair carriers and with foot supports fastened to the floor slab with expansion lag screws.
c. Urinals shall be supported by floor mounted carrier with support plate, bearing plate, adjustable extension, tubular uprights, block bases and chrome-plated trim.
d. Installations shall be complete with all necessary bolts, nuts and washers, iron or brass connecting nipples between fixtures and piping system of the proper length and graphite non-asbestos gaskets for closet connections.
e. Where wall hung fixtures are secured to masonry walls or partitions, they shall be fastened with 1/4 inch through bolts provided with nuts and washers at back. Bolt heads and nuts shall be hexagon and exposed bolts, nuts, washers and screws shall be chromium-plated brass.

f. Where secured to concrete or brick walls, they shall be fastened with brass bolts or machine screws in lead sleeve type expansion shields and shall extend at least three inches into solid concrete or brick work, except fixtures specified to be supported or chair carriers.

5. Installation of Fixtures

a. Mount fixtures level at elevations shown on architectural drawings. Refer to toilet room elevations and casework details.
b. Install handicapped use fixtures in accordance with the requirements to the Architectural Access Board Code and ANSI A117.1. Insulate hot water supply and waste piping under lavatories.

1) Where urinals are provided: Install one urinal with the rim mounted above the finish floor in compliance with the handicapped code. Coordinate architectural drawing for mounting height.

c. Grout wall and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.
d. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

6. Fixture Trim:

a. All materials specified to be chromium plated shall be thoroughly cleaned and polished before plating, and plate shall be heavily, thoroughly and evenly applied, guaranteed not to strip or peel.
b. Where escutcheons are not furnished with plumbing fixtures, Plumbing Subcontractor shall supply them. Escutcheons shall be the type and material specified herein.
c. Each fixture shall be separately trapped using the type and size of trap specified herein and required by the Plumbing Code.
d. Unless otherwise specified, faucets and all exposed fittings shall be chromium plated. Chromium plating for brass shall be applied on a first plating of nickel.
e. All fixtures requiring hot and cold water shall have the cold water faucet on the right hand side of the fixture and the hot water faucet on the left hand side of the fixture.
f. All brass shall conform to brass tubing and shall be not less than No. 17 gauge.

7. Adjustments and Cleaning

a. After completion of the installation work and equipment start-ups, perform the necessary adjustments to systems installed under this Section. Submit verification that systems are operating at the specified temperatures and pressures.
b. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
c. Operate and adjust disposers, hot water dispensers, and controls. Replace damaged and malfunctioning units and controls.
d. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.
e. Replace washers of leaking and dripping faucets and stops.
f. Adjust flush valves, open fixture stops, and clean faucet aerators.
g. Set aquastats on water heaters and circulation pumps.

h. Temperature adjustments: Adjust pressure balanced mixing valves at showers to provide a maximum temperature of 112 degree F. Adjust metering faucets in public toilet rooms to provide a maximum temperature of 110 degree F.
i. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

8. Protection

a. Provide protective covering for installed fixtures and fittings.
b. Do not allow use of fixtures for temporary facilities, except when approved in writing by Project Manager.

3.4 ELECTRICAL COORDINATION

A. The Electrical Contractor shall provide the power wiring (120V) to all equipment provided under the plumbing Sections of the specifications.

B. For systems which utilize central control panels, the Electrical Contractor shall connect power to the control panel. For systems which do not utilize central control panels, the Electrical Contractor shall connect power to the equipment manufacturer provided junction boxes or wiring points

C. For systems which utilize central control panels, the 15401 Sub-Contractor shall connect power from the control panel to the various components within the given system. The 15401 Sub-Contractor shall retain the services of a licensed electrical contractor to perform all required work. 15401 Sub-Contractor shall verify with each system vendor all electrical and control work required for the proper installation and operation of their respective systems, which has not included in the vendor’s price and include this work in his bid price. All conduit and wiring provided by The Section 15401 Sub-Contractor and his subcontractors shall be installed in accordance with the requirements of Division 16 -Electrical of these specifications.

D. Low Voltage Control Wiring: Provide 24 VAC control wiring from plumbing fixture controller to each controlled utility or device. Make connections at controlled device and terminate at output terminal on Controller. Minimum wiring, 18 AWG, plenum rated cable. Provide cable with required conductors plus two spares

3.5 INSPECTION AND TESTS

A. General

1. All labor, materials, instruments, devices and power required for testing shall be provided by the Plumbing Subcontractor. The tests shall be performed in the presence and to the satisfaction of the Architect and such other parties as may have legal jurisdiction. No piping in any location shall be closed up, furred in, or covered before testing and approval by the Local Plumbing Inspector and Project Manager.
2. Where portions of piping systems are to be covered or concealed before completion of the project, those portions shall be tested separately in the manner specified herein for the respective entire system.
3. Any piping or equipment that has been left unprotected and subject to mechanical or other injury in the opinion of Owner’s Project Manager shall be retested in part or in whole as directed.
4. The Authority retains the right to request a recheck or resetting of any pump or instrument by the Plumbing Subcontractor during the guarantee period at no additional cost to the Contract.

5. Repair, or if directed by Project Manager, replace any defective work with new work without extra cost to the contract. Repeat tests as directed, until the work is proven to meet the requirements specified herein.
6. Restore to its finished condition any work, provided by other Contractors, damaged or disturbed by tests. The Plumbing Subcontractor shall engage the original Contractor to do the work of restoration to the damaged or disturbed work.
7. The fixtures shall be tested for stability of support and satisfactory operation. The piping shall be tested when directed by the Architect, Local Plumbing Inspector for stability of support.
8. After the fixtures are set and connected, and the piping systems to same have been tested, the Plumbing Subcontractor shall turn water on to the fixtures, equipment, fill the traps, etc., and the proper operation of all items shall be demonstrated by him in the presence of and to the satisfaction of the Engineer, Owner's Project Manager, Plumbing Inspector, or their designated representative.
9. Caulking of screwed joints or holes in piping shall not be acceptable.
10. The Plumbing Subcontractor shall notify the Architect, Owner's Project Manager and all inspectors having jurisdiction, a minimum of 48 hours in advance of making any required tests so that arrangements may be made for their presence to witness scheduled tests.

B. Specific

1. Storm and Sanitary Piping Systems:

   a. Before the installation of fixtures, equipment and insulation, each system including vents shall have all necessary openings plugged to permit the entire system to be tested in accordance with the State Plumbing Code. Each system shall hold this water without a drop in water level. Test to be witnessed by Local Plumbing Inspector and Project Manager.
   b. Where a portion of the system is to be tested, the test shall be accomplished with a vertical stack ten feet above the highest horizontal line to be tested may be installed, and filled with water to maintain sufficient pressure. A pump may be used to supply the required pressure. The pressure shall be maintained for a minimum of four hours for sufficient time to permit inspection of all joints.

2. Cold and Hot Water Piping System:

   a. Upon completion of the roughing-in and before setting fixtures and final connections to all equipment, all water piping systems shall be tested to a hydrostatic pressure of 150 pounds per square inch.
   b. Each systems test shall be maintained for eight hours without a drop in pressure. These tests to be witnessed by Local Plumbing Inspector and Owner's Project Manager.
   c. After testing, provide complete adjustment of all parts of each water system until design distribution or balancing is obtained throughout.

3.6 SPECIAL RESPONSIBILITIES

A. Coordination: Cooperate and coordinate with work of other Sections in executing work of this Section.

1. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.
2. Provide information as requested on items furnished under this Section which shall be installed under other Sections.
3. Obtain detailed installation information from manufacturers of equipment provided under this Section.

4. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections or by User Agency.
5. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Architect.
6. Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor-mounted vibrating and rotating equipment provided under this Section.
7. Notify Architect of location and extent of existing piping, ductwork and equipment that interferes with new construction. In coordination with and with approval of Architect, relocate piping, ductwork and equipment to permit new work to be provided as required by Contract Documents. Remove non-functioning and abandoned piping, ductwork and equipment as directed by Architect. Dispose of or store items as requested by Architect.

B. Installation Only Items

1. Where Plumbing Subcontractor is required to install items which it does not purchase, it shall coordinate their delivery and be responsible for their unloading from delivery vehicles and for their safe handling and field storage up to the time of installation. This trade shall be responsible for:

   a. Any necessary field assembly and internal connections, as well as mounting in place of the items, including the purchase and installation of all dunnage supporting members and fastenings necessary to adapt them to architectural and structural conditions.
   b. Their connection to building systems including the purchase and installation of all terminating fittings necessary to adapt and connect them to the building systems.

2. Plumbing Subcontractor shall carefully examine such items upon delivery. Claims that any of these items have been received in such condition that their installation shall require procedures beyond the reasonable scope of work of Plumbing Subcontractor shall be considered only if presented in writing within one week of their date of delivery. Unless such claims have been submitted Plumbing Sub contractor shall be fully responsible for the complete reconditioning or replacement of the damaged items.

C. Maintenance of equipment and systems: Maintain Plumbing equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions. Do not use boilers before providing water treatment where required; this includes use of boilers for temporary heat or for testing.

D. Use of premises: Use of premises shall be restricted as directed by Architect and as required below.

1. Remove and dispose of dirt and debris, and keep premises reasonably clean. Upon completion of work, remove equipment and unused material. Put building and premises in neat and clean condition, and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Architect and as specified under CLEANING paragraph.
2. It shall be this trade's responsibility to store his materials in a manner that shall maintain an orderly clean appearance. If stored on-site in open or unprotected areas, all equipment and material shall be kept off the ground by means of pallets or racks, and covered with tarpaulins.

3. Do not interfere with function of existing sewers and water mains. Extreme care shall be observed to prevent debris from entering ductwork. Confer with Architect as to disruption of heating services or other utilities due to testing or connection of new work to existing. Interruption of heating services shall be performed at time of day or night deemed by Architect to provide minimal interference with normal operation. Obtain Architect's approval of the method proposed for minimizing service interruption.

E. Surveys and measurements:

1. Base measurements, both horizontal and vertical, on reference points established by Contractor and be responsible for correct laying out of work.
2. In event of discrepancy between actual measurements and those indicated, notify Architect in writing and do not proceed with work until written instructions have been issued by Architect.

3.7 MATERIALS AND WORKMANSHIP

A. Work shall be neat and rectilinear. Piping shall run concealed except in mechanical rooms and areas where no hung ceiling exists. Install material and equipment as required by manufacturers. Installation shall operate safely and without leakage, undue wear, noise, vibration, corrosion or water hammer. Work shall be properly and effectively protected, and pipe openings shall be temporarily closed to prevent obstruction and damage before completion.

B. Except as specified otherwise, material and equipment shall be new. Provide supplies, appliances and connections necessary for complete and operational installation. Provide components required or recommended by OSHA and applicable NFPA documents.

C. References to manufacturers and to catalog designation, are intended to establish standards of quality for materials and performance but imply no further limitation of competitive bidding.

D. Finish of materials, components and equipment shall be as approved by Architect and shall be resistant to corrosion and weather as necessary.

E. The Owner will not be responsible for material and equipment before testing and acceptance.

3.8 CONTINUITY OF SERVICES

A. Do not interrupt existing services without Owner’s Project Manager's approval.

B. Schedule interruptions in advance, according to Owner’s Project Manager's instructions. Submit, in writing, with request for interruption, methods proposed to minimize length of interruption.

C. Interruptions shall be scheduled at such times of day and work so that they have minimal impact on User Agency's operations.

3.9 ANCHORS AND INSERTS

A. Inserts shall be iron or steel of type to receive machine bolt head or nut after installation. Inserts shall permit adjustment of bolt in one horizontal direction and shall develop strength of bolt when installed in properly cured concrete.

B. Provide anchors as necessary for attachment of equipment supports and hangars.

3.10 INSTALLATION OF EQUIPMENT

A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways, to satisfaction of Architect and in accordance with code requirements. Installation shall permit clearance for access to equipment for repair, servicing and replacement.

B. Install equipment so as to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof-mounted equipment shall be installed and supported on structural steel provided under other Sections.

C. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall or ceiling mounting of equipment provided under this Section (e.g. heating and ventilating units, fans, ducts and piping) as indicated on Drawings and in Specifications.

D. Provide steel supports and hardware for proper installation of hangers, anchors, guides, etc.

E. Provide cuts, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.

F. Structural steel and hardware shall conform to Standard Specifications of ASTM; use of steel and hardware shall conform to requirements of Section Five of Code of Practice of American Institute of Steel Construction.

G. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly which will void warrantee. Report in writing to Architect, prior to purchase or shipment of equipment involved, on conditions which may prevent proper installation.

3.11 PAINTING

A. Equipment shall have shop coat of non-lead gray paint. Hangers and supports shall have one coat of non-lead red primer. Complying with IEQ requirements specified under Section 09900 - PAINTING. Machinery such as pumps, fans, etc., shall be stenciled with equipment name. Stencil shall be at least 6" high for large equipment, 2" high for small equipment. Finish painting, including painting of various piping and duct systems, shall be done under other Sections.

3.12 SYSTEM SHUTDOWNS

A. Coordination shutdowns of existing systems with the Project Manager and submit a written request at least ten working days in advance. Minimize system shut downs as much as possible. Submit a list of all affected areas, the proposed work to be performed, and the expected length of the shut-down including time for retesting.

B. Provide temporary services to maintain active system during extended shut-downs as required for demolition and construction phasing.

3.13 CORE DRILLING

A. Do not core new or existing concrete structure without written approval from the Structural Engineer.

B. Perform all core drilling required for the proper installation of this Section. Locate all required openings and prior to coring. Coordinate the opening with the other Trades and obtain approval from the Structural Engineer.

C. Thoroughly investigate the existing conditions in the vicinity of the required opening prior to cutting. Take care so as not to disturb the existing building systems. Damage to existing conditions incurred during core drilling shall be corrected to the Owner Project Manager's satisfaction with no additional expense to the contract.

3.14 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

A. Refer to Specification section 017900 Demonstration and Training

B. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, Contractor, and subcontractors. Perform the following:

1. Review installed systems, subsystems, and equipment.
2. Review instructor qualifications.
3. Review instructional methods and procedures.
4. Inspect and discuss locations and other facilities required for instruction.

C. Training Modules: Develop an instruction program that includes individual training modules for each system, subsystem, and equipment.

END OF SECTION

SECTION 15601

HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

(Filed Sub-bid Required)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

   The following should appear on the upper left hand corner of the envelope:

   Name of Sub-Bidder: _____
   _____
   _____

   Project: MILLBURY HIGH SCHOOL –
   FOODS PROGRAM ROOM RENOVATIONS
   Millbury Memorial Junior/Senior High School
   12 Martin Street
   Millbury, Massachusetts 01527

   Sub-Bid for Section: 15601, HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.3 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.4 DESCRIPTION OF WORK

A. Work Included: The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:

1. Hangers and Supports
2. Sleeves
3. Air distribution and Ductwork
4. Diffusers, Registers and Grilles
5. Fans
6. Roof Curbs
7. Automatic Temperature Controls
8. Firestopping of penetrations made by/for this contractor.
9. Hoisting and rigging for equipment and materials specified herein.
10. Testing and balancing

B. Provide any other component or related system (whether or not listed) which is part of the overall design and basic equipment and deemed necessary for its completion, thoroughness and readiness for operation in perfect condition.

1. The HVAC Subcontractor shall, at all times, have a foreman or superintendent on the project authorized to make decisions and receive instructions as if the HVAC Subcontractor himself were present. The foreman or superintendent shall not be removed or replaced without the express approval of the Architect-Engineer after construction work begins. The HVAC Subcontractor shall employ only competent and experienced workmen at a regular schedule in harmony with the other tradesmen on the job. The HVAC Subcontractor shall also exercise care and supervision of his employees in regard to proper and expeditious layout of his work.
2. It shall be the HVAC Subcontractor’s responsibility to submit all documentation required of these sections pertaining to Section 15601 work.
3. Air Filters: It is the intent of this specification that all equipment requiring or specified with air filters be furnished with one spare sets of filters for each piece of equipment in addition to those supplied with the unit. All filters shall have minimum efficiency of MERV 8.

C. Alternates: Not Applicable.

D. Items to Be Installed Only: Not Applicable

E. Items To Be Furnished Only:

1. Products Furnished, But Not Installed Under This Section

   a. Furnish pipe sleeves for placement into formwork by the General Contractor.
   b. Furnish access doors and panels to be installed by the applicable sections.
   c. Furnish access panels for installation in walls, ceiling and floors at locations to permit access for adjustment, removal, replacement and servicing of all concealed equipment, valves and materials installed under this Section of the specifications.
   d. Access panels will be installed under the Section of the related trades of the finished surfaces in which they are located.
   e. Access panels shall be located in closets, storage rooms and/or other non-public areas if possible; positioned so that the equipment can be easily reached, and the size shall be sufficient for this purpose (min. 16" x 16"). When access panels are required in corridors, lobby or other habitable areas, they will be located as directed by the Owner's Representative.
   f. Access panels shall be prime painted, keyed alike and provided with cylinder lock and two keys for each panel. Units shall be manufactured by Milcor, Inland Steel, Miami Carie or approved equal. Required fire resistance of walls and ceilings shall be maintained.

F. Reference To Drawings: Work specified in HEATING, VENTILATING AND AIR CONDITIONING (HVAC) is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1, D-1.2, A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, and E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

G. Related Work:

1. Examine all other sections of the Specifications and all drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and coordinate all work under this section therewith.
2. The following related items are not included in this Section and will be performed under the designated Sections:

   a. Section 07840, FIRESTOPPING.
   b. Section 09900, PAINTING; Painting of all exposed ductwork and other mechanical equipment not having enameled, surfaces, stainless steel or chromed finishes.
   c. In general, all wiring required for equipment provided by the HVAC Contractor that requires Automatic Controls and all interlock wiring for this HVAC equipment that is not shown or indicated on the Electrical Drawings of Section 16101, ELECTRICAL WORK shall be provided under Section 15601, HVAC.

1.5 REFERENCES

A. For products or workmanship specified by association, trade, or federal standards, comply with the requirements of the standard, except when more rigid requirements are herein specified or are required by applicable codes.

B. The date of the standard is that in effect at the Bid date.

C. Schedule of References:

1. AABC Associated Air Balance Council
1518 K Street, N.W.
Washington, DC 20005

2. ABMA American Boiler Manufacturers Association
950 N. Glebe Road
Suite 160
Arlington, VA 22203

3. ARI Air-Conditioning and Refrigeration Institute
4301 North Fairfax Drive, Suite 425
Arlington, VA 22203

4. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.
1791 Tullie Circle N.E.
Atlanta, GA 30329

5. AWS American Welding Society, Inc.
P.O. Box 351040
550 NW LeJeune Road
Miami, FL 33135

6. FM

7. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, Inc.
4201 Lafayette Center Drive
Chantilly, VA 22021

1.6 DEFINITIONS

A. As used in this Section, the following terms shall be understood to have the following meaning:

1. Work: all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.
2. Concealed: hidden from sight in chases, furred in spaces, shafts, embedded in construction, in a crawl space, and above hung ceilings.
3. Exposed: not installed underground or concealed as defined above.
4. "Furnish" shall mean purchase and deliver to the project site, complete with every necessary appearance and support.
5. "Install" shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting, proper location and operation in the project.

6. "Provide" shall mean furnish and install.
7. "Piping" shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.
8. "Furnished by others" shall mean materials or equipment purchased and set in place under other sections of the general contract and connected to the systems covered by this Section of the specifications by this trade contractor.
9. "Coordinate" shall mean all work provided under this Section of the specification shall be in compliance with work of other trades.
10. “HVAC Subcontractor,” “Subcontractor,” or “Installing Contractor” shall be the Subcontractor responsible for the Work of this Section of the Specifications, and shall be responsible for coordination of the Work of this Section of the Specifications with the Work of Paragraph 2.57-Automatic Temperature Controls, where applicable.
11. “ATC” shall mean Automatic Temperature Controls and shall be interchangeable with HVAC Control Systems.

1.7 CODES, ORDINANCES AND PERMITS

A. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, but not limited to:

1. All Applicable NFPA Standards
2. State and Local Building Mechanical and Energy Codes
3. American Society of Mechanical Engineers
4. American Society for Testing and Materials
5. American National Standards Institute
6. Underwriters' Laboratories, Inc.
7. Occupational Safety and Health Administration

B. Any other local codes or authorities having jurisdiction including any other standards specifically indicated in other paragraphs of this specification.

C. All pressure vessels shall conform to ASME and state codes and regulations.

D. All equipment shall meet the more efficient requirement:

1. As shown on bid documents, or
2. Minimum efficiencies state in the energy code.

E. This Subcontractor shall give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by Architect, inspectors, and authorities having jurisdiction. Replace unacceptable work to conform to requirements, satisfactory to Architect, and without extra cost to the Owner. If work is covered before inspection and approval, this Subcontractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.8 SUBMITTALS

A. Conform to the requirements of Section 01300, SUBMITTALS, for schedule and form of all submittals. Coordinate this submittal with submittals for all other finishes. Submit plans with location of pipe penetration in structural slabs.

B. Shop drawings and design layouts shall be prepared by licensed installing contractors and shall note the name(s), license number(s) and license expiration date(s) of the contractor(s) installing the heating, piping and refrigeration systems.

C. Material List: Before purchasing materials for the work, submit to the Architect a complete list showing (1) the materials specified, and (2) the equivalent materials proposed for use, including description of product, if the Subcontractor desires to use materials other than those specified.

1. All materials shall be approved by the Architect before commitment for materials is made. Intention of using specified materials shall not relieve the Subcontractor from submitting the above list.

D. Product Data: Submit complete manufacturer's product description and technical information including:

1. Hangers and Supports
2. Sleeves
3. Ductwork
4. Diffusers, Registers and Grilles

E. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.

1. Access panel shop drawings shall be submitted to the Architect for approval.
2. Do not submit multiple product information in a single bound manual.
3. Three-ring binders shall not be accepted.

F. In the event that the Subcontractor fails to provide Shop Drawings for any of the products specified herein:

1. Subcontractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.
2. Subcontractor furnishes and installs material and/or equipment which is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment from the Work and shall be responsible for the replacement of this material and/or equipment with material and/or equipment which is in complete accordance with these Specifications, at the direction of the Owner's Representative.
3. Removal and replacement of materials and/or equipment which are not in complete compliance with these Specifications shall be executed by the Subcontractor at no extra cost to the Owner.
4. Removal and replacement of materials and/or equipment which are not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.

G. Mark dimensions and values in units to match those specified.

H. Submit Material Safety Data Sheets (MSD) on each product with submittal.

1.9 OPERATION AND MAINTENANCE (O&M) DATA

A. Refer to Section 01700, CONTRACT CLOSEOUT.

B. Prepare and submit Operating and Maintenance manuals at least two (2) months prior to the date of Substantial Completion of the Project. Submit six complete sets of operation and maintenance data complete with at least the following.

C. Table of Contents:

1. Introduction:

a. Explanation of Manual and its use

2. Maintenance

a. Maintenance and Lubricating Chart: furnish three sets of charts indicating equipment tag number, location of equipment, equipment service, greasing and lubricating requirements, lubricants and intervals of lubrication. One chart shall be framed under glass and mounted where directed by the Architect.
b. Valve and System Chart: correspond to valve tags, refer to Paragraph 3.05.
c. Recommended List of Spare Parts: furnish two typed sets of instructions for ordering spare parts with sectional views of the fittings or equipment showing parts numbered or labeled to facilitate ordering replacements. Each set shall include a list with itemized prices of those parts recommended to be kept on hand as spares, as well as the name and address of where they may be obtained.

3. Manufacturer's Literature:

a. Hangers and Supports
b. Sleeves
c. Ductwork
d. Diffusers, Registers and Grilles

4. Manufacturer's Nameplate

a. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.10 MATERIAL AND EQUIPMENT STANDARD

A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Architect.

B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. The Request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process.

C. If a substitution of materials or equipment in whole or in part is made, this HVAC Subcontractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.

D. All materials, equipment and accessories provided under this Section shall be new and unused products of recognized manufacturers as approved.

1.11 ELECTRICAL WORK

A. All electrical apparatus and controls furnished as a part of the work of this Section, but which are not integral with the equipment served, will be mounted by the Electrical Subcontractor and all wiring will be done under Division 26 - ELECTRICAL.

B. Except for electrical apparatus specifically called for as part of this Section, all switches and controllers required will be provided under Division 26 - ELECTRICAL.

C. All electrical apparatus and controls furnished as a part of the HVAC work shall conform to applicable requirements under Division 26 - ELECTRICAL.

1.12 RECORD DRAWINGS

A. Refer to Section 01100, SUMMARY OF WORK and Section 01700, CONTRACT CLOSEOUT.

B. All costs for Record Drawings shall be borne by the HVAC Subcontractor.

C. Maintain at the job site at all times, a complete set of black line prints of the HVAC Drawings. As the work progresses, mark all changes made, whether resulting from addenda, formal change orders or other instructions issued by the Architect. Color in the various ductwork, piping, equipment, apparatus and associated appurtenances exactly as they are erected.

D. The accurate location, depth, size and type of all concealed items shall be recorded before concealment to ensure accurate and direct future access doors and panels. Show inverts of all services at key points within the building, or buried items, and entering and leaving the building. Show dimensions from building grid lines.

E. The record drawings will be reviewed at regular intervals by the Architect and will be taken into consideration when reviewing the monthly applications for payment submitted by the HVAC Subcontractor.

F. When this procedure has been accomplished to the satisfaction of the Architect, the Record Drawing information shall be transferred by this Subcontractor to the CAD files, and a CAD disc and as directed in Section 01700, CONTRACT CLOSEOUT.

1.13 WARRANTIES

A. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of 12 months commencing with the Date of Substantial Completion. Any failure due to defective material, equipment or workmanship which may developed, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.

B. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.

C. Upon receipt of notice from the Owner of the failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.14 COORDINATION

A. The work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed nor interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.

B. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Architect for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Architect's satisfaction at no expense to the Owner.

C. Where work of this Section will be installed in close proximity to work of other sections or where there is evidence that the work of this section will interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8-inch scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

D. Keep fully informed as to the shape, size and position of all openings required for all apparatus, piping, ductwork, etc., and give information in advance to build openings into the work. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the General Contractor for the proper setting of same.

E. All distribution systems, which require pitch or slope such as condensate drains and water piping, shall have the right of way over those, which do not.

F. The HVAC Subcontractor shall, with the approval of the Architect and without extra charge, make reasonable modifications in his work as required by normal structural interferences, or by interference with work of other trades, or for proper execution of the work.

G. Keep fully informed as to the size, shape and location of all openings required for the work of this Section and give full information to all Subcontractors and the General Contractor.

1.15 COORDINATION DRAWINGS

A. Refer to Section 01300, SUBMITTALS and Section 01700, CONTRACT CLOSEOUT for coordination drawings submittal requirements and use of project CAD Files.

B. Indicate clearances and advise other trades of clearance requirements for operation, repair, removal and testing of mechanical equipment.

C. Indicate aisle ways and access ways required on coordinated shop drawings for mechanical equipment rooms, electrical rooms, computer rooms, and kitchens.

D. HVAC Coordination Drawings

1. The HVAC subcontractor shall prepare Coordination Drawings showing all HVAC work to be installed as part of this Section. The HVAC Coordination Drawings shall show all equipment, pipes, sleeves, inserts, ducts, registers, diffusers and supports.
2. The HVAC subcontractor after showing all of the HVAC work shall forward the reproducible Coordination Drawings to the Contractor.

3. The HVAC subcontractor shall not install any of his work prior to the preparation of the final Coordination Drawings. If HVAC work proceeds prior to the final Coordination Drawings, any change to the HVAC work to correct the interferences and conflicts which result will be made by the HVAC subcontractor at no additional cost to the Owner.
4. Coordination Drawings are for the HVAC subcontractor's and Construction Supervisor's use during construction and shall not be construed as replacing any shop, "as-built", or Record Drawings required elsewhere in these Contract Documents.
5. Construction Supervisor's review of Coordination Drawings shall not relieve the HVAC subcontractor from his overall responsibility for coordination of all work performed pursuant to the Contract or from any other requirements of the Contract.
6. No Coordination shall allow the passing of any pipe or conduit through any ductwork system.

1.16 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by the HVAC Subcontractor or his/her Sub-subcontractors, without additional expense to the Owner.

B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the site and shall have the approval of the Architect before being installed. The HVAC Subcontractor shall follow Drawings, including shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Architect before proceeding with the installation. The HVAC Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

C. Refer to the Architectural, Structural, Fire Protection, Plumbing and Electrical Drawings and coordinate location and requirements of all HVAC equipment.

D. Sizes of ducts and pipes and routing are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge.

1.17 SURVEY AND MEASUREMENTS

A. Base all required measurements, horizontal and vertical, from referenced points established by the Contractor and be responsible for correctly laying out the Work required under this Section of the Specification.

B. In the event of discrepancy between actual measurements and those indicated, notify the Contractor in writing and do not proceed with the related work until instructions have been issued.

1.18 DELIVERY, STORAGE AND HANDLING

A. No materials shall be delivered or stored on site until Shop Drawings have been approved.

B. All manufactured materials shall delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.

C. Protect materials against dampness. Store off floors, under cover, and adequately protected from damage.

1.19 PROTECTION OF WORK AND PROPERTY

A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.

B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.

C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.

D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.20 SUPERVISION

A. Provide a Construction Supervisor with a minimum of 5 years of experience in HVAC Construction Supervision who shall be responsible for the installation of the Work of this Section of the Specifications, and in accordance with this Section of the Specifications and with the Contract Drawings.

1.21 SAFETY PRECAUTIONS

A. Life safety shall be a primary consideration. Provide all required and prudent material, labor and equipment to comply with applicable safety regulations. Further, provide all material, labor and equipment to comply with reasonable or generally accepted safety precautions as directed by the Owner or the Architect.

B. Comply with all of the safety requirements of OSHA throughout the entire construction period of the project.

C. Furnish, place and maintain proper guards for prevention of accidents and any other necessary construction required to secure safety of life and property.

D. Perform work only in areas of the building as approved by the Owner or his representative. Personnel and equipment access to the site, lay down areas, parking areas and areas of work shall only be as designated and allowed by the Owner.

1.22 SCHEDULE

A. Construct work in sequence under provisions of GENERAL CONDITIONS.

1.23 SPARE PARTS

A. The HVAC Subcontractor shall furnish spare-parts data for each different item of equipment furnished. The data shall include a complete list of parts and supplies, with current unit prices and source of supply; a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified hereinafter to be furnished as part of the contract; and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 180 days at the particular installation. The foregoing shall not relieve the HVAC Subcontractor of any responsibilities under the guarantees specified herein.

B. The HVAC Subcontractor shall furnish a minimum of 4 additional complete sets of filters for all air handling equipment using filters. In addition to the filters furnished with each piece of equipment from the manufacturer, the HVAC Subcontractor shall provide two complete sets of filters to be used during the construction and then the testing and balancing period.

1.24 MAINTENANCE ACCESSORIES AND TOOLS

A. All special tools necessary as recommended by the equipment manufacturer(s) for the operation and maintenance of boilers, pumps, fans, and other equipment shall be furnished. Small hand tools shall be furnished with a suitable lockable cabinet, mounted where directed.

B. Special Wrenches

1. Special wrenches shall be provided as required for opening boiler manholes, hand holes, and cleanouts.

1.25 SEALING

A. All penetrations through the structure shall be sealed air and water tight where required for acoustical reason or where penetrating a fire rated element must be firestopped. This contractor shall coordinate all penetrations of the floors and ceiling with G.C. Firestopping requirements is under Section 07840, FIRESTOPPING.

1.26 SLEEVES, INSERTS AND ANCHOR BOLTS

A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this Section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this Section of the specifications.

B. Unless otherwise specified herein, all pipes passing through floors, walls, ceilings or partitions shall be provided with sleeves and rating shall be maintained of fire stopping.

C. Field drilling (core drilling), when required, shall be performed under this Section of the specifications, after receipt of approval by the General Contractor.

1. When coring cannot be avoided, provide 1/4-inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below and protect and piping, ductwork, wiring, personnel, etc., below the location of the core.

1.27 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

A. Provide all supplementary steel, factory fabricated channels and supports required for proper installation, mounting and support of all equipment and systems provided under this Section of the specification.

B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the General Contractor, as shown on the drawings, or hereinafter specified.

C. The type and size of the supporting channels and supplementary steel provided under this Section of the specifications shall accommodate all deflections in conformance with the manufacturer's requirements for the specific loading on the system installed therein.

D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.

E. All supplementary steel including factory fabricated channels, supports and fittings shall be UL approved, shall be galvanized steel where exposed or subject to rust producing atmosphere and shall be manufactured by Unistrut, H-strut, Powerstrut or approved equal.

1.28 ACCESSIBILITY

A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are readily accessible. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the General Contractor.

B. All piping runs and valve locations shall be coordinate with plumbing and fire protection piping to permit shut off and isolation of piping shall occur from one location with common access panel.

1.29 TESTING AND BALANCING

A. General Requirements

1. The Contractor shall select AABC MN-1, NEBB-01, SMACNA-07 or ASHRAE 111 as the standard for providing testing, adjusting and balancing of air and water systems. The selected standard shall be used throughout the project. Testing, adjusting, and balancing shall be accomplished by a firm certified for testing and balancing by Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Prior to testing, adjusting, and balancing, the Contractor shall verify that the systems have been installed and are operating as specified. Approved detail drawings and all other data required for each system and/or component to be tested shall be made available at the job site during the entire testing, adjusting and balancing effort. The Contractor shall verify that all balancing devices are properly installed to permit testing, adjusting and balancing and that all duct leakage tests have been completed prior to testing, adjusting and balancing. The Owner's Representative shall be notified in writing of all equipment, components, or balancing devices, that are damaged, incorrectly installed, or missing, as well as any design deficiencies that will prevent proper testing, adjusting, and balancing. Testing, adjusting, and balancing shall not commence until approved by the Owner's Representative. Instrumentation accuracy shall be in accordance with the standard selected in this paragraph. Sound level measuring equipment shall be rated in accordance with ANSI S1.4 and ANSI S1.11.
2. The Final position of each balancing valve and damper shall also be physically marked with permanent marker.

B. Instrument Accuracy Requirements

1. All instrumentation shall be checked for accuracy before beginning testing, adjusting and balancing procedures. Instrument accuracy shall be in accordance with the standard selected in Paragraph A. General Requirements, immediately above. Checks may be carried out against similar equipment maintained specifically for checking purposes or by the manufacturer or a recognized testing facility. All instrumentation used for testing shall be calibrated within 6 months of use. Pitot tubes and U-tube manometers do not require checking. In no case shall the instrumentation accuracy be less than specified by the instrument manufacturer. Any instrument falling out of calibration during the process of balancing and testing shall be recalibrated or removed from the site and replaced by a properly calibrated instrument. No instruments shall be allowed to remain on-site that are not in calibration.

C. Submittals

1. List the minimum data to be included in the final balance report.
2. The following shall be submitted in accordance with Section 01300, SUBMITTALS.
3. Reports:

   a. Testing and Balancing; 6 copies of a preliminary report, 30 days before balancing commences. The report shall be organized by specific systems and shall clearly identify each item of equipment to be tested, adjusted, and balanced. The appropriate test procedures and measurements to be taken for each item of equipment shall be listed. Instrument calibration records shall be provided on forms shown in AABC MN-1 or SMACNA-07. Manufacturer's specified accuracy shall be shown. The report shall include floor plan drawings showing all dimensions of ductwork, piping and their related measurement locations and types of measurements to be made. All related data necessary for testing, balancing, and adjusting, including fan curves and pump curves, shall be included. A system readiness checklist, similar to that shown in SMACNA-07, shall be included. The report shall contain a listing of the deficiencies of all systems to be tested, adjusted and balanced and the corrective action taken. The report shall contain a schedule for the testing and balancing. Six copies of the final report on forms shown in AABC MN-1 or SMACNA-07, 30 days after completion of the test and balance operation. Data shall be in a hard bound cover identifying the project name, location, date of submittal, name of Contractor, and a general title indicating the specific area and type of work, and shall be signed by a registered professional engineer, employed by the test and balance firm, who has a minimum of 2 years' experience in testing, adjusting and balancing work. The final report shall include a summary describing test methods, test results, and major corrective actions taken. The report shall include as-tested floor plans showing all measurement locations and types of measurements made. The air handling unit data shall include a static pressure profile diagram, and pitot tube traverses where possible. Pump data shall include pump efficiency. Data for heating and cooling coils shall include heat balance calculations.
   b. All instruments that are recalibrated and brought back onto the job site after being found to be out of calibration shall have recalibration records submitted on forms shown in AABC MN-1 or SMACNA-07.

4. Certificates

   a. Qualification: Qualification data, 90 days prior to testing and balancing operations. The test and balance firm shall be certified by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB). The lead balancing technician shall be qualified by AABC or NEBB and his qualification data shall include past experience on at least five similar projects.

1.30 CERTIFICATES OF INSPECTION/APPROVAL

A. Furnish upon completion of all work, certificates of inspections from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating conditions.

PART 2 – PRODUCTS

2.1 DUCTWORK

A. Metal Ductwork

1. All aspects of metal ductwork construction, including all fittings and components, shall comply with THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS, 2ND ED., 1995 unless otherwise specified. Elbows shall be radius type with a centerline radius of 1-1/2 times the width or diameter of the duct where space permits or unless noted otherwise. Otherwise, elbows having a minimum radius equal to the width or diameter of the duct or square elbows with factory fabricated turning vanes may be used. Static pressure Class ½ and 1-inch WG ductwork shall meet the requirements of Seal Class C. Class 2-inch WG ductwork shall meet the requirements of Seal Class B. Class 3 through 10-inch WG shall meet the requirements of Seal Class A. Pressure sensitive tape shall not be used as a sealant. Spiral lock seam duct, and flat oval shall be made with duct sealant and locked with not less than 3 equally spaced drive screws or other approved methods indicated in THE SMACNA HVAC DUCT CONSTRUCTION STANDARDS, 2ND ED., 1995. The sealant shall be applied to the exposed male part of the fitting collar so that the sealer will be on the inside of the joint and fully protected by the metal of the duct fitting. One brush coat of the sealant shall be applied over the outside of the joint to at least 2-inch band width covering all screw heads and joint gap. Dents in the male portion of the slip-fitting collar will not be acceptable. Outdoor air intake ducts and plenums shall be fabricated with watertight soldered or brazed joints and seams.

2. Rectangular ductwork schedules:

SCHEDULE OF RECTANGULAR DUCTWORK CONSTRUCTION (UP TO 2-inch WG)

Duct Dimension (inches)	Metal gages		Transverse joint construction	Reinforcement spacing	Transverse joint Reinforcement
	Galvanized steel	B & S aluminum			
<=12	24	0.040"	1" pocket lock	---	None
13-18	24	0.040"	Standing "S" slip	8'-0"	1"x26 gauge
19-26	22	0.050"	Standing "S" slip	8'-0"	1"x26 gauge
27-30	20	0.064"	Standing "S" slip	8'-0"	1"x24 gauge

3. Round:

   a. Round ductwork shall be furnished where shown or called for on the drawings, and may be substituted for rectangular, as an option to the Sheet Metal Sub-subcontractor when approved by the Engineer and shall be provided where shown on the Drawings.
   b. Round duct and fittings shall be of spiral lock seam construction and shall be fabricated from G-60 galvanized steel or 316 stainless steel. Galvanized steel shall meet ASTM A525 & A527 standards and stainless steel shall meet ASTM A240 and shall be fabricated in accordance with the following table.

SCHEDULE OF ROUND DUCTWORK CONSTRUCTION

Duct Diameter (inches)	0.0" to +10.0" WG		0.0" to -10.0" WG (Class B)			
	Galvanized		Galvanized		316 Stainless Steel	
	Ductwork	Fittings	Ductwork	Fittings	Ductwork	Fittings
3-8	26	22	24	20	24	20
9-14	26	22	22	18	22	18

4. Transitions

   a. Diverging airflow transitions shall be made with each side pitched out a maximum of 15 degrees, for an included angle of 30 degrees. Transitions for converging airflow shall be made with each side pitched in a maximum of 30 degrees, for an included angle of 60 degrees, or shall be as indicated. Factory-fabricated reducing fittings for systems using round duct sections when formed to the shape of the ASME short flow nozzle, need not comply with the maximum angles specified.

5. General Service Duct Connectors

   a. A flexible duct connector approximately 6-inches in width shall be provided where sheet metal connections are made to fans or where ducts of dissimilar metals are connected. For round/oval ducts, the flexible material shall be secured by stainless steel or zinc-coated, iron clinch-type draw bands. For rectangular ducts, the flexible material locked to metal collars shall be installed using normal duct construction methods. The composite connector system shall comply with UL 214 and be classified as "flame-retarded fabrics" in UL-01.

B. Ductwork Accessories

1. Access Doors in ductwork up to 2-inch pressure class.

   a. Frame: 24 gage galvanized steel with seal
   b. Door: hinged, with 24 gage galvanized steel exterior and interior panels.
   c. Locks: doors 16" and under, one lock doors over 16", two locks
   d. Seals: foam gasket
   e. Insulation: ½-inch foam board with aluminum foil face, 0.12K at 75°F.
   f. Ruskin Model ADH-2, Inland Steel, Miami-Carey or approved equal.

2. Splitters and Manual Volume Dampers

   a. Manual volume dampers shall be provided where shown on the Drawings at every branch take off from the main duct, and elsewhere as required by the Balancing Sub-subcontractor, and shall be single or multiple blade type with sleeve bearings, galvanized steel interlocking blades and a galvanized steel frame. In ducts over 15" deep provide multiple opposed blade type, gang operated dampers with a maximum blade width of 8". Damper blades shall be fabricated of 16-gauge steel with hemmed edges, and a maximum length of 48". Damper operating rod shall be full blade length extended through the duct to externally mounted bearing plates. On insulated ductwork, bearing plates shall be installed flush with insulation finish and fastened to the duct. Operating lever shall be of the indicating type with locking quadrant.

3. Blank off Plates

   a. Any blank off plates or conversions required for mounting control dampers or coils shall be the responsibility of the Sheet Metal Sub-subcontractor.

4. Insulated Metal Panels

   a. Provide 18-gauge, insulated double wall sandwich construction, 1½" thick where called for on the Drawings and for blanking off unused portions of wall louvers.

5. Test Openings

   a. Provide instrument test opening enclosures in the ductwork at the discharge of each fan and fan coil, inlet of each fan and fan coil, and where directed by the Balancing Sub-subcontractor. The enclosures shall be installed before the application of the insulation and shall be of the proper height to extend beyond the insulation. The attachment of the test opening enclosure shall be made airtight.

6. Flexible connections shall be 6" wide connections constructed of heavy glass fabric double coated with neoprene. Flexible connections shall meet the requirements of the National Board of Fire Underwriters.

C. Duct Sleeves, Framed Prepared Openings, Closure Collars

1. Duct Sleeves

   a. Duct sleeves shall be provided for round ducts 15-inches in diameter or less passing through floors, walls, ceilings, or roof, and installed during construction of the floor, wall, ceiling, or roof. Round ducts larger than 15-inches in diameter and square, rectangular, and oval ducts passing through floors, walls, ceilings, or roof shall be installed through framed prepared openings. The Contractor shall be responsible for the proper size and location of sleeves and prepared openings. Sleeves and framed openings are also required where grilles, registers, and diffusers are installed at the openings. Framed prepared openings shall be fabricated from 20-gauge galvanized steel, unless otherwise indicated. Where sleeves are installed in bearing walls or partitions, black steel pipe, ASTM A 53, Schedule 20 shall be used. Sleeve shall provide 1-inch clearance between the duct and the sleeve or 1-inch clearance between the insulation and the sleeve for insulated ducts.

2. Framed Prepared Openings

a. Openings shall have 1-inch clearance between the duct and the opening or 1-inch clearance between the insulation and the opening for insulated ducts.

3. Closure Collars

a. Collars shall be fabricated of galvanized sheet metal not less than 4-inches wide, unless otherwise indicated, and shall be installed on exposed ducts on each side of walls or floors where sleeves or prepared openings are provided. Collars shall be installed tight against surfaces. Collars shall fit snugly around the duct or insulation. Sharp edges of the collar around insulated duct shall be ground smooth to preclude tearing or puncturing the insulation covering or vapor barrier. Collars for round ducts 15-inches in diameter or less shall be fabricated from 20-gauge galvanized steel. Collars for round ducts larger than 15-inches and square, and rectangular ducts shall be fabricated from 18-gauge galvanized steel. Collars shall be installed with fasteners on maximum 6-inch centers, except that not less than 4 fasteners shall be used.

2.2 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Air Balance Inc.; a division of Mestek, Inc.
b. McGill AirFlow LLC.
c. Nailor Industries Inc.
d. Ruskin Company.

2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch thick.

6. Blade Axles: Galvanized steel.
7. Tie Bars and Brackets: Galvanized steel.

B. Jackshaft:

1. Size: 1-inch diameter.

2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.3 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Greenheck Fan Corporation.
2. Nailor Industries Inc.
3. Ruskin Company.
4. Young Regulator Company.

B. A Frames:

1. Angle shaped.
2. Galvanized-steel channels, 0.064 inch thick.
3. Mitered and welded corners.

C. Blades:

1. Multiple blade with maximum blade width of 8 inches.
2. Opposed-blade design.
3. Galvanized steel.
4. 0.064 inch thick.
5. Blade Edging: Closed-cell neoprene edging.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

D. Blade Axles: 1/2-inch- diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

2.4 EXHAUST FANS

A. Fans shall be tested and rated according to AMCA 210. Fans may be connected to the motors either directly or indirectly with V-belt drive. The sound power level values shall be obtained according to AMCA 300.

B. Centrifugal Type Power Roof Ventilators: Fans shall be driven with backward inclined, non-overloading wheel. Motor compartment housing shall be hinged or removable and weatherproof, constructed of heavy gauge aluminum. Fans shall be provided with bird screen, disconnect switch, motorized dampers, roof curb, and extended base. Motors enclosure shall be drip proof type.

2.5 ROOF CURBS

A. As supplied by equipment manufacturer for roof mounted equipment. Provide pre-fabricated adjustable curbs for duct penetrations.

B. Provide roof curbs shop-fabricated from 0.064-inch aluminum sheet with heliarc welded joints, integral cants, and flanges, and wood nailer. Sizes as indicated or as required for equipment.

C. Provide insulation liner of 1-1/2-inch minimum thickness glass fiber: NFPA 90A Standards, flame spread rating of 25 or less, smoke rating 50 or less; coated with neoprene or equal as protection from erosion.

2.6 AUTOMATIC TEMPERATURE CONTROLS

A. Basic Components and Systems:

1. General: Provide control products in sizes and capacities indicated, consisting of dampers, thermostats, clocks, sensors, controllers, and other components as required for completed installation. Except as otherwise indicated, provide manufacturer's standard materials and components as published in their product information, designed and constructed as recommended by manufacturer and as required for application indicated. All equipment and systems shall be installed by factory trained contractors with the following functional and construction features.

B. Controls Systems Wiring

1. All conduit raceways, wiring, accessories and wiring connections required for the installation of the Controls Systems shall be provided by the Controls Contractor except as shown on the Electrical Drawings. All wiring shall comply with the requirements of applicable portions of the Electrical Section 16101, ELECTRICAL WORK and all local and national electric codes and the requirements of the AHJ.
2. All Controls Systems wiring materials and installation methods shall comply with the original equipment manufacturer recommendations and standards.
3. The sizing type and provision of cable, conduit, cable trays and raceways shall be the design responsibility of the Controls Contractor.
4. Class 2 Wiring

    a. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
    b. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5 ft. from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines.

5. Class 2 signal wiring and 24VAC power may be run in the same conduit. Power wiring 120VAC and greater shall not share the same conduit with Class 2 signal wiring.
6. Perform circuit tests using qualified personnel only. Provide necessary instruments and equipment to demonstrate that:

    a. All circuits are continuous and free from short circuits and grounds.
    b. All circuits are free from unspecified grounds; that resistance to ground of all circuits is no less than 50 megaohms.
    c. All circuits are free from induced voltages.

7. Provide complete testing for all cables and wiring. Provide all equipment, tools, and personnel as necessary to conduct these tests.
8. Provide for complete grounding of all signal and communication cables, panels and equipment so as to ensure integrity of Controls Systems operation. Ground cabling and conduit at panel terminations. Do not create ground loops.

C. DDC & HVAC Mechanical Equipment Controllers

1. DDC and HVAC Mechanical Equipment Controllers shall use the same programming language and tools as existing controller and shall be compatible with existing system. DDC and HVAC Mechanical Equipment Controllers which require different programming language or tools on a network are not acceptable.
2. DDC and HVAC Mechanical Equipment Controllers which do not meet the functions specified are not acceptable.

D. Current Sensing Relay:

1. Provide solid-state, adjustable, current operated relay. Provide a relay which changes switch contact state in response to an adjustable set point value of current in the monitored A/C circuit.
2. Adjust the relay switch point so that the relay responds to motor operation under load as an “on” state and so that the relay responds to an unloaded running motor as an “off” state. A motor with a broken belt is considered an unloaded motor.
3. Provide for status device for all fans and pumps.

2.7 SETPOINT AND SEQUENCE OF OPERATIONS

A. Exhaust Fans: Exhaust fans are started and stopped based on a time of day schedule. On a call to start, respective dampers (where applicable) will open and fan will be energized. If unit fails to start, as sensed by current sensor, an alarm will be generated.

PART 3 - EXECUTION

3.0 GENERAL

A. Install all items specified under PART 2 - PRODUCTS, according to the applicable manufacturer's recommendations and shop drawings, the details shown on the drawings and as specified under this Section. Provide all required hangers and supports.

3.1 SPECIAL RESPONSIBILITIES

A. Perform work such that progress of entire project including work of other Sections shall not be interfered with or delayed.

B. Provide information as requested on items furnished under this Section which shall be installed under other Sections.

C. Obtain detailed installation information from manufacturers of equipment provided under this Section.

D. Obtain final roughing dimensions or other information as needed for complete installation of items furnished under other Sections or by Owner.

E. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other Sections. Give full information so that openings required by work of this Section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at own expense and to full satisfaction of Architect.

F. Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor-mounted vibrating and rotating equipment provided under this Section.

G. Maintenance of equipment and systems: Maintain equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal

H. Remove and dispose of dirt and debris, and keep premises clean. During progress of work, remove equipment and unused material. Put building and premises in neat and clean condition, and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Architect.

3.2 MISCELLANEOUS

A. Unload materials and equipment delivered to site. Pay costs for rigging, hoisting, lowering and moving electrical equipment on and around site, in building or on roof.

3.3 COORDINATION

A. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades. If installation without coordination causes interference with work of other trades, Contractor shall correct conditions without extra charge.

B. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.

3.4 BALANCING, ADJUSTING, OPERATING, AND INSTRUCTIONS

A. Engage a balancing company to adjust, balance, and operate the heating, ventilating and air-conditioning system and thoroughly instruct the Owner's personnel in all phases of care and operation of the systems. The Balancing Company shall be certified by Associated Air Balance Council or by the National Environmental Balancing Bureau.

B. Before the air systems are tested and balanced, ducts and equipment shall be thoroughly cleaned by the contractor so that no dirt, dust, or other foreign matter will be deposited in or carried through the systems. For this purpose, cheesecloth shall be placed over each opening for entraining such particles during the cleaning operation.

C. The Contractor as a part of this contract shall provide all materials, labor, and service of all subcontractors for fulfillment of air balancing of all systems. The Balancing Company shall inform Contractor of all requirements ahead of time.

D. All equipment shall be operated and adjusted and all air systems shall be adjusted and balanced, readings taken and recorded on an approved form submitted to the Engineer for approval, readjusted and balanced again in accordance with the Engineer's review comments and resubmitted.

3.5 AIR SYSTEMS

A. Systems shall be adjusted and balanced so that air quantities at outlets are as indicated on the drawings and so that the distribution from supply outlets is free from drafts, and uniform over the face of each outlet.

B. Adjustments shall be made by the Balancing Company to volume dampers at air outlets to produce the least pressure drop consistent with volume requirements.

C. After completion of balancing and adjusting, settings of dampers, shall be permanently marked by the Balancing Company so that they can be restored if disturbed at any time.

D. Direct reading velocity meters may be used by the Balancing Company for comparative adjustment of individual outlets, but air quantities in ducts have velocity of 1,000 feet per minute or greater, shall be measured by means of pitot tubes and inclined gauge manometers. Instrument test opening enclosures as specified shall be provided as required.

E. Adjustment of the temperature controls shall be coordinated by the person in charge of the balancing and adjusting and shall be performed coincidental therewith. In conjunction with the Automatic Temperature Control System, simulate a complete cycle of operation for each system.

F. After completion of the testing, balancing and adjusting of the air systems, six copies of a report showing the following information shall be submitted to the Engineer for review and approval. The report shall be arranged as follows:

G. Location of each air outlet or inlet.

H. Dimensions or size of each outlet or inlet.

I. Type: diffuser, grille, register, supply, return exhaust, and Ak value for each.

J. Cfm of air as indicated on drawings for each outlet or inlet.

K. Cfm of air as measured, after each complete system has been balanced and adjusted, for each outlet or inlet.

L. After each complete system has been balanced and adjusted, the total cfm at fan discharge, static pressure at fan outlet, total static pressure for apparatus, fan speed, motor amperage for each phase and voltage shall be listed.

3.6 TESTING

A. All hot water piping in whole or in part, prior to insulating and being closed in, shall be subject to a hydrostatic test pressure of 100-psig for eight hours without a pressure drop at the end of the test period. All leaks that occur shall be repaired by removing the joints in their entirety, rejoining, and test repeated as often as necessary until the piping system or systems are absolutely tight.

B. Furnish all necessary equipment to conduct the testing of the piping system.

C. Two pressure gauges shall be used whose range shall not exceed 0 to 150-psig, nor less than 0 to 120-psig. Evidence of leakage or pressure drop shall be cause for rejection.

D. A log of all tests shall be kept by the Contractor. The log shall provide a description of the test or inspection, the date performed, and the signatures of the responsible contractor's person performing the work and the witnessing engineer. This log shall form part of the final documentation. Failure to maintain this log will result in re-inspection or testing at the Contractor's expense.

E. Test all electrical controls in accordance with respective installation manuals

3.7 SHEET METAL WORK

A. All of the sheet metal work shall be done by contractors regularly engaged in this type of work.

1. Fabrication, installation, sealing, protecting and testing of all ductwork and duct liner shall comply with the most recent publications from the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) including but not limited to the following:

   a) SMACNA Duct Cleanliness for New Construction Guideline: This project must comply with SMACNA Duct Cleanliness Guidelines Advanced Level.
   b) SMACNA HVAC Duct Construction Standards - Metal and Flexible
   c) SMACNA Air Duct Leakage Test Manual

2. Neatly erect all sheet metal work as shown on plans or as may be required to carry out the intent of these plans and specifications.
3. All necessary allowances and provisions must be made by this subcontractor in the case of beams, posts, pipes, iron work or other obstructions in the construction of the building or the work of other trades whether or not the same is shown on plans.
4. All ducts are to be rigid and are to be strongly and carefully supported with suitable braces or angles to keep them true to shape and to prevent buckling.
5. All joints are to be made tight and all interior surfaces are to be made smooth.
6. Protect all work under this Section from damage during the progress of erection and until final acceptance by the Architect.
7. All metal work in dead or furred down spaces is to be erected in time to occasion no delay in the work of other trades on the building.
8. Supply collars to diffusers shall be installed inside the neck of the diffusers. Dampers on all registers and diffusers shall be installed in the open position.
9. Joints in all ductwork throughout shall be sealed per Seal Class as specified in Ductwork in Section 2 of this specification. All ductwork shall be taped and sealed.
10. During the progress of the work and after the completion of the same, this Subcontractor shall remove from the premises all dirt, debris, rubbish, waste materials, etc., cause by him in the performance of this work, together with all his tools and appliances.

END OF SECTION

SECTION 16101

ELECTRICAL WORK

(Filed Sub-bid Required)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."

1.2 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 1 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

B. Time, Manner and Requirements for Submitting Sub-Bids:

1. Sub-bids for work under this Section shall be for the complete Work of this Section and shall comply with the requirements of M.G.L., c. 149, §44F. and shall be filed in a sealed envelope with the TOWN OF MILLBURY at a time and place as stipulated in the "INVITATION FOR BIDS".

   The following should appear on the upper left hand corner of the envelope:

   Name of Sub-Bidder: _____
   _____
   _____

   Project: MILLBURY HIGH SCHOOL –
   FOODS PROGRAM ROOM RENOVATIONS
   Millbury Memorial Junior/Senior High School
   12 Martin Street
   Millbury, Massachusetts 01527

   Sub-Bid for Section: 16101, ELECTRICAL WORK

2. Each sub-bid submitted for work under this Section shall be on forms furnished by the AWARDING AUTHORITY as required by Section 44F of Chapter 149 of the General Laws, as amended. Sub-bid forms are included in this Project Manual or may be obtained at the office of the Architect.

3. Sub-bids filed with the AWARDING AUTHORITY shall be accompanied by BID BOND or CASH or CERTIFIED CHECK or TREASURER'S CHECK or CASHIER'S CHECK issued by a responsible bank or trust company payable to the TOWN OF MILLBURY in the amount of five percent of the sub-bid. A sub-bid accompanied by any other form of bid deposit than those specified will be rejected.

1.3 SUB-BID REQUIREMENTS

A. Each Sub Bidder shall list in Paragraph E of the "Sub Bid Form" the name and bid price of each person, firm or corporation performing each class of work or part thereof for which the Section of the Specifications for the Sub-Trade requires such listing, provided that, in the absence of as contrary provision in the Specifications, any Sub Bidder may, without listing any bid price, list his own name in said Paragraph E for each such class of work or part thereof and perform that work with persons on his own payroll, if such Sub Bidder, after Sub Bid openings, shows to the satisfaction of the Awarding Authority, that he does customarily perform such class of work or the part thereof with persons on his own payroll and is qualified to do so. This Section of the Specifications requires that the following class(es) of work shall be listed in Paragraph E under the conditions herein.

CLASS OF WORK	REFERENCE PARAGRAPHS
None Required Under This Section	

1.4 DESCRIPTION OF WORK

A. Work shall be inclusive but not limited to the removal of the existing electrical systems within the renovated Foods Program room. Installation of a new lighting and power systems to support the renovated area.

1. Labor, supervision, materials, tools, scaffolding, equipment, supplies, transportation and services for a complete and operational electrical system as specified shall be provided.
2. Materials and equipment shall be installed in accordance with standards of the National Electrical Code, local codes, safety codes and ordinances.

B. Alternates: Not Applicable.

C. Items to Be Installed Only: Not Applicable

D. Items To Be Furnished Only:

E. Reference To Drawings: Work specified in ELECTRICAL WORK is subject to provisions of Section 44A to 44L inclusive, of Chapter 149 of General Laws of the Commonwealth of Massachusetts, as amended, and are indicated on the following Contract Drawings:

1. Drawings T-1.0, T-1.1, D-1.2, A-1.2, A-2.2, A-3.1, A-4.1, H-0.0, H-1.1, H-2.1, P-0.1, P-0.2, P-1.1, ED.1, and E1.1.
2. This Subcontractor shall carefully inspect all Drawings, not just those pertaining particularly to his sub-trade unless specifically called for otherwise, regardless of where among the Drawings it appears.

F. Related Work:

1. Examine all other sections of the Specifications and all drawings for the relationship of the work under this Section and the work of other trades. Cooperate with all trades and coordinate all work under this section therewith.
2. The following related items are not included in this Section and will be performed under the designated Sections:

a. Major cutting and patching.

b. Firestopping of all penetrations where necessary in rated walls and ceilings: see Section 07840 FIRESTOPPING for acceptable material to be used on the exterior of the sleeve and around wires to be used by this Contractor. The Electrical Contractor shall be responsible for all firestopping of the interior and exterior of raceways installed through walls and floors.

1.5 EXAMINATION OF SITE

A. Before submitting a Bid, this Contractor must visit the job site to determine the conditions under which the work is to be done.

1.6 DRAWINGS AND SPECIFICATIONS

A. Drawings and specifications are complementary to each other. Any labor and material which is called for by either, whether or not by both, or which is necessary for the successful operation of all systems, shall be furnished and installed. Discrepancies should be brought immediately to the attention of the Architect.

B. Plans and specifications for this project should be examined to determine the scope and character of the work, the building design and function, and the required coordination with the General Contractor and other Trades before and during construction.

C. Any questions regarding the plans and specifications shall be addressed in writing to the Architect five (5) days before Bids close; otherwise, after the closing of the Bids, the Architect's interpretation of the meaning and intent of the plans and specifications shall be final.

D. This Contractor shall prepare an electrical set of coordination drawings to overlay with all other Trades. Drawings shall be prepared on translucent drawings to properly coordinate all of the other equipment to be installed. Prior to any installations, the Electrical Contractor must receive approval of drawings from the Architect.

1.7 INSURANCE

A. Insurance is to conform to the provisions and requirements as set forth in the CONDITIONS OF THE CONTRACT and Division 1.

1.8 CHANGES AND REVISIONS

A. Costs for changes and/or revisions shall be submitted to the General Contractor with material and labor breakdown of charges and credits clearly itemized.

B. Work shall not be executed until approval has been received in writing from the Architect.

1.9 WORKMANSHIP

A. Materials shall be new and shall conform to the standards of UL, Inc., in every case where such a standard has been established for the particular type of material in question. Work shall be executed in a workmanlike manner and a competent Foreman shall be provided for the entire project.

B. After wires are pulled in and fixtures and equipment are installed, this Contractor shall make tests for performance, grounds, etc., and shall immediately remedy any defects. Equipment for tests shall be provided by this Contractor.

C. Work under this Contract must be so performed that the progress of the entire project, including work of all Trades, shall not cause delays or interference. Materials and apparatus shall be installed as fast as the condition of the building will permit.

D. It will be the responsibility of the Electrical Foreman to instruct the Owner in the function, operation and maintenance of electrical systems and equipment. This is to be done upon completion of the installation, before leaving the job site and to the satisfaction of the Owner, Engineer, and Architect.

1.10 MANUFACTURERS' NAMES AND TRADE NAMES

A. Throughout the specification types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of performance and quality, and not to limit competition.

1.11 MATERIAL STORAGE AND OFFICE SPACE

A. This Contractor shall maintain at his own expense, where directed on the premises, neat covered storage for material and equipment, and office space where drawings and specifications shall be kept for records.

B. Equipment or material damaged during the construction period shall be replaced at this Contractor's expense.

1.12 GUARANTEE

A. Materials and labor incorporated in the work are to be guaranteed against defects for a period of one (1) year from date of substantial completion. This Contractor shall correct such defects that occur within the guarantee period and to the satisfaction of the Architect without cost to the Owner, within a twenty-four (24) hour period.

B. This Contractor shall not be responsible for failures through normal usage, nor for those caused by neglect or abuse on the part of the Owner or his employees.

1.13 CUTTING AND PATCHING

A. This Contractor as part of his work, and without extra charge, shall do fitting and minor cutting required for conduit four (4) inches and under. Cutting over four (4) inches and patching will be by the General Contractor. The General Contractor shall be responsible to cut and patch the proposed wall section to allow for the new recessed branch circuit panel to be installed under the direction of the Electrical Contractor. Costs for openings required due to lack of coordination shall be the responsibility of this Contractor.

1.14 OPERATING INSTRUCTIONS

A. This Contractor shall furnish electronic PDF copies of the Operating and Maintenance Manuals outlining in detail the operational features of the following systems:

1. Lighting
2. Metal raceway system.
3. Cable.
4. Wiring devices and cover plates.

1.15 PERMITS

A. This Contractor shall obtain and pay for permits for the electrical systems on this project.

1.16 RECORD DRAWINGS

A. A set of record drawings shall be maintained at the job site for reference by the Engineer and Architect. Weekly, the Electrical Foreman will note changes and review drawings periodically with the Engineer. Changes, including feeders, lighting, power, panel schedules and other schedules shall be recorded on the drawings. At the conclusion of the construction this Contractor shall order from the General Contractor a compact disc with all drawing files. All changes shall be made on the disc and shall be compatible to that of AutoCad 2020.

1.17 TEMPORARY LIGHT AND POWER

A. This Contractor shall furnish, install, maintain and remove at completion of work all necessary temporary electrical distribution wiring.

B. Temporary service shall feed to the existing branch circuit panels currently located within the facility.

C. Temporary light shall be based on 100W lamp or LED equivalent for rooms up to 500 sq. ft. and two (2) 200W lamps for every 1000 sq. ft. or fraction thereof. All lamps shall be furnished and replaced by this Contractor.

D. Panelboards, switches, receptacles, and accessories required for temporary light and power installation shall be provided.

E. Outlets shall be located at convenient points so that extension cords of not over fifty (50) feet will reach work requiring temporary light and power.

F. The General Contractor and Subcontractors, individually, shall furnish cords, sockets, motors and accessories for their work.

G. Temporary wiring, service equipment and accessories thereto installed, shall be removed at the expense of this Contractor after they have served their purpose.

H. Temporary work shall be furnished and installed in conformance with OSHA, local codes and ordinances.

1.18 DEFINITIONS

A. The terms "This Contractor", "Electrical Contractor", "Electrical Subcontractor", or "This Section" all refer to the work of this Section 16101, ELECTRICAL WORK.

1.19 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. The General Contractor shall provide and pay for all dumpster services during the entire construction period. Suppliers and Sub-Contractors to bring all rubbish and debris to the dumpster location daily. No costs are to be assessed to the suppliers or Sub-Contractors by the General Contractor for this service.

B. The General Contractor, Sub-Contractors and suppliers, individually, shall furnish their own staging, scaffolding, and hoisting equipment to get workers, material and equipment from the point of delivery at the project site to the point of use or installation within the building and project site.

1.20 WORK CONDITIONS/SEQUENCE

A. If Sub-Contractors find that conditions are not appropriate for them to begin the work of their trade of if they are directed to perform their work out of sequence by the General Contractor, or if the General Contractor directs Sub-Contractors to start and continue regardless of job conditions, the Sub-Contractor shall notify the Architect in writing by certified mail immediately.

PART 2 - PRODUCTS

2.1 RACEWAYS AND FITTINGS

A. Rigid conduit shall be heavy wall hot dipped, galvanized: Midland-Ross, Wheatland or Republic.

B. Minimum size of conduit used shall be 3/4" with no more than 9-#12 conductors. All circuits shall have separate neutrals and grounds.

C. Electrical Metallic Tubing (EMT) shall be mild steel, electrically welded, galvanized, Midland-Ross, Wheatland or Republic.

D. Conduit shall be kept at least six (6) inches away from adjacent copper piping or other copper work on the project.

E. During construction, ends of conduit shall be kept tightly plugged to exclude plaster, dirt, dust, moisture and debris.

F. Ends of conduit entering boxes shall be equipped with galvanized locknuts or bushings. Cut ends of conduit shall be reamed free of burrs and sharp edges.

2.2 FIREPROOFING AND CONDUIT SEAL

A. The Electrical Contractor is responsible for all fireproofing where necessary of raceways through floors and walls.

B. The material to be used for fire-stopping shall be 3M moldable fire rated putty or 3M #CP25WB caulk to fire-stop penetrations in fire rated areas of walls and floors.

2.3 WIRING SYSTEM

A. Wiring shall be installed concealed in the construction. Wiring underground or in concrete slabs shall be installed in heavy wall or rigid conduit.

B. Joints in wiring shall be made with approved type solderless connectors of the self-insulating type with an insulation equal to that of the conductors being joined. They shall be Minnesota Mining & Manufacturing Co., Type "Y", "R" or "B" Scotchlok, T&B Twist-on-Piggy or TUB one-piece, pressure type, self-insulating wire joint.

C. All branch circuits shall have separate grounds and neutrals.

2.4 WIRE

A. Unless otherwise specified, conductors installed in conduit shall be Type THW or THHN, 600V, 90 degree C. – Rome Cable. Conductors shall be copper.

B. MC shall be Type THHN #12 copper conductors or as noted on the drawings.

C. Covering of wires and cables designed to meet the above specifications shall have distinctive markings as required by the latest standards of UL, Inc., making them readily identifiable in the field.

2.5 GROUNDING

A. The entire system shall be grounded in accordance with the National Board of Fire Underwriters', State and local requirements.

B. This Contractor shall furnish and install an equipment ground wire in feeder runs to meet requirements of the National Electrical Code.

C. All branch circuits shall have separate neutrals and grounds.

2.6 OUTLET BOXES

A. Outlet boxes shall be Steel City, Appleton, or Raco, galvanized of a type best adaptable to their respective use and in general four (4) square or octagon. Boxes in plaster areas shall be equipped with plaster rings or trim. Studs of suitable size for proper support shall be provided in boxes from which fixtures are to be hung.

B. Boxes installed in tile, block or similar finished walls shall be solid flush type, square cornered, without ears, 1-2-3 and 4-gang as required - Raco, Steel City or Appleton.

C. Outlet boxes shall be provided with only the holes necessary to accommodate conduit connected. Boxes shall be furnished with lugs, ears, covers and/or outlet devices for attachment.

D. Plastic boxes are NOT acceptable.

2.7 PULL AND JUNCTION BOXES

A. Pull and junction boxes shall conform to requirements of the National Electrical Code. They shall be galvanized code gauge steel construction with removable cover plate secured by 1/4" brass machine screws. Junction boxes shall be supported to the building structure.

2.8 SLEEVES

A. It shall be the responsibility of this Contractor to furnish and install sleeves through floors, walls, rated assemblies, etc., where necessary.

B. Sleeves shall be sealed with UL, Inc., approved fire rated material after wires have been installed. Refer to FIRESTOPPING Section.

2.9 WIRING DEVICES

A. Switches shall be Hubbell Co. #DS120-color single pole, DS320-colr three way, DS420-color four way Leviton, General Electric or Cooper

B. Tamper proof resistant receptacles shall be Hubbell. Co. DR20-COLOR-TR series or equal.

C. Ground fault receptacles shall be Hubbell GF5352-color or equal.

D. Range outlet shall be Hubbell Co. or equal #HBL936X series. Leviton, General Electric or Pass & Seymour. Coordinate with the owner to determine the plug NEMA configuration prior to purchasing.

E. Grounded type duplex receptacles shall be used. Provide ground path either by continuous metal conduit or separate conductor. Flush mounted receptacles shall have ground connection from terminal screw of the receptacle to the outlet box.

F. Plates in general shall be phenolic plastic – color selection by the architect.

G. Mounting height from center to finish floor, unless otherwise noted, shall be as follows for wiring devices:

Switches, in general .....48"
Receptacles, in general .....18"
Receptacles with X - See Architectural details for mounting height above counter.

H. All device plates for all switch controls, receptacles, etc., shall be labeled on the outside of the device plate indicating the panel designation, circuit number and voltage using a Brady style adhesive lettering tool. Handwritten designations on the front face will not be acceptable.

2.10 SYSTEM OF LIGHT AND POWER

A. Secondary distribution system is 277/480V and 120/208V, 3 phase, 4 wire, 60 HZ AC.

2.11 CIRCUIT BREAKERS

A. Circuit breakers for lighting and small power loads shall be bolt-on thermal magnetic, quick-make, quick-break, trip free and sized as designated on drawings. Connect to spare or new to match the existing manufacturer and AIC ratings.

2.12 LIGHTING SYSTEM

A. Provide and install the complete lighting system from the lighting outlets including wire, conduit, feeders, flexible wiring system, outlet boxes, junction boxes, wiring devices, lighting fixtures and related drivers.

B. Include labor and fittings necessary for the complete installation of fixtures. Steel rod, support wire, or chain hangers and mechanical suspension channel shall be furnished and installed. Light fixtures are to be hung to the building structure and not to the metal roof or floor decking.

C. Where recessed lighting fixtures are to be installed in plaster ceiling, plaster rings and frames shall be installed under this Section of the specification.

D. Recessed LED lighting fixtures shall be supported by wire or chain hangers by this Contractor and shall not depend on the ceiling hangers to support the weight of the fixtures

E. Unless otherwise detailed on the electrical drawings, a framed opening shall be provided under another section of the specification for recessed lighting fixtures to be installed in the ceiling.

F. LED drivers shall meet applicable ANSI Standards for harmonic distortion surge protection. All ballasts and LED drivers shall be of one manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION AND COORDINATION

A. This Contractor shall inspect surfaces and areas that will receive his material and the job conditions as they exist and report any conditions that may adversely affect his work. Notify Architect or General Contractor of unsuitable conditions.

B. Coordinate work with construction schedule and job progress.

C. This Contractor shall confer with the General Contractor and other Trades to coordinate his work and to properly locate systems to avoid conflict and interference.

D. Any interference with the work of other Trades or with architectural or structural details shall be brought to the attention of the Architect for decision before installation. Contractor's failure to so coordinate his work will not relieve him of the responsibility to correct work to suit building conditions.

3.2 INSTALLATION

A. Installation shall be by skilled workmen using proper equipment. Commencement of work shall be deemed as acceptance of existing conditions by installer.

B. Entire application shall be in strict accordance with manufacturer's recommendations and the standards of the National Electrical Code, local codes and ordinances, OSHA safety codes and regulations.

C. After wires are pulled in and all fixtures are installed, this Contractor shall make tests for performance, grounds, etc., and shall immediately remedy defects. Equipment for tests shall be borne by this Contractor.

D. Work under this Contract must be so performed that the progress of the entire project, including work of all Trades shall not cause delays or interference. Material and apparatus shall be installed as fast as condition of the building will permit.

3.3 RACEWAYS AND FITTINGS

A. Conduit and wiring shall be installed concealed in the construction where possible. Conduit shall be installed in a neat, workmanlike manner and run parallel to building walls. Conduit size shall be minimum 3/4".

B. Conduit installed underground or under concrete slabs shall be painted with Rustoleum protective compound before installation, touched up and sealed to exclude water entering conduit after installation.

C. During building construction ends of conduit shall be tightly plugged to exclude plaster, dirt, dust and moisture.

D. Ends of conduit entering boxes shall be equipped with galvanized locknuts and bushings. Cut ends of conduit shall be reamed free of burrs and sharp edges.

E. Electrical metallic tubing couplings and terminations in outlet boxes, junction boxes, panelboard cabinets, etc., shall be secured thereto for grounding by means of raintight and concrete-tight fittings of the interlocking compression ring or stainless steel, multiple joint locking type. Set screws or indentations will be acceptable as a method of attachment of fittings to conduit or EMT.

3.4 WIRING

A. Joints in wiring shall be made with approved type solderless connectors.

B. All branch circuits shall have separate neutrals and grounds.

3.5 WIRE

A. Wire #8 and larger shall be stranded and no wire less than #12 shall be used, unless otherwise noted.

B. This Contractor may use MC cable with THHN conductors where allowed by code. No wiring less than #12 AWG shall be used.

C. NM Type cable shall NOT be used.

3.6 OUTLET BOXES

A. Ceiling boxes shall be supported to carry the weight of fixtures which are to be hung.

B. Boxes in poured concrete slab ceilings shall be four (4) inch concrete type as required by slab thickness with complete back plate and support.

C. Outlet boxes shall be provided with only the holes necessary to accommodate the conduits being connected. Boxes shall be furnished with lugs or ears for attachment of covers and/or outlet devices.

3.7 WIRING DEVICES

A. Grounded type duplex receptacles shall be used. Provide ground path either by continuous metal conduit or separate conductor.

B. Receptacles with X typical for above counter or special mounting height. Refer to the Architectural Drawings for these locations and details before installation.

3.8 LOCATION OF OUTLETS

A. Outlets shall line up with items above and be centered on wall. Add supports as required for this purpose. Do not mount on nearest studs.

B. Architect or Engineer has the right to move outlets a reasonable distance.

C. This Contractor shall check any questionable outlet before installation.

D. This Contractor shall review drawings for exact location of receptacles mounted above counter or for special purpose. Dimensions shall be taken from Architectural drawings not from Electrical.

3.9 HANGERS AND SUPPORTS

A. Lighting fixtures shall be hung independent of the ceiling system.

B. Recessed fixtures shall be supported from two (2) one-quarter (1/4") inch steel rod supports or chain or wire hangers having the same strength designed for the purpose.

C. Surface fixtures shall be supported from 1/4" rods.

D. Wiring above the ceiling shall be supported to conform to code.

3.10 INSTRUCTIONS TO OWNER

A. It shall be the responsibility of the Electrical Foreman to instruct the Owner in the function, operation and maintenance of electrical systems and equipment.

3.11 CLEANUP

A. Stains and/or damage to the finish of the building caused by faulty workmanship and/or improper handling of material in regard to installation shall be cleaned or removed and replaced at no cost to the Owner.

B. Panels and like shall be cleaned and left in a neat manner and where required shall be painted if any finish material has been removed.

C. Temporary wiring shall be removed.

D. Lighting fixtures shall be left clean. Lenses shall not be installed until areas are completed and free from dust and dirt.

3.12 FIRESTOPPING

A. The Electrical Contractor shall be responsible to fire stop all the raceways and the interior and exterior of all sleeves through which wires penetrate walls, floors or any other penetrations requiring firestopping material under this Section.

END OF SECTION